

Assessment
2016

West Africa coastal areas

GENERAL DOCUMENT



2017

This document has been developed by the West African Coast Observation Mission with the support of the Centre for Ecological Monitoring (CSE) and the International Union for the Conservation of Nature (IUCN) as part of the implementation of UEMOA Regional Coastal Erosion Control program and the enforcement of article 10 of the Abidjan convention related to coastal erosion control through the implementing agency agreement entered into between UEMOA and CSE in November 2012.

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Acronyms and abbreviations

AFD	French Development Agency
ALTTFP	Abidjan Lagos Trade and Transport Facilitation Project
CBD	Convention on Biological Diversity
CSE	Center for Ecological Monitoring of Dakar
DAC OECD	Development Aid Committee and Organization for Economic Cooperation and Development
DAL	Coastal Development Guidelines
DC	Developing Countries
DFI	Direct Foreign Investments
ECOWAS	Economic Community of West African States
EEZ	Exclusive Economic Zone
EITI	Extractive Industries Transparency Initiative
FFEM	French Facility for Global Environment
GDP	Gross Domestic Product
GEF	Global Environment Facility
HDI	Human Development Index
HISC	Highly Indebted Small Countries
ICAM	Integrated Coastal Area Management
IDA	International Development Association
IHDI	Inequality-adjusted Human Development Index
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature
IRD	Research Institute for Development
JICA	Japan International Cooperation Agency
MOLOA	West African Coast Observation Mission
MPA	Marine Public Area
NDF	Nordic Development Fund
PACO	IUCN Central and West Africa Program
PDALM	Master Plan for Development of the Mauritanian Coast
PMA	Protected Marine Area
PRCM	Regional Program for the Conservation of Coastal and Marine Areas in West Africa
PRLEC	West Africa Regional Coastal Erosion Control Program
RAMPAO	Regional Network of Marine Protected Areas in West Africa
REDD	Reducing emissions from deforestation and forest degradation
SDAU	Urban Development Master Plan
SDLAO	West African Coastal Master Plan
SNIM	Mauritania National Industrial and Mining Company
TEU	Twenty-Foot Equivalent Unit
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
WACA	West African Coastal Areas Management Program
WAEMU	West African Economic and Monetary Union
WII	Wetlands of International Importance – Ramsar site
WWF	World Wide Fund for Nature

1. Introduction

ASSESSMENT 2016 WEST AFRICA COASTAL AREAS
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Even though West African States are now experiencing rapid growth in different ways, this growth is directly translated into increasing stakes and therefore risks on the Western African Atlantic Coast. This increase in stakes is combined with the increase in the frequency and intensity of coastal hazards.

The shoreline monitoring study and the Master plan for the Management of the West African coastal area (SDLAO) were published in 2011. The Environment Ministers meeting held in Dakar in May 2011 marked, through the Dakar Declaration (see Annex I), a regional awareness and high-level political commitment on coastal risk issues and the procedures for their integration. The establishment of the West African Coast Observation Mission (MOLOA) immediately after the validation of the SDLAO allowed for monitoring the development of hazards and stakes over the 11 000 km coast of the 11 SDLAO partner countries.

The prospective study conducted in 2010 with the target dates of 2030 and 2050 showed the extremely rapid development of human occupancy in large areas of these coastal zones. In fact, the major trends observed both at the demographic and economic levels now seem to be fully confirmed by the developments noted between 2010 and 2015. The forecasts on climate change impacts, updated through the 5th report of the Intergovernmental Panel on Climate Change (IPCC), are also a source of concern, and some recent events in various parts of the West African shoreline confirm this worrying trend.

The preparation of this 2016 assessment of the status of the West African coastal areas involved all the members of the West African Coast Observation Mission (MOLOA) Regional Coordination, established by the Center for Ecological Monitoring in Dakar (CSE), MOLOA scientific committee members, supported by the Coastal Expert Group of IUCN Ecosystem Management Commission and the Marine and Coastal Program of IUCN for Central and West Africa.

This review, which takes place during the same period as the COP 21 of the United Nations Framework Convention on Climate Change, proposes an update of the SDLAO's detailed issues. This update is the result of the work carried out by the network set up under the MOLOA, which brings together the national offices of the 11 coastal states, from

Mauritania to Benin¹.

This work is proportionate to the resources made available by the West African Economic and Monetary Union (UEMOA). In this context, MOLOA's national offices did not have a specific budget and were therefore required to deploy their activities to the extent of their own resources supported for regional meetings through the coordination of MOLOA.

This work focuses on the main developments over the period 2010-2016. It is accompanied by an updated map of the SDLAO at a scale of 1/500,000th. The extension of knowledge and the establishment of a regional vision of the great changes that shape the future shorelines of West Africa allow today an update of the scenarios which helps outline potential relevant adaptation strategies to climate change impacts in the West African context.

The updated assessment of West Africa coastal areas addresses current changing pressures on coastal systems (Chapter 3) and the responses of States to cope with these pressures (Chapter 4). These elements are preceded by a general context (Chapter 2), which includes an updated review on the prospect made during the SDLAO in 2010.

In terms of adaptation and reduction of coastal risks on this shoreline, the "SDLAO Master Plan" (document 1) remains highly relevant, as it proposes guidelines for the development of effective adaptation policies. However, this being a recent issue, adaptation doctrines are rapidly changing. Some recommendations on approaches to coastal climate change adaptation and coastal risk reduction are proposed in Chapter 5.

This updated work also includes an update of the SDLAO mapping presented in 9 sheets of A1 format. An updated version of the detailed master plan, presented in an appended document, includes the changes observed across the 179 coastal segments identified during the SDLAO and confirmed during regional technical seminars organized by MOLOA. This update was complemented in particular by the inclusion of protected areas with marine and/or coastal right-of-way classified or in the process of classification and main coastal protection structures.

¹ Mauritania, Senegal, Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Ghana, Togo and Benin.

Finally, this work comes at the end of MOLOA's initial operational program which lasted three years and enabled the establishment of a regional network that is now operational.

MASTER PLAN FOR THE MANAGEMENT OF WEST AFRICAN SHORELINE AND ESTABLISHMENT OF MOLOA

The regional study for shoreline monitoring and drawing up a development scheme for the West African coastal area was launched by UEMOA as part of the regional program to combat coastal erosion (PRLEC-UEMOA), the subject of Regulation 02/2007/CM/UEMOA, adopted on April 6, 2007. This decision also follows on from the recommendations of the Conference of Ministers in charge of the Environment dated April 11, 1997 in Cotonou. The meeting of Ministers in charge of Environment, held on January 25, 2007 in Cotonou approved this Regional Coastal Erosion Program in its conclusions.

This study is implemented by IUCN as part of its Marine and Coastal Program for Central and West Africa (MACO), as a thematic component of IUCN's Program for Central and Western Africa (PACO). The MACO Program benefited from the support of the Coastal Expert Group of IUCN's Ecosystem Management Commission (CEM).

UEMOA is the contracting owner of the study, in this instance through PRLEC-UEMOA coordination of the UEMOA Commission. The work was conducted under the supervision of:

- ⇒ PRLEC-UEMOA Regional Steering Committee is set up to improve the orientation of the different projects and ensure their diligent and effective execution. This is presided over by the State, which holds the presidency of the Council of Ministers of UEMOA.
- ⇒ The PRLEC-UEMOA Regional Scientific Committee, established with a view to assisting the UEMOA Commission in validating the technical and scientific contents of projects initiated within the framework of the implementation of PRLEC. This Committee also expresses a technical and scientific opinion on all the

reports drawn up within the framework of the implementation of this program.

The SDLAO involved the active participation of more than 130 specialists from research institutions and universities of the region's countries and from various international scientific networks. This baseline study made it possible to make various observations:

- ⇒ **Recognition of the importance of the potential risks to coastal urban concentrations and associated (human, economic, and industrial) issues in the changing context of climate change. The trends identified in 2020 and 2050 highlight the rapid development of these coastal issues (demographic growth, corporate coastal settlement, economic development and related infrastructure). In this situation, the ability to anticipate and strategically consider the development and management of coastal territories becomes vital.**
- ⇒ **The skills and know-how within the sub region is significant, but little developed, because they are compartmentalized between states, between institutions within the states. The opportunities for partnership and connection with northern institutions confronted with similar situations are real but must be tackled in a coordinated and coherent way by the States of the sub region. A sustainable management of the shoreline now involves the networking of skills for decision-making and the development of interstate and inter-agency cooperation within the region and beyond.**
- ⇒ **The development of integrated approaches for the reduction of coastal risks, involving all sectors and stakeholders operating on the shoreline, requires the provision of reliable and updated information that is shared and made available at different decision-making levels to improve the strategic quality of decisions concerning the development, occupancy and conservation of coastal areas.**

The results of SDLAO's work were presented at a conference of ministers of Environment on financial markets, held in Dakar on May 18, 2011. One of the main resolutions of that conference was the establishment of a West African Coast Observation Mission (MOLOA). This conference resulted in the Dakar Declaration (Annex 1).

MOLOA thus constitutes a necessary and relevant regional response to these challenges, intended to develop a shared pool of capacities, knowledge and know-how enabling West African States to face the challenges related to coastal areas development and preservation, in a context marked by global climate change and increasing coastal social and economic issues.

The mission is the frontline of a regional co-operation mechanism for the management of the shoreline and the reduction of coastal risks in West Africa, which will ultimately disseminate quality information to existing consultative and decision-making bodies (Governments, UEMOA Commission, ECOWAS², Abidjan Convention, Secretariats of Canary and Guinea Current Large Marine Ecosystems projects, as well as at territorial and local level). The coordination and management of MOLOA were entrusted to CSE, supported by IUCN Marine and Coastal Program for Central and West Africa and by the Coastal Expert Group of IUCN Ecosystem Management Commission.

The initial work program of MOLOA was spread over a period of 3 years and started in December 2012. This work program included the establishment of monitoring and evaluation arrangements and procedures in line with the provisions of the Development Assistance Committee of the Organization for Economic Cooperation and Development (OECD/DAC) and best practices in the area to ensure a high level of accountability to MOLOA.

FIGHT AGAINST COASTAL EROSION AND/OR COASTAL DEVELOPMENT?

The monitoring and update of the shoreline are a specific aspect of the mobility and dynamics of coastal and littoral formations. A master plan for the management of the coastal area, however, covers a much broader reality, integrating the multiple problems related to the development and human occupancy in areas near the sea. These problems

2 Economic Community of West African States

lems must also be addressed in a prospective way, in relation to the future targets to be set (2020 and 2050).

Restricting the study to a focus limited solely to coastal erosion would run the risk of overlooking development dynamics that underlie and explain the present and future impacts and challenges of the observed shoreline mobility. Extending the ambition of the work to the development of a specific master plan for coastal management would inevitably lead to a stalemate, given the time and means granted to work on a set of eleven countries. For example, the process leading to the master plan for Mauritanian coastal development took more than 18 months, with the setting up of a prospective project and the corresponding support and communication procedures, aiming to involve the different interest groups in the project.

Given the principle of subsidiarity, it is also conceivable that a regional scheme would scarcely be a "master plan" in the primary sense of the word, i.e. binding for the States concerned. The mission therefore proposed that the arbitration between an approach exclusively centered on coastal erosion and a more ambitious vision of a coastal development scheme is reflected in the objective of achieving a **regional plan for climate change adaptation and coastal risk prevention in West Africa**.

This approach had the advantage of including the prospective dimension through adaptation to climate change; while proposing an approach that would not be reduced to coastal erosion, but will, based on available data, integrate other components of coastal issues (development, pollution, natural resources, etc.).

This angle of view also has the advantage of inducing a **rigorous framing of the work** according to the three components of the **risk**³ :

3 The elements of definition below are drawn from the evaluation of France's actions in the area of risk prevention in developing countries since 2000. Ministère des Affaires Étrangères et Européennes – Bureau de l'évaluation (JJ Goussard & al.)

● L'ALÉA

Natural hazards :

Natural hazards include phenomena such as earthquakes, volcanic activity, landslides, tsunamis, tropical cyclones and other severe storms, tornadoes and extreme winds, coastal flooding, forest or bush fires and smoke generated by those fires, droughts, sandstorms and infestations «(ISDR - International Strategy for Disaster Reduction).

Technological and/or industrial hazards :

they are determined by technological and/or industrial accidents, but they can also be dependent or triggered by natural hazards (earthquakes and nuclear accidents, storms and oil spills, for example). **The international disaster reduction strategy applies to industrial, technological or environmental disasters only when they are caused by natural hazards.**

● **THE VULNERABILITY** : The degree to which a system, community, structure, service or geographic area is likely exposed to damages or serious disturbances under the impact of a particular threatening disaster. The vulnerability is the degree of expected damage to people and property as a result of a particular hazard. »

● **THE SOCIAL, economic, environmental and development issues.**

therefore be accepted a priori that the shoreline is generally mobile⁴

Conventionally, and in several programs (such as EUROSION⁵), the shoreline is defined as the maximum height reached by the sea at the highest annual tides (for example, considered to stand at a coefficient of 120 in Europe). Many factors (winds, swells, atmospheric pressure) can, however, and with the same tidal coefficient, modify this line, **which therefore remains above all conventional.**

The instability of the shoreline also hinges on different time scales: short (waves, tides), longer (deposits or extraction of sediments (re) mobilized during exceptional or seasonal events); geological time (eustatism, marine transgressions and regressions).

In every case, the line chosen is therefore only a **compromise** between different positions of the shore. Except in the case of unaltered rock formations, the position of the shoreline therefore remains difficult to define and should theoretically be the result of **the average of repeated measurements**. As part of the work conducted for the Aquitaine Coast Observatory, the French oceanographic institution IFREMER and Geological and mining research Bureau (BRGM) define an average dynamic shoreline ("a line of equilibrium marked by the berm crest in good weather or springtime") and a maximum dynamic shoreline, equivalent to the "line of dynamic action marked by the peak of the winter surges, the erosion beach scarps and the highest watermarks of tides". This definition is certainly the most commonly encountered on an international level. Note that for France the difference between these two measurements concerns an average height of approximately 1.20 m.

On another level, the length of the shoreline itself depends on the scale of its cartographic expression and **generalizations** (simplifications of the line) which are made when the scale is reduced. The length of the shoreline is therefore not the same on the scale of 1/500 000th as on the scale of 1/500th.

Lastly, in the case of estuaries, the limit to be placed

4 Especially on unconsolidated coasts, but at other scales of time the rocky coastal areas also move.

5 European Program on coastal erosion.

UNCERTAINTIES RELATED TO THE CONCEPTS OF SHORELINE AND COASTAL AREA

● CONCEPT OF SHORELINE

At first sight, the notion of shoreline seems intuitively easy to understand: *the line that separates the ocean from the continent*. In reality, the boundary of the shoreline implies the fixing of a "static" limit within a milieu, the shore that is primarily characterized by its dynamic nature and dual inclusion in the land and the coastal waters. It should

can only be arbitrary, given the highly seasonal nature of the distribution of the salinity gradient of waters.

While the definition of the shoreline today appears somewhat obsolete for geomorphological studies and tends to be replaced by morphodynamic monitoring of the shoreline making it possible to apprehend and characterize the processes governing its evolution, **it is still necessary for placing the legal and fiscal ownership boundary of the public maritime domain**, currently often based on the analysis of the distribution limit of adjacent terrestrial plant formations characteristic of saltwater milieus.

● CONCEPT OF COASTAL AREA

In practice, how coastal area is defined often depends on why it is being defined, from the “state” coastal area limited to the Maritime Public Domain (MPD), to the developer’s coastal area (population basin affected by the marine economy), or again that of environmentalists, which includes the different natural elements contributing to the dynamics of marine and coastal ecosystems. Often more than territorial, this definition of coast originates from a **reflection on function**, and in fact leads to a collective representation that is quite generally shared, but the territorial limits of which remain globally ill-defined on the land side, including in the most sophisticated legislation.

The recognition of the role of the coast as a development area that contributes to the national economy in multiple ways; like the recognition of the different resources linked to it, leads us to take this coastal strip into account in an extended, more social than territorial way, which, on the level of legal systems, remains shared between the public law that applies on the MPD, and the private law that applies outside the MPD. In West Africa, common land ownership law is still often recognized locally.

The emergence of a specific notion, called “proximity to the sea” makes it possible to add rules and procedures common to the two areas - land and sea. The purpose of these rules and procedures is to guarantee the **compatibility of usages** in the whole coastal strip, and harmonize the modes of development according to the imperatives of

preserving natural milieus that are both fragile and vital for national economies.

According to this functional representation of the coastal area, any zoning arrangements should incorporate usages and players, with a view to proposing a system of spatial units compatible with the **recognition of management responsibilities**, which may possibly be subject to contractual policies.

The notion of coastal area therefore spreads through the terrestrial milieus located outside the PMD according to a **principle of general equilibrium** of the territory, the public management of which incorporates proximity to the sea, and in particular the constraints and natural risks likely to affect the security and continuity of terrestrial activities.

The coastal area therefore remains above all a complex territory that groups together all the milieus directly marked and influenced by proximity to *coastal waters*. It is easily conceivable that in such a definition, based primarily on functional considerations, the territorial limit on the land side **should be defined in each local situation**. The interlinking of the following components of the terrestrial part of the coast should be successively distinguished:

- The maritime public domain.
- The territories of communities with a sea front.
- The population basins where products from the sea are processed and marketed.
- Natural coastal areas and conservation sites.

Note that the geomorphologic definition consisting in considering the sediment formations originating from deposits and shaped by marine currents, and linked to the interaction of the two systems of sedimentation, terrestrial and marine (intertidal zone, dune belts, lagoon systems, delta formations, brackish waters and wetlands) whose regime is in particular linked to tides, is often applicable.

The same problem of boundary may also be posed on

the maritime side of the coastal interface. An extension of the coastal maritime space to the entire EEZ⁶ seems exaggerated if it is a question of qualifying **coastal waters**. However, the morphology of the continental shelf and the bathymetry of near shore coastal waters can play a significant role in the organization and dynamics of coastal currents, as in the storage and redistribution of sediment reserves.

The ambiguities evoked above concerning the very notion of coast are also perceptible in other domains, where the diversity of the players and stakeholders has for corollary a diversity of points of view. Certain notions such as zoning or the vocation of areas can give rise to interpretations that are a simplification with respect to the functional aim of the development. For, in fact, there are potentially multiple ways of zoning the coast depending on the point of view we begin from. The identification of the vocations of areas with a view to identifying the stakeholders in the development should above all preserve their **multifunctional** nature. Even if the accent can be placed pertinently in a given sector on such and such a type of activity, use or occupancy, this should respect the principle of territorial equilibrium, in particular by respecting the principles of compatibility between usages.

The inclusion of this one-off study in the broader framework of the UEMOA Coastal Erosion Control Program means that we have to think in terms of **processes**. It includes not only achieving the deliverables defined below, but also ensuring that **the work carried out contributes to building sustainable dynamics for the development of West Africa coasts**. This means, thus, mainstreaming existing processes, adopting them, and as far as possible, enhancing them while developing the resources and efforts existing in each country.

⁶ *Exclusive Economic Zone*

2. West african littoral systems : quick state of the play

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2.1. COASTAL PHYSICAL FEATURES IN WEST AFRICA⁷

These elements are presented in more detail in the West African Coastal Master Plan (SDLAO).



West Africa continental shelf (until the isobath-300m)

⁷ These elements are detailed in the document 4 - SDLAO Regional Diagnostic

The West African relief is, on the whole, not very rugged. The continental shelf is narrow in the main (on average thirty kilometers), except from Guinea-Bissau to the Sherbro islands in Sierra Leone, where it widens considerably (200 km).

This continental shelf is marked by some major deep features: the Kayar canyons in Senegal to the north of the Cap Verde peninsula and the deep canyon ("Trou sans fond" (bottomless pit) that cuts through the shelf perpendicular to Abidjan in Côte d'Ivoire. For some authors, these bathymetric features contribute to trapping the sediment carried by the coastal drift current parallel to the coast.

2.1.1 A BASICALLY SEDIMENTARY, MOBILE AND DYNAMIC COASTAL AREA

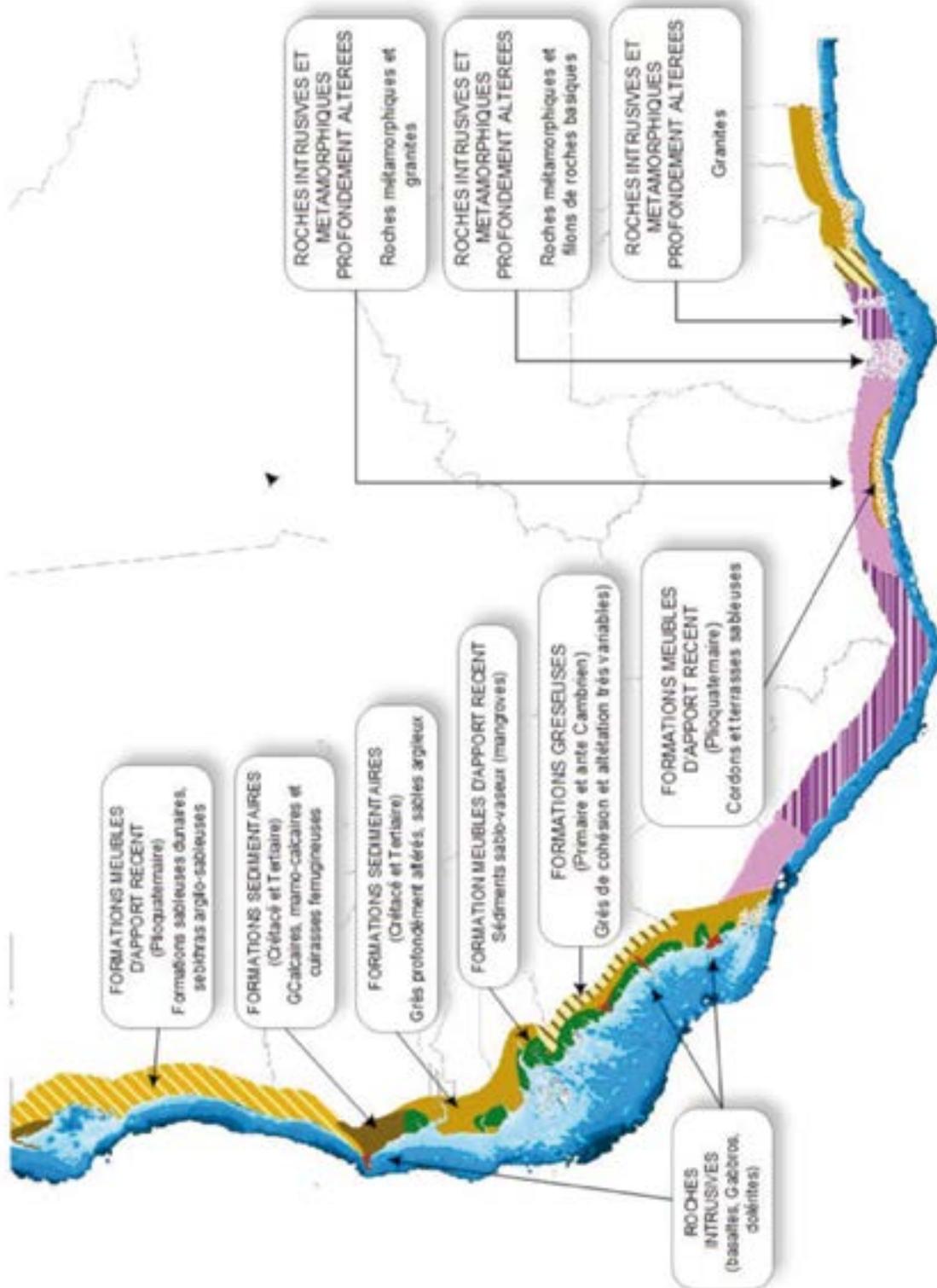
At the scale of 1/100 000, the West African coastal area stretching from Mauritania to Benin covers about 10 000 km. Of this estimated shoreline, rocky coasts represent less than 3% of the coast (for areas directly exposed to the ocean). These coasts are made of rock that is often altered or fractured, sometimes inconsistent, and subject to landslides and erosion, as observed in Dakar cliffs. The remainder of these coastal areas, mainly composed of sedimentary basins, is distributed as follows:

Unstable, mobile and very dynamic coastal areas

- ⇒ Continuously evolving mangroves (48%)
- ⇒ Sand banks, estuaries, river mouths, spits and islets by nature also very unstable and dynamic (12%).
- ⇒ Sandy formations of lidos (thin sandy rim between a lagoon and the sea shore) also unstable and highly changing (7%).

Dynamic sedimentary coasts, whose mobility is organized over longer time scales, even if they are subject to natural episodes of erosion and accretion, that are seasonal or resulting from exceptional marine weather events outside of human intervention:

- ⇒ More or less straight sandy coasts, relatively stable but subject to cyclical phases of erosion or accretion, also very sensitive to any disruption of the coastal drift (16%).
- ⇒ Stepped coasts or headlands and coves (14%), where coves are compartments more or less separated by rock outcrops or harder rock. Their stability strongly depends on their orientation with regard to ocean waves and currents. The sediment stocks here are often very limited.



Simplified lithology of the West African coastal area (source: SDLAO 2011)

2.1.2 HOT SPOTS RELATING TO SHORELINE CHANGES AND SEA-LEVEL RISE

As aforementioned, a large part of the West African coastal zone is composed of sedimentary, sandy and naturally mobile and dynamic shorelines. The dynamics of these mobile shorelines are mainly conditioned by the circulation of «sediment trains» carried by a coastal drift roughly parallel to the coast.

A list of some “hot spots” that have been subject of protection structures, sometimes long - standing ones, and which illustrate the most remarkable risk situations often due to the local concentration of challenges and the artificialization of the shoreline as a result of its development has been established:

⇒ **Erosion resulting from port infrastructures:** The South of the port of Nouakchott is experiencing strong erosion due to the disruption of the coastal drift by developments in the port. This space is associated with salt flats of lowest-lying areas, which are subject to short-term or long-term submersion in case of rain. The dune ridge, which was formerly continuous, is strongly altered by the extraction of materials. The same trend related to the interruption or disruption of the coastal drift is observed in Abidjan port (Vridi channel), Lomé port in Togo and Cotonou port in Benin. In the case of Abidjan, the presence of a deep canyon directly cutting off the continental shelf could also contribute to the trapping of sediments.

⇒ **Erosion due to reduced sediment supply:** this is the case for the Volta dam, the entire delta and downstream adjacent areas, notably in Togo and Benin. It should be noted that deltas are often subject to subsidence and gradually sink under the sediment load if they are not regularly supplied with new inputs. In Benin, the construction of the Nangbeto dam considerably changed the functioning of the Mono-Couffo estuarine system. The last mouth of this system (Bouche du Roy) is particularly dynamic and has experienced several migrations from 1995 onwards. This last shifted 3 km eastward between 1996 and 1999. This migration reached 7 km, between 1999 and 2009, which is an annual rate of 700 m per year. In 2007, this

caused the displacement of some of the inhabitants of the village of Docloboé. The intervention through developments allowing for a better control of the dynamics of this tidal mouth is today a topical issue.

⇒ **The disappearance of beaches following the building of residential seafront constructions :** it is the case for example of the Petite Côte in Senegal or the Gambia or the site of Varela in Guinea Bissau, where the reflective effect on beach walls results in rapid erosion due to the reflection of waves’ energy on the constructions.

⇒ **The alteration of rice-growing areas in Guinea, but also in Guinea-Bissau,** where they are directly threatened by storm surges and sea-level rise.

⇒ **Progression of the salt water wedge:** vegetable crops widely distributed throughout the West African shoreline with some important production areas such as the Gandiolais in the south of Saint-Louis or Keta in Ghana are directly threatened by the advance of the salt water wedge and the salinization of lands.

⇒ **Some other situations:** the Buchanan area in Liberia experienced a decline in the shoreline estimated at 6.6 m per year. The building of a breakwater of 600 m should stabilize this area, at least temporarily. In Côte d’Ivoire, several sites are directly affected, for example there are declines in the shoreline of 1 to 1.5 m per year in San Pedro. In Grand Lahou, the decline in the shoreline was estimated at 13 m between 2008 and 2014.

2.2. EVOLUTION OF COASTAL ISSUES, DEMOGRAPHIC AND ECONOMIC FORECASTS: A CONFIRMATION IN 2016 OF THE TRENDS IDENTIFIED IN 2010

“Among the African regions, coastal population growth is projected to be highest in Eastern and Western Africa, especially in the urban centers of Western Africa where, according to scenarios, between 72 million and 94 million people will reside by 2060. Nigeria, Senegal, Benin and Côte d’Ivoire are growing considerably faster and will be among the top-25 countries with the largest population rate living in low-lying coastal zone by 2060. A characteristic example is Senegal, which had 2,9 million people living in the low-lying coastal zone in 2000 (2.9 million), while 50% of the country’s total population will live in such area by 2060⁸».

The coastal zone, whose Gross Regional Product is expected to increase tenfold between 2010 and 2050, will most likely remain at the forefront of expected changes and will hardly be able to shelter from the various kinds of pressure on its soils, natural resources, ecosystems and landscapes. One of the challenges of the SDLAO will be to define the best possible compromise between the imperatives of risk prevention and environmental protection, on the one hand, and the equally urgent development imperatives, the pace of which will be largely dictated by the demographic dynamics. » (SDLAO – étude prospective – 2011).

2.2.1 A CONTINUOUS AND INCREASING POPULATION CONCENTRATION IN COASTAL AREAS

By 2050, the population of sub-Saharan Africa (SSA) will double to almost 2 billion people, making this part of the African continent one of the largest markets in the world. Africa is the last continent in the world to complete its demographic transition.

Forecast analyses of the West African Coastal Master Plan, based, inter alia, on the results and methodologies of the Africapolis study⁹, presented in 2011 the following trends that are still relevant:

- ⇒ The coastal zone (arbitrarily defined here at a width of 25 km inwards) concentrates more 30% of the total population and more than 50% of the urban population of the coastal states ;
- ⇒ The total urban population of the littoral zone in the 11 countries (from Mauritania to Benin) could double from 18 to 36 million between 2000 and 2020, while the rural population is expected to increase by half ;
- ⇒ From 2020 to 2050, the urban coastal population would grow from 36 to more than 80 million under the business-as-usual scenario and to 74 million under the moderate “controlling disparities” scenario.
- ⇒ The current average population density is 260 per km², with maxima of 1,000 per km² in Togo and Benin and zones with fewer than 10 per km² in Liberia or Guinea Bissau. Certain areas remain unoccupied. In the future, these densities could exceed 2,000 people per km² in some countries in the Gulf of Guinea, such as Benin, for example.

⁸ Neumann B, Vafeidis AT, Zimmermann J, Nicholls RJ (2015) Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding - A Global Assessment. PLoS ONE 10(3): e0118571. doi :10.1371/journal.pone.0118571.

⁹ E-geopolis « AFRICAPOLIS : Dynamiques de l’urbanisation ouest-africaine 1950-2020

Region	Composition	1990	2000	2006	2020	2025	2050
West African coastal countries	12 countries	60	79	94	131	148	231
West African coastal countries	7 countries	142	186	208	281	313	476
West African coastal countries WALTPS	19 countries	201	265	302	412	461	707
ECOWAS	15 countries	179	239	267	366	409	629
Sub-Saharan Africa	49 countries	510	661	766	1032	1151	1748
Coastal area in % of the WALTPS		30%	30%	31%	32%	32%	33%

Total population in millions of inhabitants.

Source UN Pop. Corrected divisions for migrations between landlocked and coastal countries

The concentration of populations in the littoral zone is also favored by the high level of mobility of people, observed at all scales:

- Locally, between cities and rural area and from landlocked countries to coastal regions.
- Between countries within the same coastal zone, for example along the Abidjan - Lagos corridor in the Gulf of Guinea.

This mobility of populations takes place between economically attractive hubs, employment areas, but also ac-

ording to the spatial organization of infrastructures and related equipment. **As a result, the landlocked countries of Sahelian Africa are an integral part of the settlement space of coastal countries.**

"Between 1930 and 1990, the population of the current Burkina Faso tripled from 2.8 to 8.7 million, while the population of Côte d'Ivoire increased eightfold, from 1.4 to 11.4 million inhabitants. Twice less populated than the current Burkina Faso in 1930, Côte d'Ivoire is now more populated by a third".

Region	Composition	9 0 - 2006	2 0 0 6 - 2020	2 0 2 0 - 2025	2 0 2 5 - 2050
West African coastal countries	12 countries	2.9%	2.4%	2.4%	1.8%
West African coastal countries	7 countries	2.4%	2.2%	2.2%	1.7%
West African coastal countries WALTPS	19 countries	2.6%	2.2%	2.3%	1.7%
ECOWAS	15 countries	2.5%	2.3%	2.3%	1.7%
Sub-Saharan Africa	49 countries	2.6%	2.2%	2.2%	1.7%

Growth rate of total population by region according to corrected UN data for migration

However, this coastal tropism is partially offset by the progression and hierarchy of the urban network of national territories and the development of secondary cities. How-

ever, there is still a marked phenomenon of metropolization.

2.2.2. THE URBAN QUESTION

One third of Africans currently live in urban centers. By 2030, urban populations will increase by 300 million. The continent's urban population will thus increase from 414 million to more than 1.2 billion by 2050.

Between 1950 and 2006, the urban population in sub-Saharan Africa has multiplied by fourteen compared to six in North Africa and four globally. More than 60% of the urban population in sub-Saharan Africa lives in precarious neighborhoods. Access to basic services remains very uneven, and infrastructure gaps remain considerable.

According to the forecast, from 2020 to 2050, the coastal urban population would grow from 36 to 83 million under the business-as-usual scenario and to 74 million under the moderate "controlling disparities" scenario. The incidence on the average rates of urban coastal population growth would therefore be 0.4% (2.4% compared to 2.8% in the dominant scenario).

	1950	1980	2000	Business-as-usual scenario		Controlling disparities
				2020	2050	2050
Benin	233	428	846	1800	4000	3600
Côte d'Ivoire	59	190	398	700	1400	1300
Cape-Verde	52	72	108	100	200	200
Ghana	99	263	489	800	1800	1600
Guinea	43	164	290	500	1000	1000
The Gambia	86	229	512	900	2000	1900
Guinea-Bissau	21	32	56	100	300	300
Liberia	28	69	127	200	500	500
Mauritania	0	29	70	100	200	200
Senegal	75	172	290	500	900	900
Sierra Leone	61	109	182	300	700	600
Togo	193	499	1054	2000	4000	3700
12 coastal countries	55	140	264	500	1000	900

Density of coastal population (inhabitants/km²)

	Business-as-usual scenario					Controlling disparities
	1950	1980	2000	2020	2050	2050
Population of coastal areas (million inhabitants)	1.1	7.7	17.8	36	83	74
including the cities of the 12 coastal countries (million inhabitants)	0.8	6.2	14	26	61	54
Coastal cities in % of the total urban population	62%	56%	54%	54%	59%	53%
Growth rate of coastal urban population		5.9%	4.2%	3.9%	2.8%	2.4%
Rural coastal population	5.3	8.4	12.5	18	27	29
Total coastal population	6.3	16.1	30.3	54	110	103
Coastal urbanization level	33%	37%	38%	41%	48%	44%
Coastal population in % of the pop of the 12 coastal countries	55	140	264	500	1000	900
Density of coastal population (inhabitants/km ²)	0	29	70	100	200	200
Senegal	75	172	290	500	900	900
Sierra Leone	61	109	182	300	700	600
Togo	193	499	1054	2000	4000	3700
12 coastal countries	55	140	264	500	1000	900

The urban sprawl that characterizes most cities in West Africa results in an average urbanized surface area of 150 m² per urban capita compared to an average of 125 m² in all developing countries. This horizontal spread of big cities will involve challenges in terms of sanitation, equipment and waste management.

Considering the expected economic developments mentioned below, and according to a conservative assumption, the urban footprint should reach an average of 260 m² per urban inhabitant in 2020 and 350 m² per urban inhabitant in 2050, for effectively developed surface areas of 180 and 250 m².

The increase in size of accommodation but especially of the space associated with accommodation (fall in net density); increased use of personal vehicles and correlative increase in space for driving and parking; increase in public facilities, office areas... mean that 1 additional point of per capita GDP is reflected in an additional point in per capita space consumption.

However, the footprint of the agglomerations is greater than built-up land area. According to the AFRICAPOLIS study, the total surface area occupied by agglomerations in 2000 was in the order of 200–300 m² per capita, and an average 210 m² per capita for the coastal agglomerations identified in the study, if Abidjan, which is said to have an abnormally low rate of space consumption, is not included.

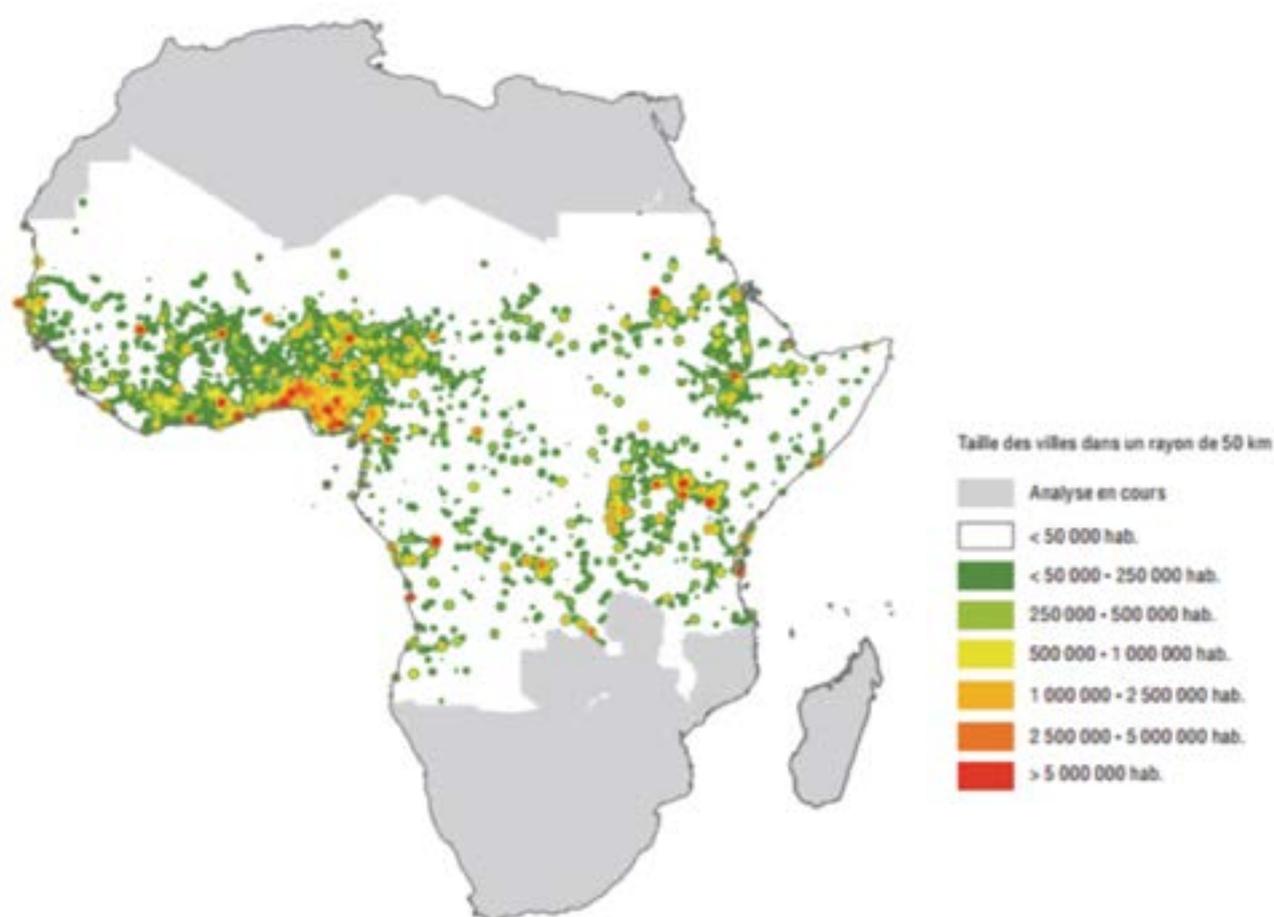
It should also be noted that even in the event of a severe crisis, the situation of insecurity further increases population concentrations in urban areas (as confirmed, for example, by the case of Liberia).

Built-up area (1)	1990	2000	1999-2000 Growth Rate
Sub-Saharan Africa	105	150	3.6%
Developing countries	105	125	1.8%
Global average	155	185	1.8%
Total urbanized surface area		210	

Built-up and urbanized area per urban inhabitant (m²/inhabitant)

(1) Source : *The Dynamics of Global Urban Expansion* World Bank 2005

(2) according to AFRICAPOLIS' data



Urban population centers in Africa, 2010.

Source: *E-geopolis* (2012); Losch, Magrin et Imbernon (2013).

2.2.3. SUSTAINED ECONOMIC GROWTH ON THE MEDIUM TERM...

“Africa’s gross domestic product grew on average by 3.9% in 2014, compared to 3.3% globally- but with wide regional variations. *Sub-Saharan Africa grew by 5.2% and by a percentage point higher when South Africa is excluded, indicating relatively robust growth despite global and regional headwinds, including depressed commodity prices and the Ebola epidemic...*”¹⁰

This finding confirms the evidence provided by the United Nations World Economic Situation and Prospects 2014¹¹, that economic growth rates in Central and West Africa are and will continue to be high despite the negative impact of Ebola.

10 BAD, OCDE, PNUD. 2015.- *Perspectives économiques en Afrique 2015. Développement territorial et inclusion spatiale.* 48p.

11 *World Economic Situation and Prospects 2014*, United Nations New York 2014

	2007 / 2010	2011	2012	2013	2014	2015
Central Africa	4.8	3.9	5.8	4.2	4.8	4.1
West Africa	6	6.1	6.7	6.7	6.9	6.8

2007-2015 growth rates in Central and West-Africa
 World Economic Situation and Prospects 2014, United Nations New York 2014
 The effective growth in West Africa reached 6% in 2014.

Although Africa still accounts for only 2% of world trade, Africa has experienced the highest growth in international trade between 2000 and 2011, an average of 16% per year for imports into Sub-Sahara.

resilient. The 2008-2009 crisis had little impact on this growth, which is greater than the population growth.

Africa is also the continent that spares the most after Asia. Foreign exchange reserves in Africa are estimated at USD 500 billion, and market capitalization has increased nine-fold since the 1990s. More than 2,000 companies are now listed. Several phenomena favored the creation of foreign exchange reserves between 2004 and 2012, and foreign exchange reserves in sub-Saharan Africa increased by 60%. Several factors contributed to this growth of reserves, notably the rise in commodity prices in the 1990s and 2000s. On the other hand, higher revenues in emerging countries are helping to make Africa more competitive.

Exports from sub-Saharan Africa grew by 117% between 2000 and 2010. HIPC relief operations have also led to strong deleveraging of African countries. Improved macroeconomic and financial management also contributed to this result.

This growth is accompanied by a reconfiguration of the geography of trade and partnerships, with a significant rise of China (USD 170 billion in 2013).

Africa’s share of global foreign direct investment (FDI) increased from 1.2% in 2007 to 3.1% in 2012; Africa is one of the few regions to have experienced an increase in inward FDI in 2011 and 2012, as world flows declined over the same period.

More generally, we can note development of strategic partnerships with emerging countries (China, Brazil, India, Turkey) accompanying the gradual integration of African countries into the global economy. The doctrines of emerging countries are primarily pragmatic, centered on natural and mining resources, but also on the promotion of multilateralism, breaking with historical cooperative relationships with former colonial powers¹².

This economic growth in Africa is thus real and seems

12 GRIP. 2014.- *Fondement des politiques africaines des émergents (Brésil, Inde, Chine Turquie et Afrique du Sud).* Note n°11.



Market share of the top 6 exporters in sub-Saharan Africa (Base CHELEM, CEPII)

In spite of the recent declines in commodity prices, the economic growth in sub-Saharan Africa appears relatively resilient; it is also driven by domestic demand. Ongoing macroeconomic developments in emerging countries also contribute to the relative competitiveness of African economies.

Other considerations include:

- The growth in the size of cities and its positive effects on urban economic productivity;
- Capital and know-how accumulation developed over the past decades in a multitude of micro-enterprises and “informal production units”;
- Interactions between popular economy and “modern” economy;
- The restoration of public investment capital for local purposes (“IFL”) and the improvement of local governance, which is expected to result gradually from decentralization efforts.

2.2.4. .. BUT PERSISTENT INEQUALITIES

Growth causes the increase in territorial inequalities between countries and within African countries, resulting thus in tensions and crises that are difficult to predict. In fact, this growth remains very unevenly distributed in 2012. The inequality-adjusted human development index (IDHI) is about 35% lower than the human development index (HDI) of African countries.

According to the World Economic Situation and Prospects 2014¹³, stronger growth and more sustained trade have not stimulated job creation and socio-economic development. Poverty remains high and inequalities are increasingly pronounced.

Informal economy is still prominent and the opportunities are still insufficient for the multitude of people aspiring to find work, as evidenced by the high unemployment rate among young people and important wage differentials between men and women.

¹³ World Economic Situation and Prospects 2014, United Nations, New York 2014

The constant pressure from the continuous flow of new entrants into the labor market (due to population growth) implies that even a sustained growth rate of the GDP is not sufficient to significantly improve the living standards of the population. Even in countries with strong growth, rapid increase in inequalities leads to economic, social and political tensions.

2.2.5. A STRONGLY PREDOMINANT PRIMARY SECTOR

The Economic Report on Africa 2013 of the United Nations Economic Commission for Africa¹⁴ reveals that the remarkable economic growth recorded has not yet been translated into significant economic diversification, although some processing industries are emerging as well as middle class-consumers of manufactured goods.

Most economies remain heavily dependent on primary commodity production and exports, with too little value addition and few forward and backward linkages to other sectors of the economy. The report also indicates that the production and export of commodities remain well below

¹⁴ *Economic Report on Africa 2013 of the United Nations Economic Commission for Africa*

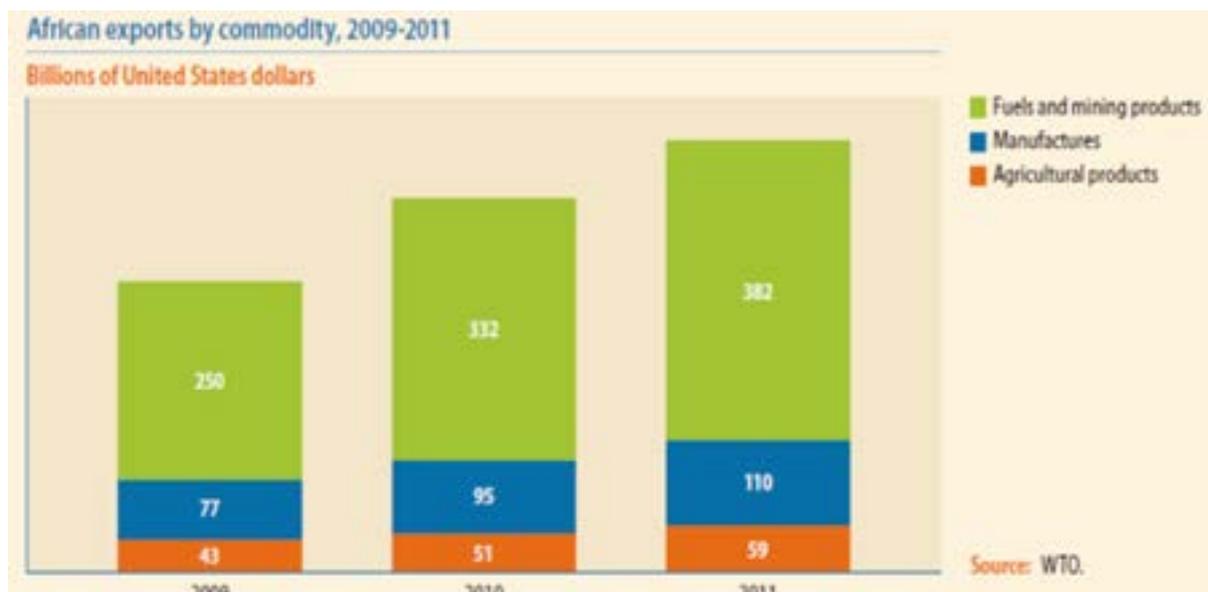
the continent's potential.

The processing of mining products is still very weak and provides an opportunity for countries to achieve more sustainable growth with the development of the industrial sector and corresponding jobs.

It should be recalled that more than half of the African population today is less than 20 years old. In 2035, the continent will have the largest labor force in the world.

However, it should be noted that the most growth-producing sectors are evolving: mining is still in first place, followed by agriculture and hydrocarbon and gas extraction. However, there is a significant contraction in these mining, agriculture, hydrocarbon and gas sectors. The perception of sectors' attractiveness shows a renewed interest in infrastructure, information, communication and financial services. The strong infrastructure deficit across the continent explains this.

The adoption of the EITI provisions (Extractive Industries Transparency Initiative) should also increase the contribution of extractive industries to economic development.



Evolution of the types of products exported by Africa World Economic Situation and Prospects 2014, United Nations New York 2014

2.2.6. TRADE INTENSIFICATION AND EQUIPMENT OF THE SHORELINE

Population growth and urban growth in a context of sustained economic growth leads to rapid development of inter-state transport and integration infrastructures on the one hand, and port facilities on the other.

The approximately **1,000 km-long Abidjan-Lagos corridor** is one of West African main economic routes linking the capital-cities of Abidjan, Accra, Lomé, Cotonou and the important economic center of Lagos in Nigeria. This axis has a traffic volume of 50 million people per year and serves a resident population of about 30 million people. It will gradually take the form of a long conurbation along the Gulf of Guinea, crossing two important sedimentary basins and ecological systems and particularly fragile wetlands.

From the Igbo country in Nigeria to Abidjan in Côte d'Ivoire, the coastal zone could, in the long term, constitute a quasi-continuous conurbation, punctuated every 100 km by multi-millionaire cities, with several hundred satellites and agro-cities serving areas for intensive agriculture development and industrial animal production areas, leaving little room for tourism development and nature protection.

Controlling the risks associated with these developments will require a real planning effort mainstreaming geotechnical constraints inherent to coastal areas in a perspective integrating climate change effects but also capacity-building programs for local communities as well as their financial empowerment determined by (i) stable and predictable state transfers over time, and (ii) local taxation development.



Abidjan-Lagos Corridor (source ALTTFP)

The expected growth in sea-borne trade is significant, from 10 to 12% per year. From 1.5 million “twenty-foot equivalent units” (TEUs) in 2011, it could increase to 10 million TEUs by 2050. The rapid development of containerization takes place in the context of the generalization of port concessions. The initiative of private groups such as *Bolloré Africa Logistics* or *AP Möller* plays a determining role in that regard. This trend of containerization centered

on a few major hub ports (Lagos-Nigeria, Tema-Ghana, Abidjan-Côte d'Ivoire and more secondarily on Dakar-Senegal, Lomé -Togo and Cotonou -Benin ports) is today fast-expanding, as evidenced by ongoing capacity-building operations in most major ports in West Africa.

It should be noted, however, that the political instability that may have affected the main corridors leading to the interior of the continent (Côte d'Ivoire for example) further limits this concentration strategy. The development of containerization in West Africa is also accompanied by increased, sometimes conflicting, competition between operators. The generalization of the concession-based model, associating public (regulation, ownership of infrastructures, development) and private (financing and operation of terminals) port organization places emphasis on the responsibility of States in the management of important environmental externalities making west African ports the main factors with lasting influence on shoreline dynamics.

Many deep water port projects are also being studied, specifically for mining activities in Guinea Conakry, but also for commercial business such as the Sémè-Podji port project in eastern Benin or for multiple purposes such as the Port du Chat project in the south of Mauritania.

Emergence of the NATural-TECHnological Risk (NATECH): the need for processing of mining products, or the intensification of hydrocarbon exploitation, with the multiplication of associated offshore and onshore infrastructures, also lead to an emergence of natural and technological risk in fragile coastal areas that are subject to various types of hazards. This type of risk is to be distinguished from environmental externalities accompanying industrial facilities.

3. West african coastal areas : increasing pressures

ASSESSMENT 2016 WEST AFRICA COASTAL AREAS
GENERAL DOCUMENT

3.1 A CLIMATE CHANGE CONTEXT

Climate change in West Africa will be translated into various effects mainly related to sea-level rise and increased climate variability, which can result in an increase in the frequency and intensity of exceptional climatic, weather and marine events. Other changes will affect temperatures as well as rainfall amounts, intensity and seasonal distribution. The knowledge of these effects remains largely subject to the global uncertainty characterizing the predictions on the evolution of climate change causes and conditions.

3.1.1. UNCERTAINTIES...

Uncertainties about climate change effects are noted at different levels:

- ⇒ How will be translated the socio-economic development in terms of greenhouse gas emissions and how will the level of these emissions respond to the development of energy-efficient technologies and policies that take into account climate change?
- ⇒ What is the internal variability of the climate system at global and regional scales and what will be the atmosphere and ocean responses? What are the threshold effects?
- ⇒ What will be climate change impacts on areas such as water availability, agricultural production, sea-level rise, storm frequency and intensity, etc.?
- ⇒ What will be the effectiveness and relevance of the measures taken to reduce the vulnerability and exposure of human interests to hazards?

Given these uncertainties, climate risk management will obviously have to rely on the expected increase in knowledge, but also on adaptation strategies that are diversified and planned at different scales. This issue will be discussed below.

3.1.2. MEAN SEA LEVEL RISE IN QUESTION

While the recent fifth report of the IPCC makes it possible to update the prospects as regards mean sea-level rise, it is very explicit about the persistent very high uncertainty of this parameter. During the last 20 years, the average rise was 3.3 mm/year, which does not exclude a high variability locally due, for example, to intense rainfall events.

In the A1B average emission scenario, the sea level rise would be between 0.20 and 0.61 m by 2100. Under the concentration scenario 45 (average emissions), the rise would be 0.36 to 0.71 cm. In the case of the contrasted RCP 8.5 scenario (high greenhouse gas emission), the rise would be 0.52 to 0.98 m.

As mentioned at the time of the preparation of the SD-LAO, the recognition of regional or even local situations is crucial to better understand mean sea level rise. In many situations, vertical soil movements determine subsidence phenomena (land surface sinking) that can be interpreted as an amplification of sea-level rise. These phenomena can have various causes:

- ⇒ Intensive groundwater pumping;
- ⇒ Subsidence of delta systems (sinking) when their sediment supply is inadequate, particularly due to upstream dams;
- ⇒ Tectonic subsidence.

The current patterns and seasonal variations in sea surface temperatures may also contribute to mean sea level changes. It is also necessary to take into account the time required for the occurrence of the mean sea-level rise¹⁵.

¹⁵ Lyu. K. & al. 2014. – *Time of emergence for regional sea-level change. Nature Climate Change. Vol 4: 1006-1010p.*

Nevertheless, coastal systems are generally able to adapt naturally to this evolution provided they have non-artificialized spaces located in the hinterland, as demonstrated by various studies¹⁶. In addition, the knowledge of the response of beaches to sea-level rise progresses through new models¹⁷ and methods. A second element is the acceleration of sea-level rise which may contribute significantly to the submersion hazard¹⁸. The sea-level rise will also guide the international governance of oceans with the creation of a new international committee that met for the first time in Washington in April 2014¹⁹.

3.1.3. ALREADY VISIBLE IMPACTS OF RISING SEA LEVEL AND STORM SURGES

On the West African Coast, storm surges associated with heavy swell periods have caused serious damage to the infrastructure in recent years. These surges have recently exceeded 1 m in Senegal and Benin. Decennial wave heights have been surpassed in Senegal in recent years, reaching practically the threshold of the centennial height (source MOLOA national office of Senegal).

In all cases, the preservation of intact natural and functional ecosystems (natural coastal ecosystems) contributes in greatly reducing risks for populations and goods located near the shoreline; This benefit can reach a percentage of around 50% of the populations and assets exposed to the risks¹. Such studies may also allow to better identify priorities for coastal conservation.

This sea-level rise is combined with other factors, including storm surges related to increasing climatic variability in systems where energy is also increasing.

¹⁶ Houston. J.R. 2015.- *Shoreline Response to Sea-Level Rise on the Southwest Coast of Florida*. *Journal of Coastal Research*. 31(4):777-789 p.

¹⁷ Deng. J. & al. 2015.- *A method for assessing the shoreline retreat due to the sea level rise by assuming stationary wind-wave climate*. *Oceanological and hydrobiological studies*. 44:3: 362-380p. Webb. E.L. 2013.- *A global standard for monitoring coastal wetland vulnerability to accelerated sea-level rise*. *Nature Climate Change*. Vol 3: 458-465p.

¹⁸ Kriebel. D.L. & al. 2015.- *Future Flood Frequency under Sea-Level Rise Scenarios*. *Journal of Coastal Research*. 31(5):1078-1083 p.

¹⁹ Vidas. D. & al. 2015.- *International law and sea level rise: the new ILA committee*.



Collapse of the protection wall on the Island of Gorée in Senegal



Breaking waves in Rufisque - Senegal (Thiawlène protection dam)

The combined effects of these phenomena affect not only the infrastructure but also the security of people, goods and means of production (e.g. destruction of fishing canoes or degradation of port or hotel infrastructures). They also affect agricultural production systems. The progression of the salt water wedge has strongly affected garden crops in the Niayes of Senegal or in other important areas such as Togo or Keta in Ghana. Mangrove rice-growing areas have also been degraded, and in some cases destroyed in Guinea. In such cases, food security is also at stake.

The opening of the Saint Louis breach: this intervention decided in 2003 consisted in the opening of a 4 m-wide breach in the Barbarie Strip, Saint Louis, to overcome a situation of pre-emergency due to the alarming level of the Senegal River. A 1.5 m altitude difference between the river waters and the ocean, combined with the opening of the gates of Diama dam generated a very powerful flow. In the days following the opening of the breach, it was enlarged by about 15m/day. In 2004, the width of the breach reached more than 700 m, and in 2005 it stood at 1200 m. Some villages have been severely affected by erosion (Doun Baba Dièye, for example). Market gardening is the main economic activity in the Gandiolais and is mainly dependent on the water resources of the quaternary sands underground reserve. Today, the salt water wedge is progressing. This progression is reinforced by the opening of the breach. Some farmers' yields have fallen²⁰ by more than 80% and often by more than 50% in two decades. Over the last years, Gandiolais people have moved from vegetable producers to consumers. On the other hand, the increase in salt concentration has led to the development of salt production, which has become an income-generating activity, particularly for women in the Gandiolais.

3.2. INCREASE AND CONCENTRATION OF ISSUES, ARTIFICIALIZATION OF COASTAL SYSTEMS

The demographic and economic forecasts presented above naturally translate into changes in the conditions of occupancy and management of coastal territories. The main features of this dynamic are structured around following items:

- ⇒ Development of transport infrastructure: port infrastructure, development of the road network, in some cases opening-up and renovation of existing accesses, airports;
- ⇒ Development of coastal protection facilities in response to erosion;
- ⇒ Development of energy production, mining and oil infrastructure;
- ⇒ Extension of built-up areas, urban areas and their peripheries.

While natural coastal ecosystems, under undisturbed conditions, are relatively resilient to the effects of climate change, their decline and conversion as a result of coastal artificialization reduce their ability to produce the ecological services needed to maintain coastal dynamic equilibrium.

²⁰ Sy. B.A. & al. 2015. - « Brèche » ouverte sur la Langue de Barbarie à Saint-Louis, esquisse de bilan d'un aménagement précipité. Lharmattan. 210p.



Aerial view of part of the port of Abidjan and the Vridi Channel

3.2.1. PORT INFRASTRUCTURE

Major ports and containerization

All ports on the West African Atlantic Coast are now experiencing major developments: new docks, container yards, dredging operations, etc. These developments have practically no exceptions and are generally in line with the dynamic of economic catch-up which is characteristic of a sub-Saharan Africa that has remained little integrated within the international logistical movements.

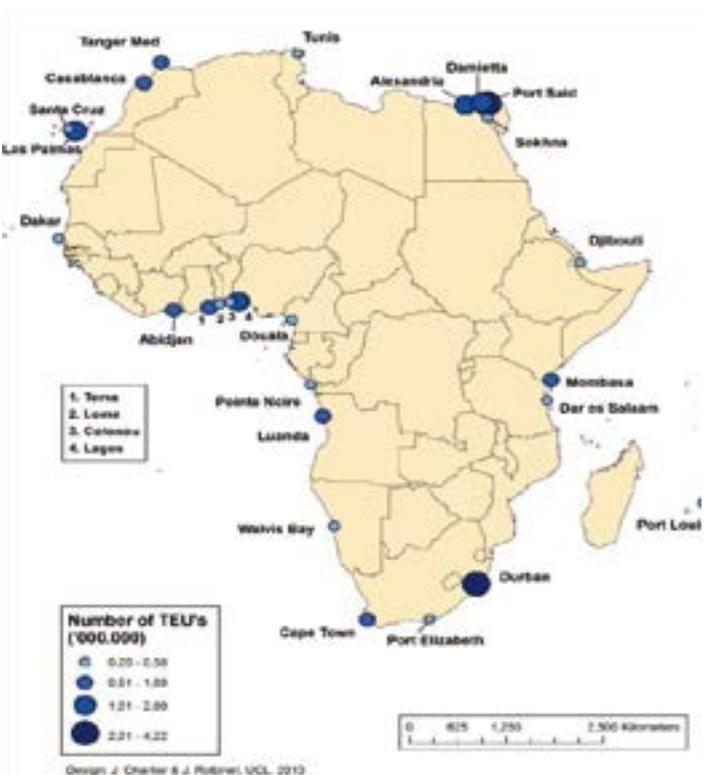
These developments are particularly linked to the emergence of middle-class consumers of manufactured products increasingly imported from Asia. However, as West African ports also serve the transit trade of landlocked countries, a real competition to access the status of West African hub is engaged. The export of commodities also contributes to this trend.

Nevertheless, as port performance is now strongly linked to strategic transshipment capacities, including multimodal transport and connection to roads, the West African network does not yet meet the criteria to contribute to the emergence of hubs, although important projects are now under discussion at the regional level (notably the Cotonou - Abidjan Rail Loop). This competition has accelerated in recent years, with the increasing number of port infrastructure concessions. These developments are largely associated with the activities of *Bolloré group* and its subsidiary *Bolloré Africa Logistics* as well as Africa operations of *AP Möller group* and its maritime subsidiary *Maersk-Sealand*. The political insecurity that still persists in West Africa also contributes to slowing down the search for complementarity or improved efficiency between the various port infrastructures. By way of illustration, projections foresee a doubling of containerized volumes by 2020.



Cotonou- Abidjan Rail Loop Project

All major West African ports are practically of colonial origin and are deeply integrated into the urban settings of large capital cities. As a result, these infrastructures are confronted with (i) the availability of suitable spaces for development purposes on the one hand, and the management of resulting externalities, particularly for the environment including the erosion subsequent to the interruption of coastal drift by jetties, which are directly noticeable in urban areas where the stakes are concentrated. A real dialog between ports and cities is yet to be established, whereas such dialog would allow for better management of logistical (especially road and urban) constraints relating to pre-and post-shipment movements.



Container traffic in African ports in 2012 (according to Debrie, J. 2014. Hubs portuaires 3: les stratégies des opérateurs sur la façade ouest africaine. Université Paris 1)

The management of changes in port activity by States is a topical challenge, given the increasing risks related to these infrastructures, which are the cause of the most striking situations of shoreline recession in West African coastal strip (ports of Nouakchott, Abidjan, Lomé, Cotonou for example). The description of the main changes in West African ports between 2010 and 2016 is presented in the updated comprehensive master plan.

Mining ports

In most cases, the traffic in mining products is integrated with the existing major port infrastructure; however, it should be noted the specific case of SNIM port in Nouadhibou (Mauritania), Buchanan port in Liberia which is mainly used for exporting Arcelor Mittal's iron, but above all Guinea projects for the construction of several mining ports (as mentioned in the updated comprehensive master plan) in mangrove areas known to be sensitive. These projects should be linked to the dynamism of the sector and should be carefully supervised.

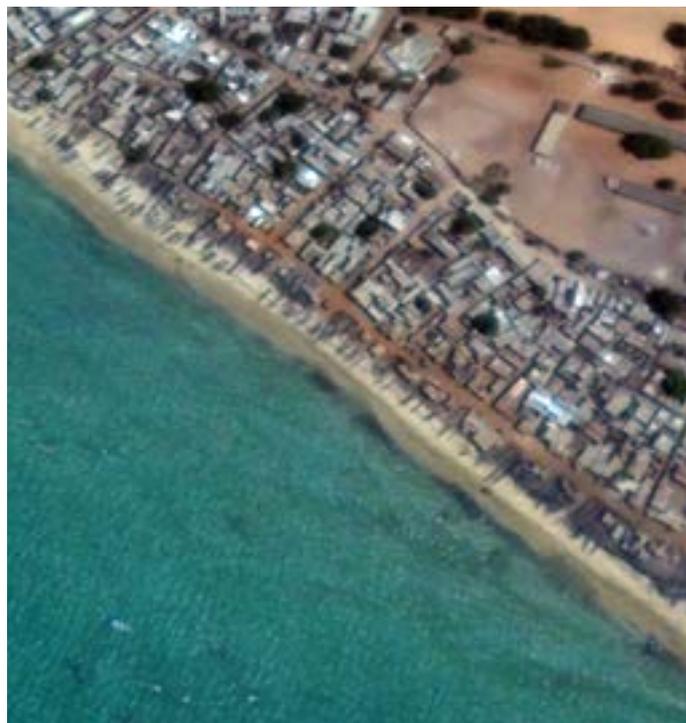
With more than 40 billion tons of bauxite (2/3 of the world's estimated reserves), 10 billion tons of iron ore, 2,000 tons of gold and 10 million carats of diamonds, the Republic of Guinea is coveted by world's largest corporations, especially with the emergence in recent years of a number of megaprojects, driven by China's growing demand for commodities. (Centre international de ressources et d'information sur l'intelligence économique et stratégique, 2012)

Fishing ports and landing points

The work carried out as part of the update of the SDLAO to complement 2011 data revealed more than 400 landing points, ranging from simple beaches where canoes are parked to real fishing ports such as that of Nouadhibou or Elima in Ghana. In some cases, as in Nouadhibou, small processing units are associated with these ports. These infrastructures are also threatened by shoreline mobility and have suffered several degradations as in Joal, Senegal, for example. In other cases, the hydro-sedimentary conditions determine the formation of bars which strongly thwart boat launches and make them more and more risky as in Saint-Louis, where deaths of fishermen are recorded

each year or in Grand Bassam in Cote d'Ivoire.

In other cases, the proximity of landing points results in impacts on the mangroves. Mangrove trees are cut to provide the wood used for fish smoking. In general, small artisanal processing units also have impacts in terms of organic pollution, especially when they are located near urban or residential and tourist extensions. Given the gradual shrinkage of beaches, conflicts on the use of these spaces between tourist activities and fishing activities are increasing.



Landing of canoes in Mbour (Senegal) erosion-prone beaches, constantly decreasing areas.

3.2.2. ROAD NETWORKS

Since the publication of the SDLAO, the regional coastal road network has not undergone a very significant change. However, two major trends emerge:

The progressive consolidation of the Inter-State Abidjan-Lagos road corridor: this consolidation is based on a sequenced approach from West to East:

- ⇒ **Côte d'Ivoire:** Abidjan - Abidjan Airport - Jean Folly - Anani - Grand Bassam: Despite the risks of shoreline recession at the level of Jean Folly and Anani, the highway coastal route has been maintained in this sector, the highway being thus away from the shoreline between Anani and Grand Bassam.
- ⇒ **Togo:** Circular boulevard and widening of the seaside boulevard in Lomé, enlargement of the road section Aného-Sanvee Condji.
- ⇒ **Benin :** Rehabilitation of the national interstate Hilacondji - Cotonou road, Ouidah - Cotonou highway, Cotonou - Nigeria highway project
- ⇒ **Ghana:** Project for the construction of a 6-lane highway announced in 2013.

Highway link with peri-urban extensions:

Senegal: Dakar - Thiès - Mbour: after the construction of north and south distribution roads in Dakar, a toll highway connects Dakar to Diamniadio (the first in Senegal). With an extension of 16 km, it must also serve the new airport "Blaise Diagne" under process of completion and located 42 km from Dakar. The sections linking Thiès on the one hand and Mbour in the petite Côte on the other hand, with a length of 50 km are under process of completion. Important port and industrial developments expected in the coastal area of Bargny, such as the progressive and highly advanced urban sprawl on the Petite Côte and the rapid peri-urban expansion of Mbour, potentially determine a risk situation in all coastal areas located South of Dakar,

which are now unlocked by this highway. The development of the new hub of Diamniadio may help relieve the pressure of buildings in direct coastal areas.

In Senegal, the ongoing coastal road project between Dakar and Saint Louis on the Grande Côte has started with the first works for the extension of the Northern Distribution Road and the construction of a first coastal section of this road behind the neighborhood of Guediawaye.

Guinea: Conakry – Coyah: This highway connection should, over time, reach the future airport of Maférényah. It should serve new urban extensions located in the north-eastern periphery of Conakry, which is the main extension area of the capital in a corridor limited in the North by significant reliefs and in the South by mangrove areas.

Côte d'Ivoire: the highway linking Abidjan to Grand-Bassam will facilitate access to the coastal residential extension area established in continuity of the city in the east of Abidjan.

3.2.3. URBAN AND BUILT-UP EXTENSIONS

It is difficult to date and accurately assess changes in urban extension areas along the West African Coast. Indeed, the baseline situation established in 2010 is based on high-resolution image mosaics, sometimes of uneven quality, dated between 2005 and 2010²¹. More than a date interval, the changes observed for this update are compared with the situation highlighted during the SDLAO, taking account of the fact that multi-date images are used. This question is discussed in the Annex 3 on methodology.

However, the comparison between the two situations reveals notable developments:

- ⇒ **Increasing progression of peri-urban extensions:** it is interesting to note that these extensions are mostly made landward of agglomerations and not seaward, as those areas are generally already saturated for a long time.

²¹ *The SDLAO mission had no budget for satellite image acquisition. Such a budget would have been particularly significant, given the size of surface areas covered throughout the 11 000 km of the West African Coast. Furthermore, MOLOA did not have a budget dedicated to the acquisition of images.*

- ⇒ **Progression in some situations of axial residential extensions** along direct coastal roads located at the entrances or exits of major cities on the coastal road corridors.
- ⇒ **Sometimes rapid development of some urban centers and secondary cities** distant from the coast and likely to polarize future developments away from the coast.

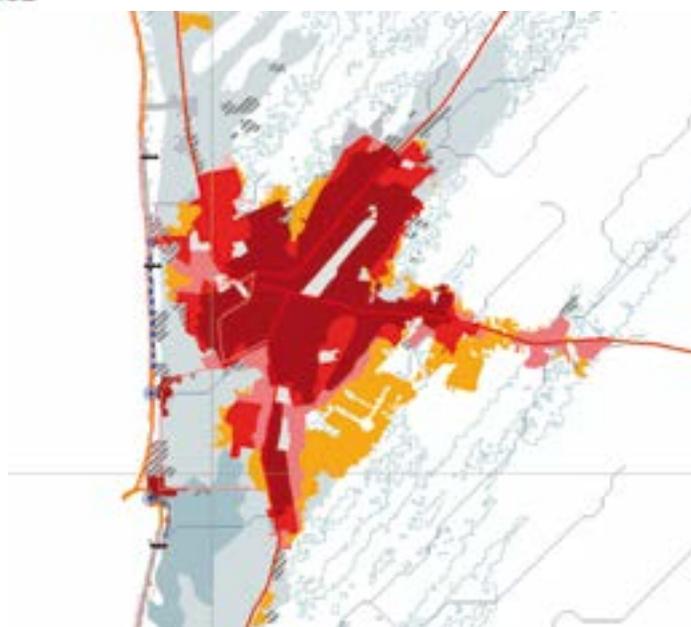
⇒ In some much localized areas, **coastal area occupancy dynamics are rapid and important.**

The legend of extension maps of main West African coastal cities presented in this paragraph is as follows:



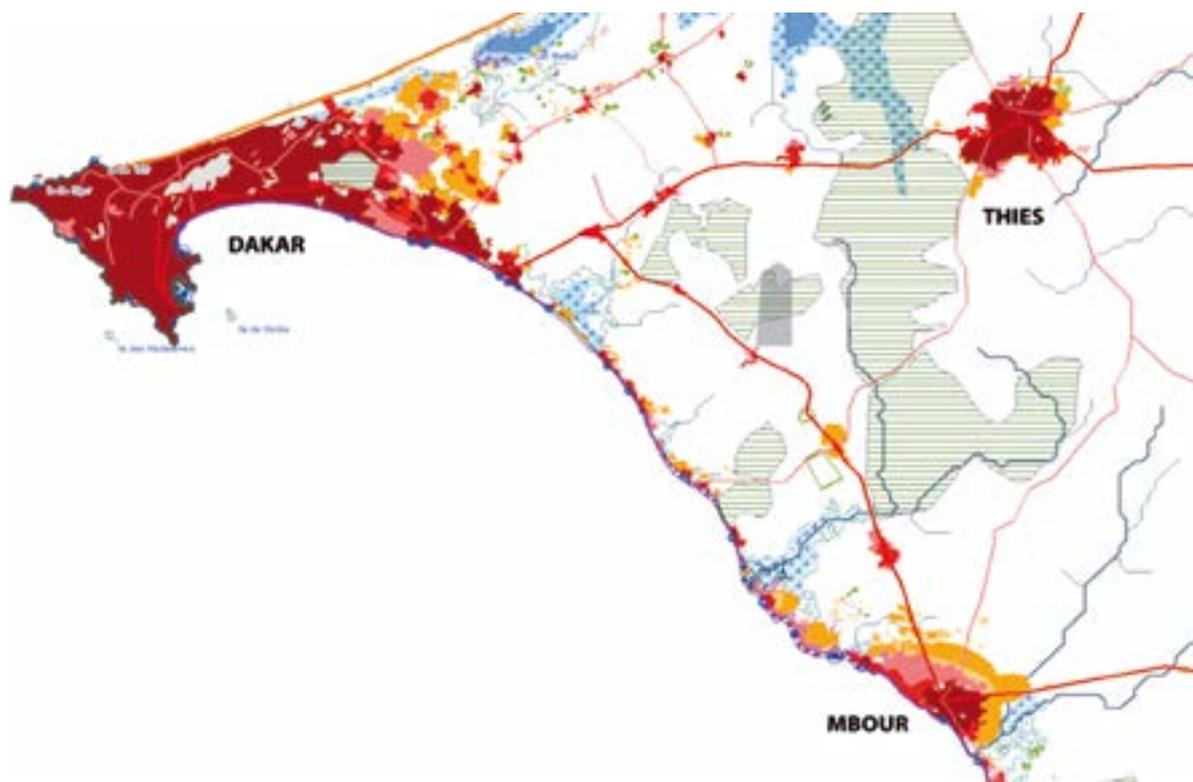
MAURITANIA

The city of Nouadhibou expanded northward along the coastal road. The acceleration of these developments, which could possibly result from the establishment of a free zone, is not yet established. Nouakchott is characterized by the vast extension of salt flats located between the city and the seafront which is itself bordered by a dune ridge locally very altered, for the extraction of materials, which is now forbidden. Work to restore this ridge is also underway. It is noted that the urban space spreads eastward and south-eastward the hinterland and more moderately towards the northern area which is polarized by the construction of the new airport and the relatively favorable geotechnical conditions beforehand identified by the master plan for Mauritanian coastal development. Some limited extensions are found along the edge of coastal salt flats, notably at the north of the port.



Extension of the city of Nouakchott observed since the situation established by the SDLAO (in yellow). There is little conquest of new spaces, but rather an upward occupancy trend. The spaces at risk are relatively respected (colored in blue-gray and blue lines representing the "low elevation coastal zone", spaces at risk located at less than 10 m rise).

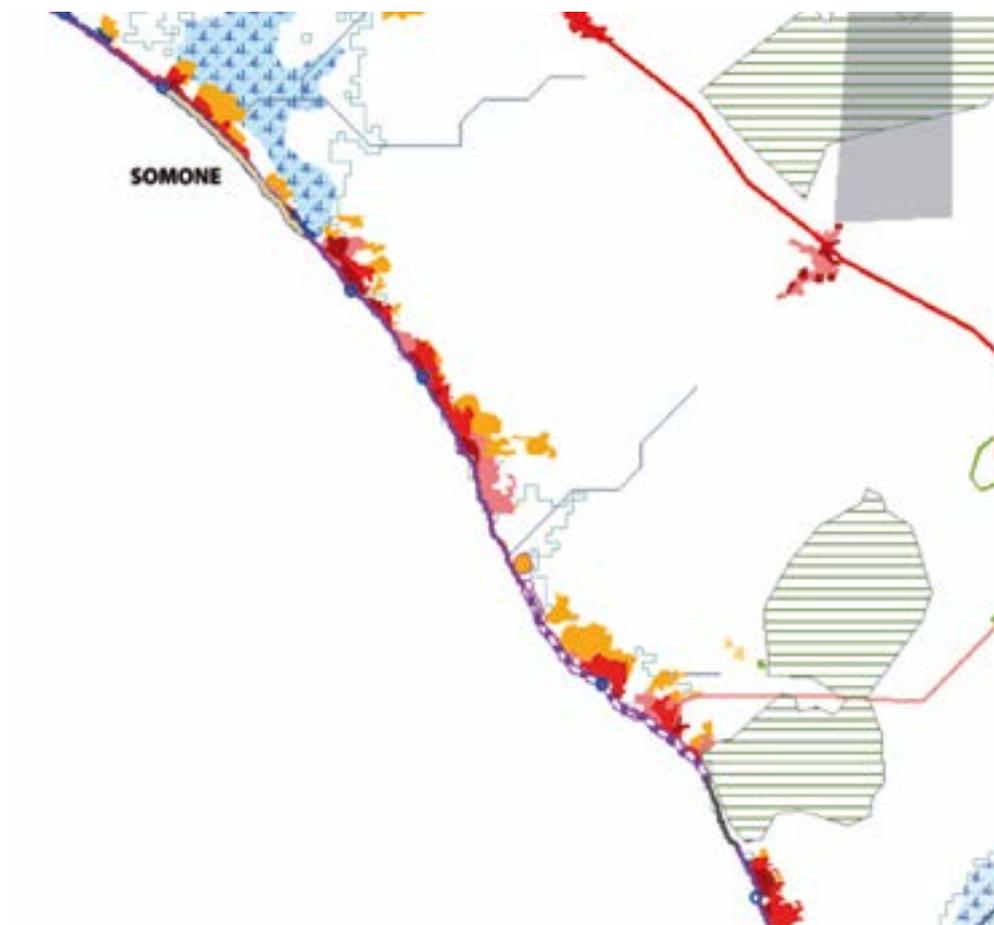
SENEGAL



*Urban developments in Senegal, the triangle Dakar -Thiès-Mbour.
New extensions, from SDLAO onward, are highlighted in yellow.*

In Senegal, there are several elements that should be noted:

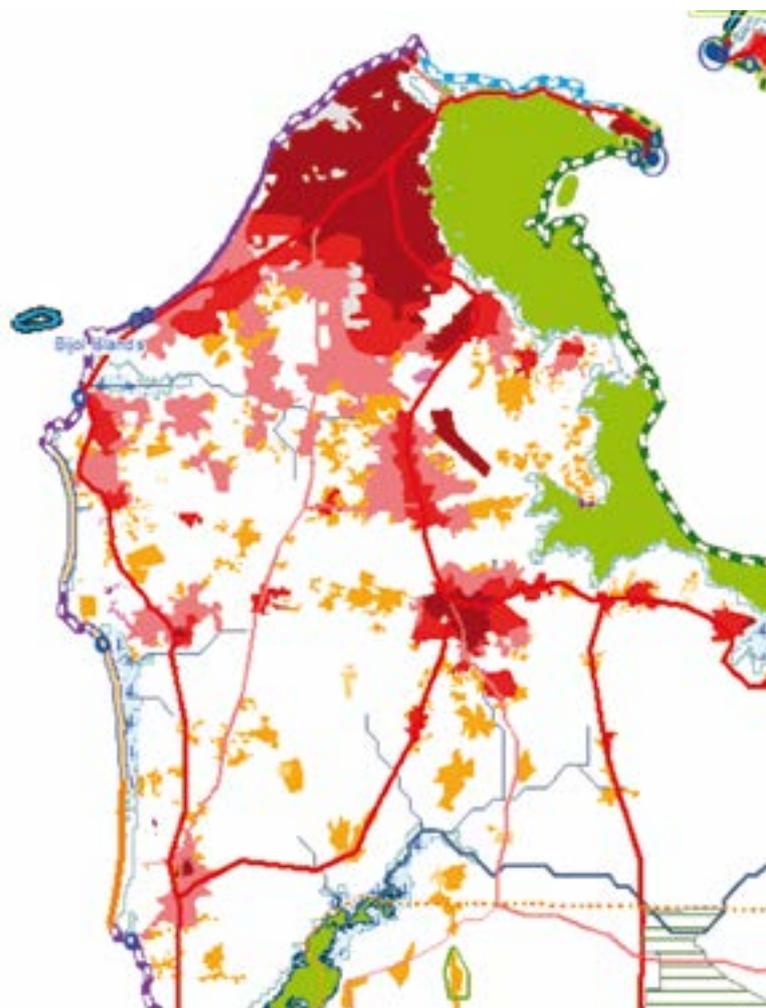
- ⇒ Urban extensions are rapid and important, both in Dakar, Thiès and above all, proportionally, in Mbour. These extensions are performed on an upward trend, and in Dakar from preexisting recent centers. The rapid extension of Mbour, facilitated by the commissioning of a partially highway link to the Petite Côte, may seem worrisome, especially given the occupancy densities characterizing the entire shoreline of the Petite Côte and the equally rapid development of important coastal urban centers at the north of Mbour (Saly and Ngaparou). Will the emerging hub of Diamniadio and the airport area of Bargny help alleviate the occupancy along the Petite Côte coastal area, which is already almost saturated?
- ⇒ The Petite Côte small coastal cities also present an important landward development, the shoreline being often saturated. Occupancy reaches the immediate vicinity of the Somone wetland.
- ⇒ Other sectors are also dynamic, but on a lesser scale: Nianing in the south of Mbour, Joal-Fadiouth.
- ⇒ All hinterland inner cities and hub cities, that are distant from the coast and situated along the roads, are also experiencing a significant expansion dynamic.
- ⇒ In Casamance, the area of Kafountine and the west of Bignona are also experiencing some developments.



*Urban developments in the Petite Côte, Senegal
New extensions, from SDLAO onward, are highlighted in yellow.*

THE GAMBIA

Few new developments have been observed on the coastal zone. On the other hand, the interior of the country is experiencing important developments around a cluster of pre-existing small towns. This dynamic is particularly remarkable in the south-west of Banjul, along the back edge of the Gambia River estuary mangroves.



*Urban developments in the Gambia
New urban extensions, from SDLAO onward, are highlighted in yellow.*

GUINEA BISSAU

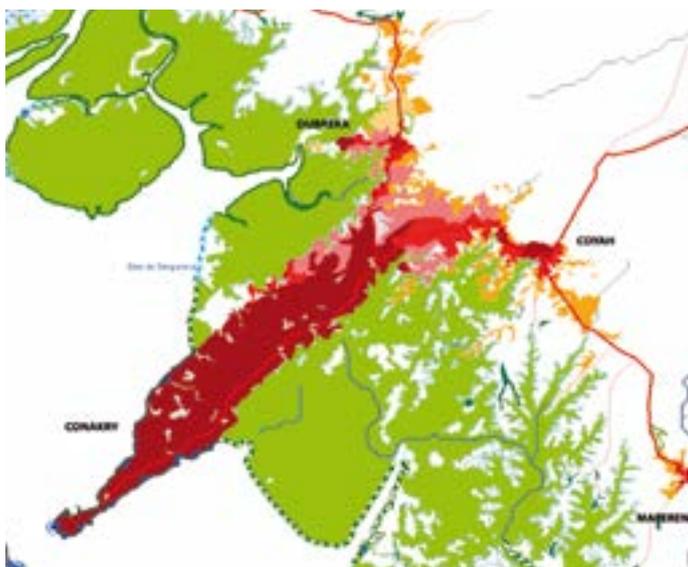
Few significant developments have been noted, except perhaps around the small town of Cachungo.

GUINEA

The pace of development of Kamsar, which expanded rapidly, seems to have slowed somewhat.

The main important developments concern the periphery of Conakry, (i) along the northern axis leading to Dubreka and beyond, but (ii) especially on the east-south-east axis leading to Coyah and Maferényah, which should host a fu-

ture international airport. A highway link towards Coyah is already planned. In this sector, the extension of the city is performed in the immediate vicinity of mangrove back areas and wetland areas bordering Conakry, with the rapid conversion of important natural areas. Many new installations in this sector are in flood-prone areas. The predictable degradation of mangroves at the front of these facilities could increase these risk situations by directly exposing these built-up areas to storm surges.



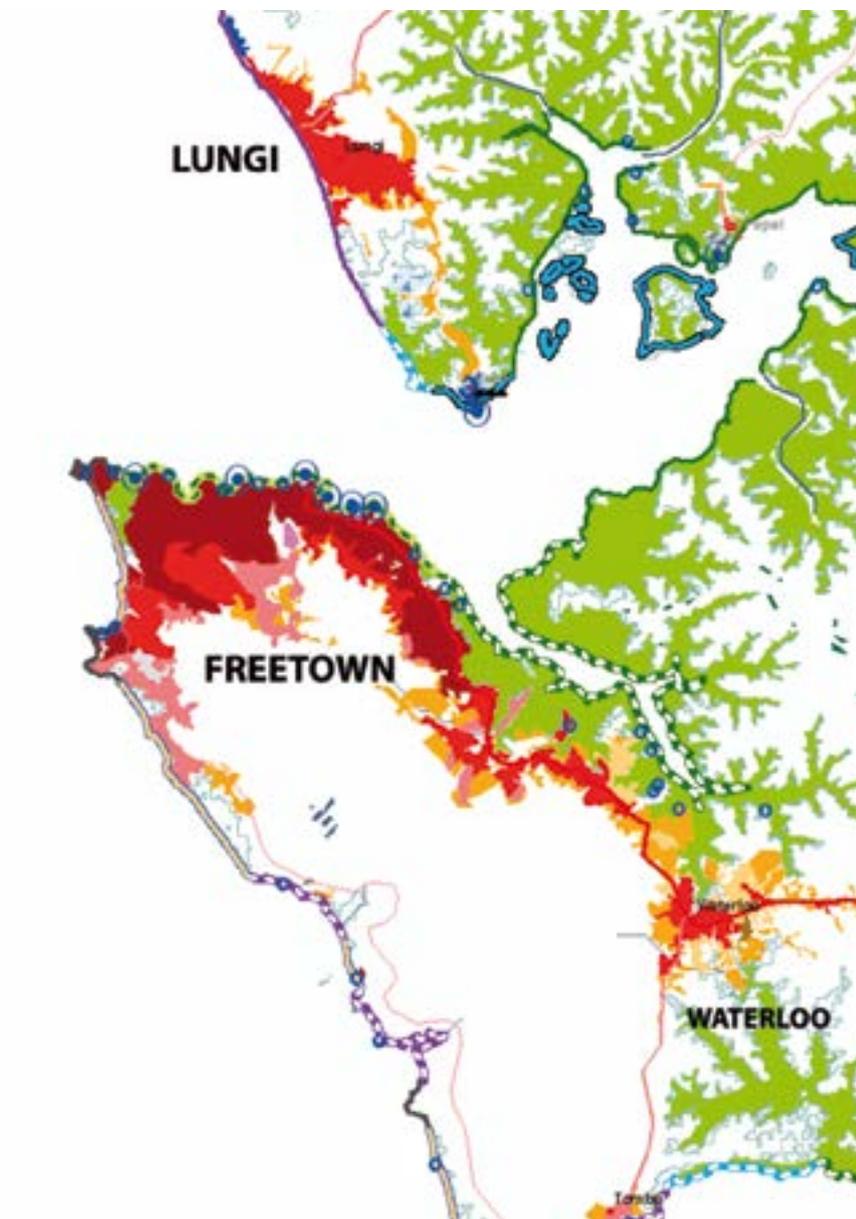
*Urban extensions at the periphery of Conakry
The new extensions since the SDLAO are highlighted in yellow.*



*Recent occupancy of low-lying areas behind the mangroves
of Conakry.*

SIERRA LEONE

Some developments are noted on the road joining Lungi to the port of Lungi. Much more significant developments in the East of Freetown Mole, at Hasting and Waterloo and along the road leading into the country's interior (Robat-Masiaka).

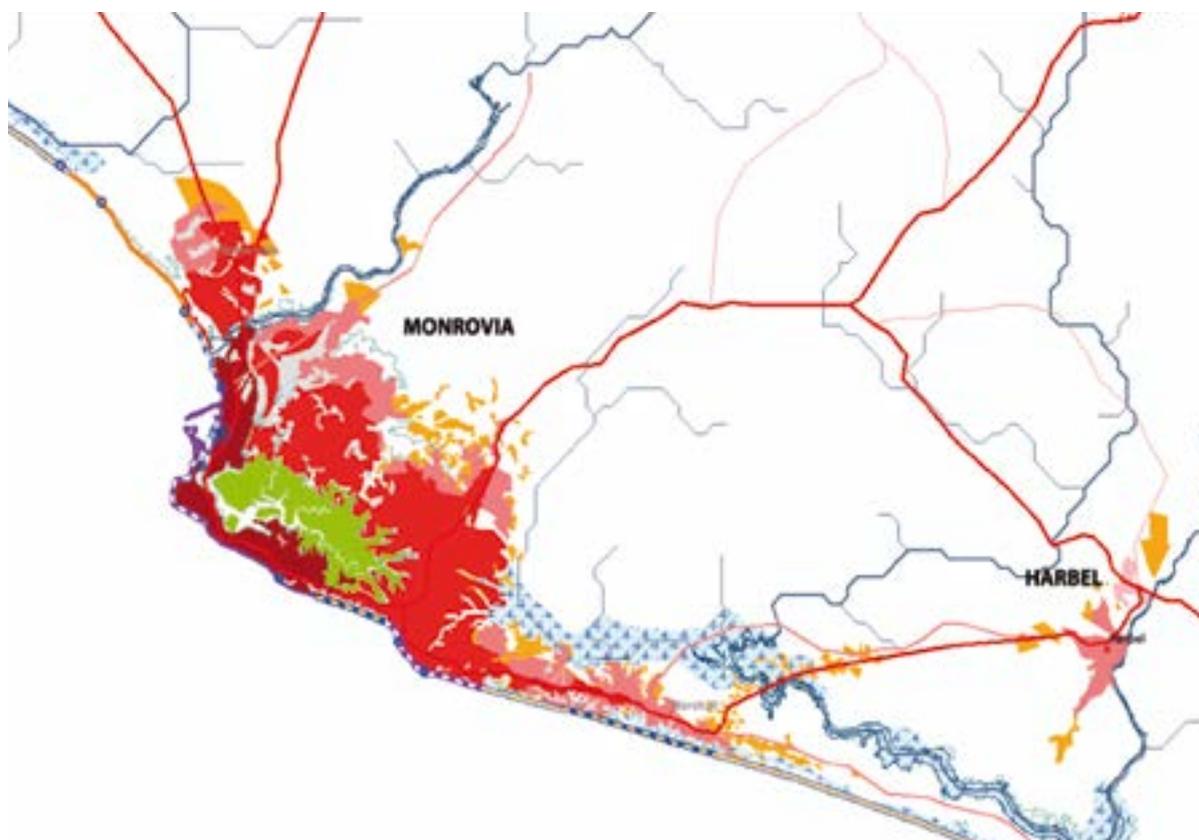


Urban extensions at the periphery of Freetown.

New extensions, from SDLAO onward, are highlighted in yellow.

LIBERIA

Some extensions in the north of Monrovia, but especially continued occupancy dynamics eastward along the coastal road leading towards Harbel and the international airport are noted. This residential space now forms a long conurbation inserted within an important wetland system.



*Urban extensions at the periphery of Monrovia.
New extensions, from SDLAO onward, are highlighted in yellow.*

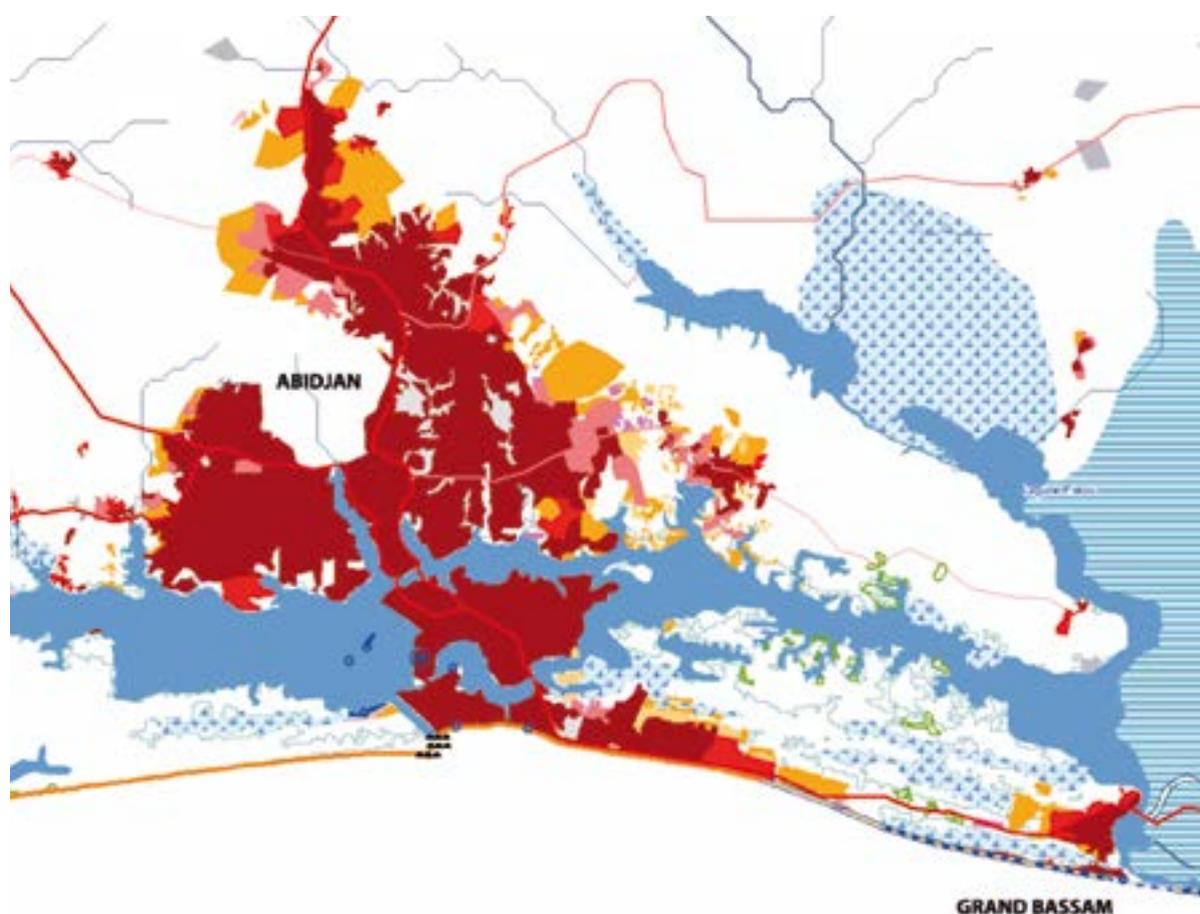
Some developments are also observed in secondary cities such as Buchanan or Harper. These developments are performed at the periphery inward and not on the coastal zone.

COTE D'IVOIRE

All the secondary cities of Cote d'Ivoire are experiencing relatively limited developments, generally concentrated in the northern periphery, i.e. in areas opposite to the coastal zone.

It is also the case of Abidjan with two main sectors: the

north and the east of the capital. The partly residential coastal conurbation continues to expand rapidly between Abidjan and Grand Bassam. It expands eastward from Abidjan and westward from Grand Bassam. This tendency is likely to be reinforced by the establishment of the Abidjan-Grand Bassam highway link, the formation of a continuous conurbation between these two cities along what constitutes a portion of the great Abidjan-Lagos corridor is probable.



*Urban extensions at the periphery of Abidjan.
New extensions, from SDLAO onward, are highlighted in yellow.*

GHANA

The agglomeration of Sekondi - Takoradi is still undergoing significant development but remains inwardly polarized. By contrast, a future conurbation is emerging and may extend eastward to Aboadze and Shama.

⇒ Extensions sprawling northward and inward. This observation is also valid for Winneba.

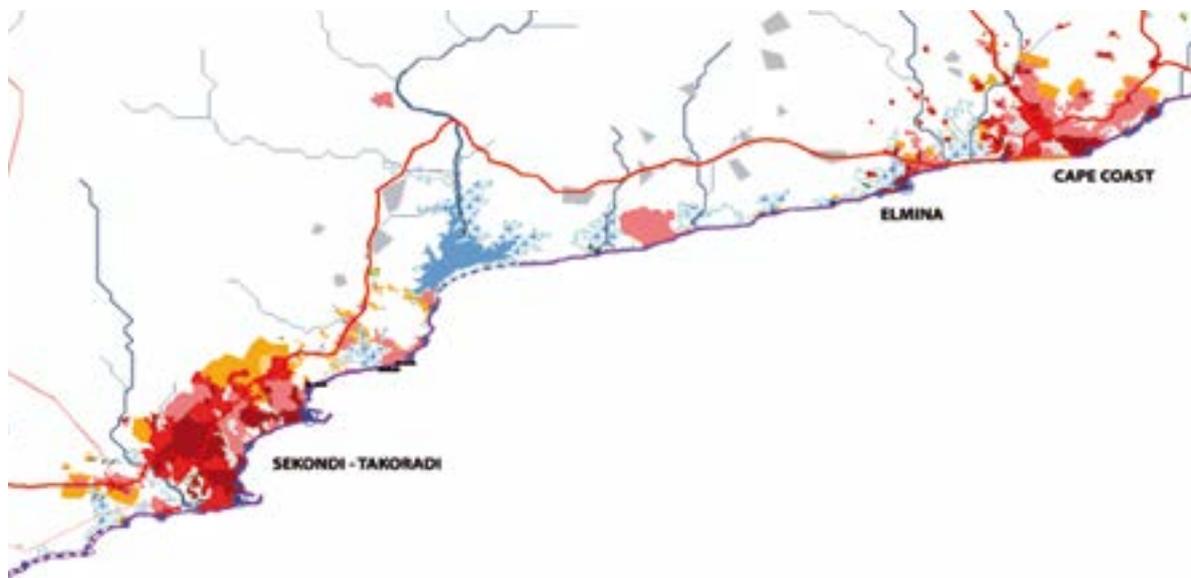
⇒ Development of hub cities

Cape Coast is also experiencing relatively limited developments that are not in continuity with each other. Future filling of interstitial spaces is predictable. Elmina can be reached in the future, while respecting the urbanization cut-off (a wetland separating the two urban centers).

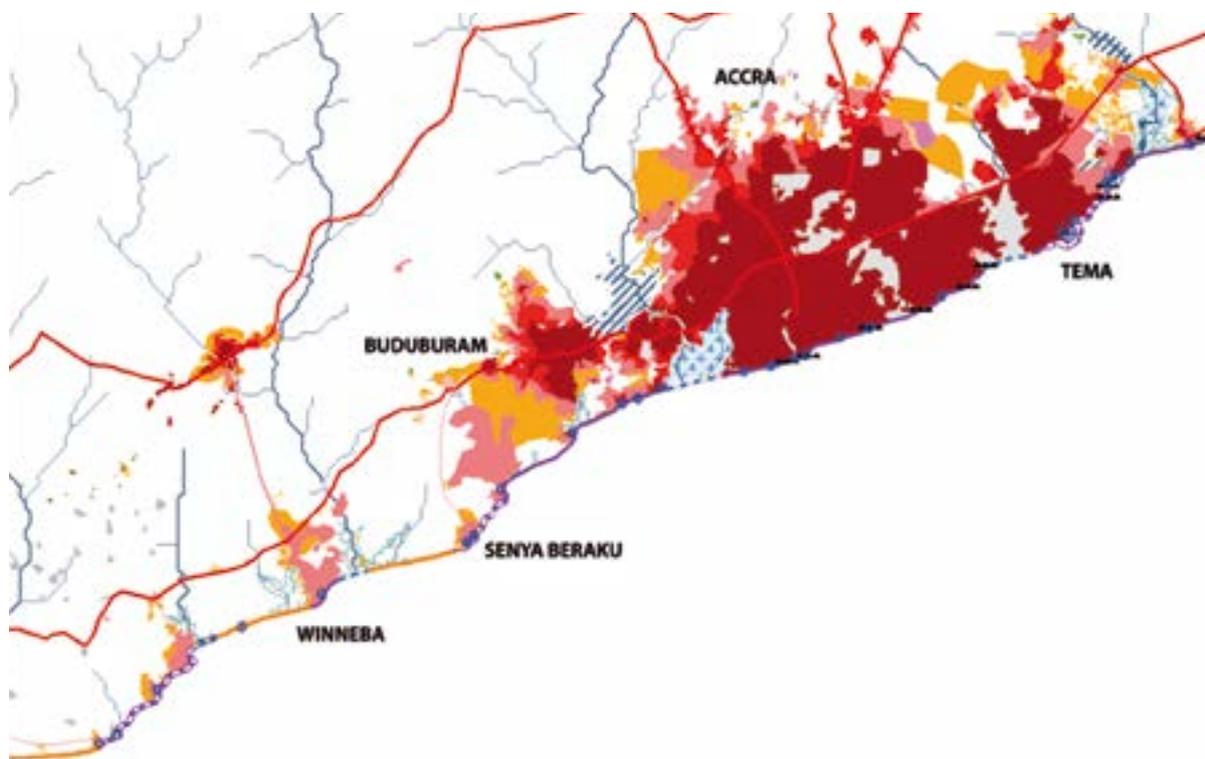
⇒ Filling of the interstices between densifying agglomerations.

⇒ Important developments in the north and east of Tema.

The entire periphery of Accra is experiencing extremely rapid development. It is based on the following trends:



*Urban extensions in Ghana, Sekondi-Takoradi – Cape Coast segment.
New extensions, from SDLAO onward, are highlighted in yellow.*



*Urban extensions in Ghana, Winneba-Tema segment
New extensions, from SDLAO onward, are highlighted in yellow.*

TOGO

In Togo, the main developments are observed in the north and north-west of Lomé.

BENIN

The main developments in Benin apply to the road towards Nigeria, in the east of Cotonou. However, they remain insignificant.

3.2.4. MINING AND OIL SECTOR

OIL

Although the recent oil boom is a consequence of a global tension on commodities that prevailed until the last few years (except in Nigeria which is an historic producer in West Africa), the first oil discoveries in Africa date back to the 1950's. Offshore exploration began in the 1980s with many deep-offshore discoveries. These discoveries increased as technologies advanced. Another advantage of West Africa's oil is that it is easier to refine than products from rival regions. Since it is an emerging activity, legal exploitation systems favor international companies. The poor legal instruments governing the management of offshore exploration and exploitation wastes also make it easier for companies to conduct their operations.

Today, all West African coastal States, except for Cape Verde, have launched exploration projects. The objective is not only to secure substantial oil revenues but also to meet ever-growing national energy needs resulting from the aforementioned trends. After these exploration projects, four countries (Nigeria not included) are already in the production phase: Mauritania, Côte d'Ivoire, Ghana and Benin. Mauritania and Benin are small oil producing countries, even if the recent discovery of oil reserves in Benin indicates a more promising future. Oil reserves in Côte d'Ivoire are located in ultra-deep offshore. In Ghana, however, oil is the second-largest source of foreign exchange behind gold²². Production now exceeds 100 000 barrels per day and it will likely increase, since the country has more than 600 million proven reserves²³.

In the other non-oil-producing countries, discoveries are increasing and countries like Senegal could soon become major producers.

The importance of the contribution of oil revenues to the development of producing countries depends obviously on their good management. States membership to the EITI should facilitate this good management.

However, ever-increasing oil production also directly leads to the construction of ground and offshore facilities, with the associated risks of pollution²⁴, industrial hazards that may be exacerbated by coastal risks related to the shoreline hardening in areas where there are currently no guidelines regulating land use.

On the other hand, the development and proliferation of offshore facilities is an opportunity that should be seized to quickly develop a maritime spatial planning approach combined with a territorial development and coastal space qualification approach. The establishment of a gas pipeline across the territorial water of such States as Benin, Togo, and Ghana is a major opportunity that Benin and Togo have already seized to set up a transboundary marine protected area. A project to expand this gas pipeline to Côte d'Ivoire (in the first hand) and then to the whole West African Coast is under consideration.

MINING

The importance of mining varies from one State to another. For some States, the mining sector barely contributes to the national economy whereas for others, it is a pillar of the economy. All exploration and exploitation operations identified in the State parties to the West African Coast Observation Mission (MOLOA) are compiled in annex 6. A three-category typology can be established:

● **Poor development of the mining sector**

The fact that the mining sector remains poorly developed in the **Gambia** and **Benin** should not prompt us to rule out growth prospects related to ongoing explorations. For the time being, production in such countries is mainly limited to industrial minerals (cement, clay, limestone, marble, sand and gravel).

²² The Jubilee oil field, discovered in 2007, is the biggest offshore oil deposit discovered in West Africa over the last decade.

²³ Kupper. C. & M. Vaghi. 2014.- Oil mapping in West Africa. GRIP Analytical note. 20p.

²⁴ According to WWF, more than 400 million tons of oil transit along the West African coasts each year.

● **An emerging mining sector**

Senegal is a major phosphate exporting-country via the mine terminal of the port of Dakar, with several operating mines and new mine projects. Gold is also exploited in Senegal and many projects are currently under study. The Zircon “Grande Côte” mine, operated by Mineral Deposit and Eramet, is in the operation phase. This type of exploitation generally gives rise to major environmental externalities that will have to be controlled. Arcelor Mittal is leading the “Falémé” iron mine project.

Guinea-Bissau: Mine production in Guinea-Bissau is presently limited to small-scale production of industrial minerals (clay, granite, limestone, sand and gravel). However, the country has potential mineral resources such as bauxite, diamond, gold, heavy minerals, oil and phosphate rocks. Several exploration projects are under way, including the Bauxite exploration project in the eastern part of the country in the Boe region (an estimated deposit of 3 million tons per year) that reportedly features a deep-water port in the town of Buba in the south-western part and a hydro-power plant on the Corubal River. The “Farim” phosphate deposit is also being explored.

Côte d’Ivoire: The country has two manganese mines and several gold mine currently are either operating or at the project stage. Other iron, nickel and cobalt mine projects are currently under study.

● **A developed mining sector**

Mauritania: the country already exports huge amounts of iron ore via the Nouadhibou mine terminal. Production is mainly concentrated in the northern part of the country in mines operated by the State-owned company, SNIM. There are several other iron mines projects. Other operations on copper and gold, are under way, including “Tasiast” one of the biggest gold deposits recently discovered and operated by the American company Kinross, and several other operations are planned. Operations on phosphate and

uranium are planned in the Southern part of the country. Some projects to exploit ilmenite or black sand extracted from littoral dunes are under consideration, but there is no operating license yet, given the effects described in the recommendations provided by environmental impact assessments. It should be noted that these sands are already under exploitation in neighboring Senegal.

Guinea: the country is one of the major bauxite and alumina producers with high value reserves exported via the Kamsar and Conakry terminals. The “Forecariah” iron mine, operated by Bellzone and China International Fund is connected to the “Konta” barge terminal, built on the Forecariah River in the previous years for productions export. Major excavations have been carried out on the left bank of the Morebaya River to set up the Marine Offloading Facility (MOF) of the iron exploitation project of the Simandou deposit that includes the construction of the mining port), a 700 km-long rail road as well as the development of the Simandou mine by Simfer S.A. (Rio Tinto and IFC)²⁵. Several projects to build new bauxite mines are under study, and there is an aluminum plant construction project. Mine constructions in Guinea results in the development of mining ports, with several projects currently under study (see updated detailed master plan).

Sierra Leone: Sierra Leone is a mineral-rich country that managed, soon after the civil war, to attract investors thanks to favorable settlement requirements. The country has two operating diamond mines and two mine projects are under study. The construction of a gold mine is being considered. A Bauxite mine is already operating. The country already exploits iron ore and several exploration activities are under way. For now, it is mainly exported via the Pepel mineral port that might be reinforced or replaced by the construction of a mine terminal in the ferry port of Tagrin. Mineral sands are being exploited and a new mine as well as an export terminal are under study. Moreover, the country has one of the biggest iron deposits, currently under-exploited and on which there are exploration activities under way and planned exploitation activities, including export-intended facilities (the Matakan deep-sea port). The recent stability enjoyed by the country aroused a keen interest among exploration companies, but poor infrastructure
 25 *The different environmental and social impact assessment reports are available at: <http://www.riotinto.com/guinea/seia-13651.aspx#13741>*

tures are slowing down the development of new mines. The country has three gold mines and several projects are under study. Two platinum mine projects are under study as well as two uranium mine projects. It should be noted that alluvial gold mining in coastal rivers can have major environmental impacts.

Ghana: Gold is one of the country's major exports and it is exploited in one of Africa's most gold-rich regions, with many exploitation and exploration sites. There are two operating Bauxite mines that supply the Alcoa's *"VALCO" aluminum smelter which is located near the port of Tema.*

There is one operating diamond mine and two others are in the project phase. Manganese and iron mine projects are under study.

3.2.5. DAMS

Shoreline recession situations are directly linked to the sediment deficit noted at the local level. Most of West Africa's sedimentary stocks are mainly inherited ones and are fed with wind inputs from Mauritania to the Cape Verde

peninsula and with river water inputs on the remaining part of the coast. The proliferation of dams obviously hinders these inputs. The construction of the Akossombo dam on the Volta has well-known consequences, which are felt not only in this river's delta, but also downstream of the long shore drift towards Togo and Benin.



Operating, under construction and planned dams (CEDEAO, 2011)

In 2011, more than 150 large dams²⁶ were built in West Africa²⁷ and about 40 new dam projects were planned in the ECOWAS region²⁸.

They are mostly known as multi-purpose dams (hydro power, irrigation, regulation, sailing, etc.).

The major dams (whether completed, under construction or planned) since 2011 in West-Africa's cross-border basins can be presented as follows:

²⁶ The International Commission of Large Dams defines a large dam as i) a dam with a height of 15m or more from the foundation, or ii) any dam between 5 and 15 meters in height with a reservoir volume of more than 3 million m³.

²⁷ The Aquastat database does not provide information on dams built in West Africa after 2008 (FAO. 2015. AQUASTAT website. United Nations Food and Agriculture Organization)

²⁸ Consultation on large infrastructure projects in the water sector within ECOWAS, assessment of and discussion on priority works projects, final version, IOW/WRCC, August 2011.

Cross-border basin	Name of the dam	Country	Reservoir capacity	Embankment height
Niger River (ABN)	Kandadji (under construction)	Niger	1.6 billion m ³	
	Taoussa (under construction)	Mali		
	Fomi (planned)	Guinea	6.1 billion m ³	42m
Senegal River (OMVS)	Felou (completed)	Mali	Run-of-river dam	13.8m (head)
	Gouina (under construction)	Mali	Run-of-river dam	23.5m (head)
	Koukoutamba (planned)	Guinea		
	Boureya (planned)	Guinea		
	Gourbassi (planned)	Mali/Senegal		
Gambia River	Sambangalou (under construction)	Senegal/Guinea		94m
Volta River	Bui (completed)	Ghana		
	Pwalugu (planned)	Ghana		
	Samendéni (under construction)	Burkina Faso		
Mono River	Adjarala	Togo/Benin		

At the national level, while Nigeria is the country with more completed big dams in West-Africa, two other countries that have overarching dam construction programs.

- ⇒ **Guinea:** especially with the Kaleta dam (completed) and the Souapati dam (planned) built on the Konkoure river, as well the Kogbedou and Frankonedou dams, built on the Milo (tributary of the Niger River) ;
- ⇒ **Côte d'Ivoire:** Mainly with the Soubré dam (under construction) as well as three other dams built on the principal course of the Sassandra river, two dams located in the north-western part of the country built on a sub-basin of the Sassandra river (baffing), two dams on the Comoé river and two dams on the Bandama river, downstream of the Kossou and Taabo dams.

The current major hydraulic project-building momentum in West Africa reflects the responses to the need for hydropower production (cheaper than fossil fuels- to give populations a better access to electricity, as well as to the increasing need for an improved water management in the context of global warming (especially for irrigation). Some infrastructures are mainly intended for mining (like in Côte d'Ivoire for example). Moreover, this trend is con-

sistent with the economic growth momentum observed in the region.

The construction of such major dams was clearly slowed down in the 1980s-90s due to their high environmental and social costs. It rebounded in the 2000s thanks mainly to the engagement of multilateral creditors (the World Bank, the African Development Bank) to subject funding to the compliance with environmental standards. This is mainly true for the Kandadji dam in Niger. Meanwhile, Chinese funds emerged on the market of investment in hydraulic infrastructures and, given their less stringent lending conditions, mainly on an environmental point of view, these contributions are really popular in the region (the Soubré, the Kaleta, the Bui dams, etc. in Côte d'Ivoire, in Guinea and in Ghana respectively).

To combine a balanced basins development, economic returns of dams, the reduction of the negative environmental and social impacts and regional integration, ECOWAS approved **the draft directive on water infrastructure development in West Africa in November 2015**. It is a legal reference framework specific to the region, the application of which, once approved, will be an enormous challenge that ought to be met.

3.2.6. TOURISM

We cannot presume that tourism is a burden on coastal systems. However, the demand in seaside leisure activities along with the persistence of anachronistic tourist and housing development models lead to unmanageable erosion situations similar to those observed in Torre Molinos (Spain). The chronological pattern of the events is the same: shoreline constructions which subsequently result in shoreline hardening and the disappearance of the upper beach sediment reserves. Reflexive beach walls are rapidly exposed or even eroded due to the disappearance of sediments. Then, anti-erosion structures, including spurs, are set up, but these only shift the problem towards non-de-

veloped areas. Even though such structures prevent sediments transit through the littoral drift, they do not interrupt offshore transit, that is why people subsequently resort to hammer-shaped spurs or breakwaters that sometimes temporarily stabilize the situation while creating other problems, such as the organic pollution of bathing waters.

This situation is observed either in geographically-spread individual hotels and residences or, on a higher scale, in areas dedicated to mass tourism. It is the case of Benin's Grand Popo, the Gambian Coast and Senegal's Petite Côte. Hopefully, the lessons learned from those failed tourist urbanization will be taken into account in new tourism developments such Senegal's Pointe Sarène, for example.

COASTAL EROSION:

A THREAT TO SEASIDE TOURISM IN SENEGAL'S PETITE CÔTE²

Tourism is at a strategic position in Senegal's economic and social development policy. It is the second income provider after fishing and the second employment-generating sector after agriculture with a 7% contribution to GDP (SES 2012). It is this importance to the national economy that justifies its integration into Plan Senegal Emergent as a priority sector, at the top of the Tourism, Industry, Culture and Handicrafts block. However, the sector will have to overcome some problems hindering its development, including: a low structured product, heavy taxes, poor access to lands, insufficient promotion methods, etc.

A largely resort-based tourism

Through its diverse potentialities, Senegal offers several tourism products. This offer includes seaside tourism (in Casamance and in Mbour), congress tourism (Dakar), discovery and return-to-the roots tourism (Gorée Island), game tourism, Safaris and, more recently, sustainable tourism with ornithology and ecotourism. Despite this various option Senegal is seen, at the global level, as a mainly seaside destination, with above 500 kilometers of beaches. The country's main seaside resorts are Saly Portudal and Cap Skirring.

The quality of the beach: a key element of seaside tourism

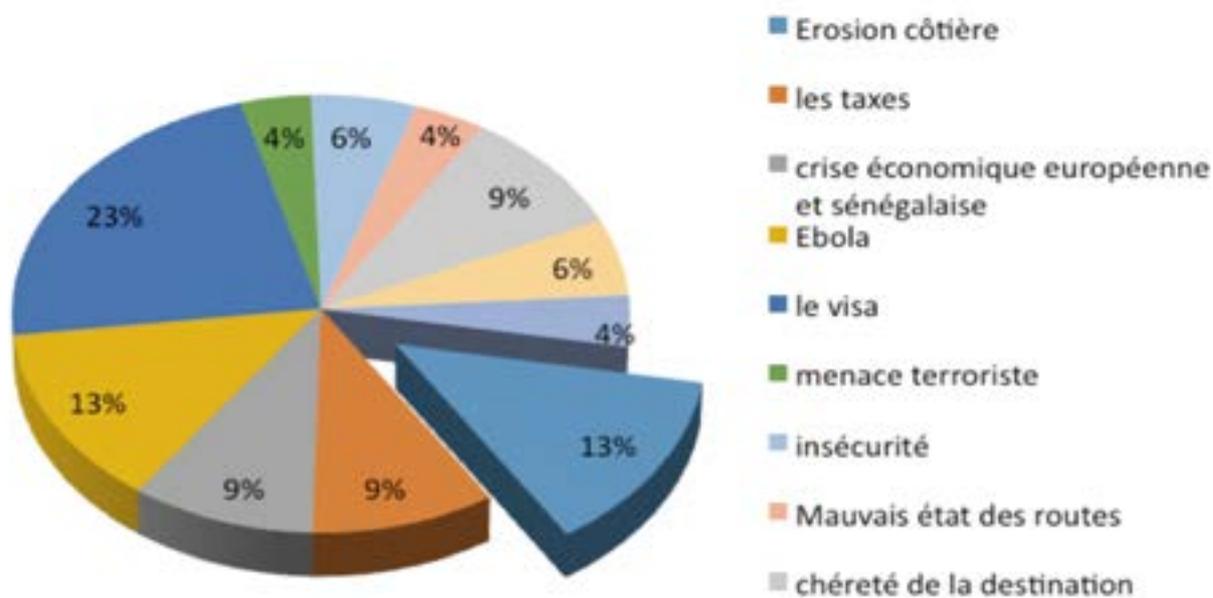
The development of seaside tourism raises the fundamental issue of beach quality. Unfortunately, in Senegal, for the past few years, beaches have been hardly hit by coastal erosion, leading to a sharp dwindling of their width or even a total disappearance in some coastal segments.



Protection works in Saly (Senegal). Located downstream of the littoral drift (on the right), the village is affected by the sediment deficit that resulted from hotel developments.

The causes of the decline of tourist activities according to operators

Several reasons have been mentioned by operators to explain the decreased attendance level of their structures.



Main reasons explaining the decline of attendance level of tourist facilities

The following figure shows that the introduction of an entry visa as well as the Ebola outbreak in West Africa are the main reasons advanced by operators. However, these are short-term phenomena and they only became effective the year 2014, even though there has been a resurgence of the disease in the region over the last few months. Senegal only had one imported case that was successfully handled; however, the psychosis that resulted from this disease hardly hit the tourist sector.

Coastal erosion is the second cause in operator's ranking, in the same position as the Ebola outbreak. Virtually all the operators identified this phenomenon as a main cause of the decline of tourist activities. "There are no more beaches". Investments made by private individuals are now threatened by the waters, especially secondary residences, restaurants, etc.

3.2.7. COASTAL DEFENSE WORKS

These constructions are the State's response to coastal hazards, but they represent pressures since they negatively affect the natural functioning of coastal systems of their host environments. These constructions, which are obviously always associated with important coastal challenges justifying their costs, have rarely shown long-

term effectiveness and must, therefore, be considered in adaptation strategies as long-term solutions designed to protect major interests, that cannot be certainly preserved in the long-run without relocation or setback operations. Such constructions are covered in the chapter on State's responses.

4. The different kinds of state's responses to coastal risks

ASSESSMENT 2016 WEST AFRICA COASTAL AREAS
GENERAL DOCUMENT

Although there is, strictly speaking, still no regional strategy to adapt to coastal risks, coastal stakeholders and the different levels of government are developing a set of responses at different levels and of scales. These responses, though often poorly coordinated, form a unit growing progressively coherent and complementary. They are developed in various areas and originate from different stakeholders, from States, governments and individuals:

- ⇒ **Overseeing the use of coastal areas and resources:** Measures aimed to adjust coastal governance to the multifunctional nature of coastal areas (ICAM - integrated coastal area management) and to define a legal and regulatory framework for the use of coastal and marine coastal resources. These measures include the introduction of governance platforms such as "Coastal Councils", the development of laws and legal instruments for their implementation, the elaboration of master plans to regulate the use and development of coastal areas and potentially loosen the occupation conditions in order to reduce exposition as well as the vulnerability of human interests.
- ⇒ **Promoting the resilience of coastal systems and preserving their resources:** Actions and policies on the conservation of natural coastal ecosystems, development and regulation of fisheries. These measures are aimed to preserve the functional characteristics of littoral ecosystems and the associated ecological services. Initially centered on biodiversity conservation through networks of marine protected areas, these measures have in fact positive effects on the preservation of sediment stocks and the resilience capacity of coastal systems.
- ⇒ **Protecting coastal interests:** These measures are aimed to protect, on the short and medium-terms the important interests previously mentioned and which are threatened by the natural dynamics of the shoreline. Coastal engineering and the establishment of anti-erosion devices are used at all levels, from major development projects on the Keta Site in Ghana, in Banjul (Gambia) or West of the Cotonou Port (Benin), for example, to local and individual initiatives such as those undertaken on Senegal's Petite Côte.
- ⇒ **Improving knowledge and awareness on coastal risks:** Almost all the universities of the region have laborato-

ries with more or less resources, or more or less linked to laboratories and Networks in the Western Hemisphere that enable them to monitor the evolution of coastal risks, at least for contingencies. UEMOA triggered an inter-state regional response that consists in promoting vigilance towards coastal risks in the framework of SDLAO and also establishing MOLOA (West-African Coast Observation mission). MOLOA remains the main regional initiative among the measures to promote a better understanding of coastal dynamics and evaluate the latter so as to inform the various decision-makers. Several initiatives to structure coastal observation mechanisms established at the national level followed the momentum generated by MOLOA (national observatories in Senegal or Benin, for example). Those initiatives should help better monitor coastal risks in those countries but also in the region as a whole.

4.1. OVERSEEING THE USE OF COASTAL AREAS AND RESOURCES: GOVERNANCE, LEGAL AND REGULATORY FRAMEWORKS

While the different States of the region have converging goals on the management of littoral and coastal resources, the internalization of global agreements they signed within national legislative and legal frameworks is advancing at different paces and according to priorities that are mainly determined by the response to the major problem facing coastal countries.

There are different response modes:

- ⇒ **Inclusive approaches based on framework documents and territorial approach to coastal development:** These approaches feature framework legislative instruments and master plans. This is particularly true in French-speaking countries.
- ⇒ **Countries with emerging territorial approaches.**
- ⇒ **Countries with an institutional approach to coastal management:** With the exception of Gambia, these countries face low coastal risks, in a context where the development of coastal stakes has also remained modest. Therefore, the need to supervise these devel-

opments is not yet a top priority, and legislative and legal actions are usually sector-centered. In these countries, the extremely rapid development of some infrastructures, especially port facilities, like in Guinea, in a poorly supervised territorial environment, can lead to rapidly increased risks.

- ⇒ The promulgation of a specific ordinance on coastal management, following the development of the PDALM in 2007.
- ⇒ The establishment of a "Conseil Consultatif National du Littoral - CCNL" (National Coastal Area Advisory Council) in 2010;
- ⇒ The process to establish an Observatory of Mauritania's coastline, initiated since 2005 (preparation of a project funded by AFD) is ongoing.

4.1.1. INCLUSIVE APPROACHES BASED ON FRAMEWORK DOCUMENTS AND A TERRITORIAL APPROACH TO COASTAL DEVELOPMENTS.

Some States developed approaches aimed to regulate both the occupation of the coastal area and the management of its resources. This is particularly true for Mauritania and Senegal, that both adopted or are adopting instruments like coastline laws. For Mauritania, these instruments are based on a master plan of the Mauritanian coastline elaborated in 2005 and which is now being updated.

From the French example, we now know the many difficulties associated with the drafting and implementation of coastline laws, and having a framework instrument also requires the elaboration and approval of more specific regulatory tools and/or locally implemented ones (the prohibition of sand removal for example).

Mauritania also has a national strategy for wetlands conservation, approved in 2015 as well as a series of legislations on biodiversity, protected areas, environment and on territorial development in coastal areas (the most important of these instruments are listed in annex 5).

Territorial development approaches validated in the PDALM since 2007 and in the framework law on territorial development since 2010 have evolved, especially with the Master plan on urban development (SDAU) of Nouakchott for the 2010-2020 period which was elaborated since 2003 as well as several coastal development guidelines (including one focused on the conservation of the "baie de l'étoile" (Star Bay).

MAIN STEPS TAKEN BY MAURITANIA

These measures include:

- ⇒ The establishment, in 1998, of a Unit for the drafting of Mauritanian coastal development plan as well as an interdepartmental committee in charge of developing Mauritania's coastline in partnership with a technical Committee. The process to develop the Plan Directeur d'Aménagement du Littoral Mauritanien (PDALM) was supported through the creation of the first prospective project of the region. PDALM calls for the establishment of instruments such as Coastal development guidelines (DAL) that promote the protection of fragile coastal ecosystems and regulate coastal occupation on the most fragile sites. A process has been initiated in 2015 to update the PDALM.

MAIN STEPS TAKEN BY SENEGAL

Senegal has initiated for many years now a process for the adoption of a specific law on the sustainable management of its coastline. This draft law on the coastline was validated by the technical committee of the General Secretariat of the Government and then by the Supreme Court. It is now before the Secretariat which will submit it to the council of ministers for approval.

In December 2012, a department in charge of coastal management was created within the Direction de l'Environnement et des Etablissements Classés of the Ministry of Environment and Sustainable Development. The country has also initiated a process for the establishment of a National Coastline Observatory with the support of the French Development Agency (AFD) and the first meeting for its implementation was held in 2015.

Senegal has made significant progress in terms of territorial development especially with:

- ⇒ The Grande Côte master plan;
- ⇒ The master plan for rain water drainage in the peri-urban region of Dakar elaborated in 2012 by the Municipal Development Agency of Senegal;
- ⇒ The [master plan for the territorial development of the Dakar - Thiès - Mbour area](#) published in 2015 by the Agence Nationale pour l'Aménagement du Territoire du Sénégal (National Land Development Agency) and that explicitly takes coastal risks into account. This

plan contributes to the "territorial development" component of the ten-year plan against floods. Its aim is to establish an overall vision of the future of this area and to define strategic priorities and the most relevant development options to deal with environmental, demographic and socio-economic issues in this fast-growing area not far away from Dakar.

Senegal also has a forest policy for the 2005-2025 period that takes mangrove ecosystems into account, a strategy for marine protected areas (see below) and a broader set of laws on biodiversity, protected areas, environment and coastal territorial development (the most important ones are listed in annex 5).

THE TERRITORIAL MANAGEMENT AND DEVELOPMENT PLAN

DAKAR - THIES - MBOUR

The area between Dakar, Thiès and Mbour, for which a territorial management and development plan has been established, is a territory of a very strategic interest. This area is characterized by diversified natural resources and hosts major structuring projects which are either completed or under way.

With respect to agriculture, the Niayes area provides most of the countries with fruits and vegetables thanks mainly to its fertile lands and its mild climate regulated by the proximity of the ocean. As for the fishing sector, the communities of Mbour, Kayar and Rufisque, which are open to oceanic coast, are Senegal's first small-scale fishing center.

This area is also the country's first extractive industry hub with mainly SOCOCIM and les Cimenteries du Sahel, that cover the country's cement needs and even beyond. This position will be strengthened by the commissioning of the Dangote cement plant.

In the tourist sector, this triangle is one of the country's main tourist hub with the seaside resort of Saly, the other tourist sites along the Petite Côte (the Nianing domain, Palm Beach, etc.) and the future development of Pointe Sarène.

Poultry farming is also very developed in the area thanks to a biophysical framework (especially temperature) favorable to farming as well as to the closeness of major agglomerations where production can be sold.

At the infrastructure level, this area was chosen to host major structuring projects such as Blaise Diagne International Airport, the Integrated Special Economic Zone, Diamniadio and Lac Rose urban centers, Diamniadio's industrial zone, Dakar's second university, Diamniadio-Airport, Airport-Thies and Airport-Mbour highway projects.

These important wealth and development potentials, along with the strong polarization of Dakar, make this triangle a strategic area, gradually attracting companies and new housing developments. This trend has been reinforced by the operation of the toll highway which makes it possible to commute between Dakar and Diamniadio in less than 30 minutes and also by the regional train project launched in 2016 to connect the two cities.

Given all these elements, it becomes crucial to control and plan the development of this area. To avoid the same uncontrolled urbanization that happened in Dakar and to better value the resources and potentials of this triangle, the Senegalese Government, through the Agence Nationale de l'Aménagement du Territoire, took the initiative to develop the territorial management and development master plan of the area between Dakar, Thiès and Mbour.

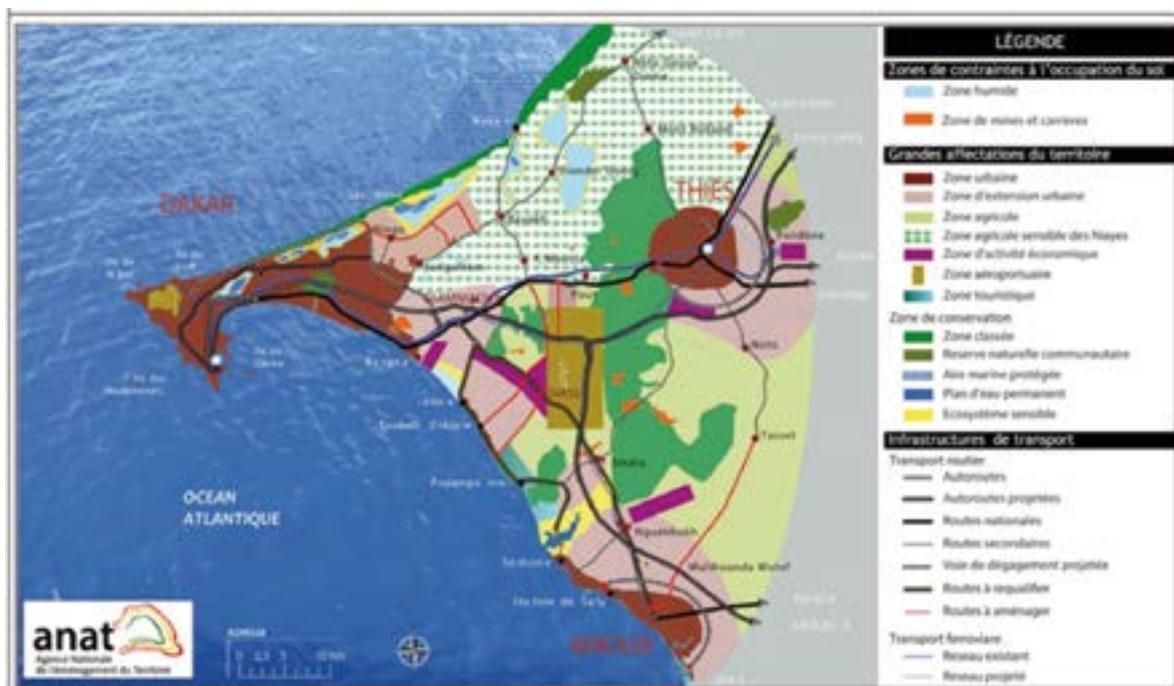
The decision to develop this plan was taken during the presidential council on floods that took place in September 2012. This project was included in the "emergency" component of the ten-year anti-flood plan.

The objectives of the master plan

The general objective is to set a common vision of the future of the Dakar-Thiès-Mbour triangle and to identify strategic priorities as well as the most efficient management and development options to meet the economic and demographic challenges. These strategies will be part of the implementation of the Plan Sénégal Emergent project as well as the spatial planning documents

Specific objectives include:

- ⇒ Propose a space use and occupation plan;
- ⇒ Help ensure coherence between structuring infrastructures in the area;
- ⇒ Accompany the initiative aimed to de-congest the Dakar's agglomeration and to metropolize the towns of Thiès and Mbour;
- ⇒ Promote the area's economic development as well as wealth and employment generation;
- ⇒ Anticipate urban and spatial dynamics through a prospective approach;
- ⇒ Promote the sustainable management of the environment and the protection of the area's sensitive ecosystems.



Major land uses of the Dakar - Thiès - Mbour area.

Presentation of the study area and methodology

The study area covers the departments of Rufisque, Thiès and Mbour. It is an area straddling the regions of Dakar and Thiès. It has a surface of 3 852 km² and was home to a total population of 1 739 897 inhabitants in 2013. The plan was developed in three steps:

- ⇒ The methodological orientation;
- ⇒ The territorial assessment;
- ⇒ The territorial management and development project.



Structure of the Dakar - Thiès - Mbour area

Visions and orientations

The area, which is a complementary territory to the Dakar metropolis, is host to major development interests for Senegal. Whatever the political choices, the relationship between the development issues of Dakar and the dynamics of the territories located in this area is pivotal for the international appeal of the Senegalese capital city. Consequently, the relationships between Dakar and these territories can no longer be limited to the center-periphery dichotomy. They have shared interests and it is therefore necessary to design a common, harmonious, fair, connected and complementary development project.

Stakeholders now have a shared understanding of the area's strengths and weaknesses, the threats facing it as well as the opportunities it can seize. It is from this understanding and consistently with the guidelines on territori-

al development and decentralization set by the different planning documents at the national and regional level that emerged a genuine vision of the future: Make the Dakar - Thiès - Mbour triangle a competitive sustainable development unit that will be a pillar of Senegalese development.

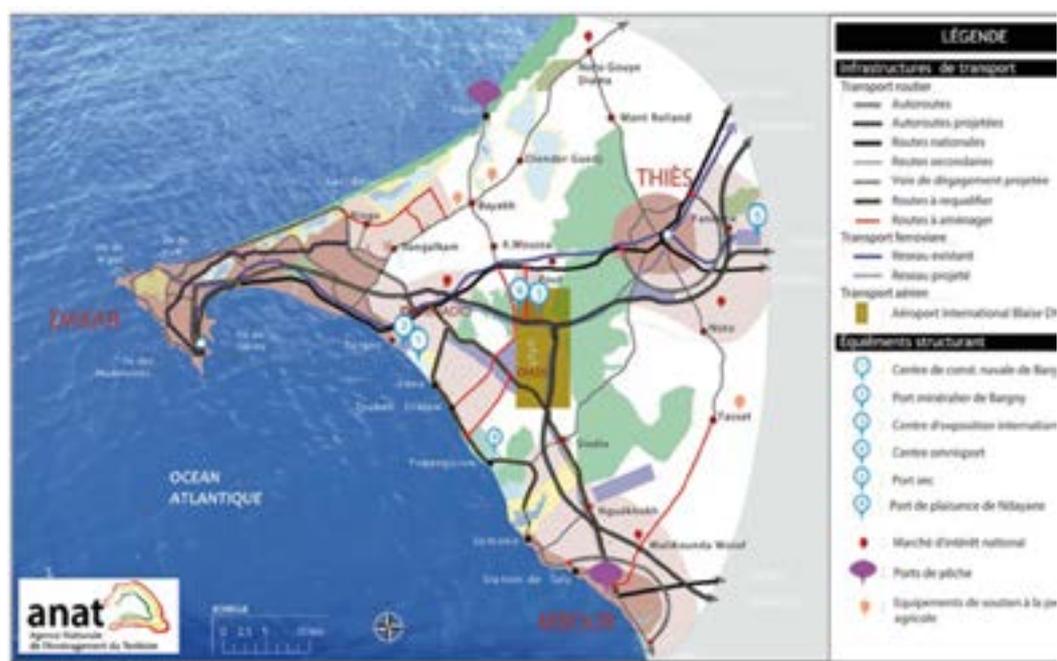
The following are the strategic guidelines that have been adopted:

- ⇒ The sustainable management of the environment and the protection of the area's sensitive ecosystems;
- ⇒ The control of urbanization;
- ⇒ Better living conditions for populations;
- ⇒ Improved mobility
- ⇒ The strengthening of the economic fabric

Major land uses

The plan proposes five main land-use areas: (i) Urban areas, (ii) Economic activity areas, (iii) Agricultural areas, (iv) Tourist areas, (v) Conservation areas.

An explicit but not exclusive use has been defined for each of these areas.



Structuring facilities of the Dakar - Thiès - Mbour area

MAIN STEPS TAKEN BY COTE D'IVOIRE

In the aftermath of the extreme climatic events that occurred in August 2011, the government of Côte d'Ivoire established an inter-departmental committee chaired by the Prime Minister to combat coastal erosion. A National Coastal Environment Program has been undertaken for which a strategy action plan is being drafted. In late 2016 a bill providing for the establishment of a national agency in charge of coordinating the country's coastline development and management activities was adopted.

The national strategy for climate change adaptation and mitigation is being formulated.

Côte d'Ivoire's 2012-2015 development plan included proposals to develop a master plan for the protection and enhancement of the coastline.

The town of Abidjan and its suburb have a Schéma Directeur du Grand Abidjan - horizon 2030 (master plan for the development of the Grand-Abidjan area to be implemented by 2030) which covers an area stretching from the District of Abidjan to its six peripheral municipalities (Alépé, Azaguié, Bonoua, Dabou, Grand-Bassam and Jacqueline). A revision of this plan funded by the Japanese International Cooperation Agency (JICA) and undertaken in March 2013 was completed in May 2015.

Côte d'Ivoire also has a forest policy for the 2010-2015 period that takes mangrove ecosystems into account, a strategy for marine protected areas (see below) and a broader set of laws on biodiversity, protected areas, environment and coastal territorial development (the most important ones are listed in annex 5).

4.1.2. EMERGING TERRITORIAL APPROACHES

MAIN STEPS TAKEN BY GHANA

In 2010, the Government of Ghana issued a strategic document entitled “*Ghana Goes for Green Growth*” to establish a green growth strategy for the country. It also developed a national development political framework entitled Ghana Shared “Growth and Development Agenda 2010-2013”. The Ghana National Spatial Development Framework 2015-2035 published in February 2015 includes a proposal for a Green Infrastructure Network (GIN) covering protected areas and green buffer zones located along coasts, major rivers, valley rivers and lakes.

Ghana has established the Environment and Natural Resource Advisory Council, a high-level body advising parliament on issues related to natural resources and environment and supervising climate change bodies, including national inter-sector bodies on climate change, the REDD+ and disaster risk management.

The National Climate Change Committee federates a host of sectoral national institutions as well as technical and financial partners²⁹ directly affected by the issue.

Ghana has a set of relevant coastal management laws and policies, especially on wetlands and mangroves (the most important ones are listed in annex 5).

MAIN STEPS TAKEN BY TOGO

A bill defining the exclusive economic zone (EEZ) was announced during the cabinet council held on 2 September 2015, whereas a Commission Nationale des Frontières Maritimes (National Commission of maritime borders) is

29 Ministry of Environment, Science and Technology; Ministry of Finance and Economic Planning; National Development Planning Commission; Ministry of Food and Agriculture; Ministry of Foreign Affairs; Ministry of Energy; Energy Commission; Ministry of Health; Environmental Protection Agency; Forestry Commission; Centre for Scientific and Industrial Research - Forestry Research Institute of Ghana; Ghana Health Service; National Disaster Management Organization; Ghana Meteorological Services; Abantu for Development; ENAPT Centre, Conservation International Ghana; Friends of the Earth Ghana; the Dutch Embassy; the UK Department for International Development.

being established with a view to enhancing the efficiency of the different works that should be conducted ahead of the talks for “a conventional and consensual maritime border demarcation and the submission of a dossier on the extension of the limits of the continental shelf from 200 to 350 nautical miles.

In 2005, Togo adopted a national strategy for mangrove protection, rehabilitation and management. Since 2008, Togo's framework law on the environment specifically governs works, buildings and developments conducted on the coastline (they should be designed in such a way to mitigate their impacts on natural resources). Amid the dangers posed by sand mining on the Togolese coastline, some inter-ministerial decrees were taken in 2011 and 2013 to prohibit those practices.

A unit on the Protection of marine environment and the coastline was established within the division for the protection of the marine and the living environment of the Department of the environment.

In September 2014 Togo established the Haut Conseil pour la Mer (a High Council for the Sea) tasked with implementing an instrument to better organize and coordinate the bodies with jurisdiction on maritime issues in Togo, as well as developments on security environmental and especially economic matters.

Studies have been undertaken in May 2014 by the Agence d'Exécution des Travaux Urbains au Togo for the development of the Schéma Directeur d'Aménagement et d'Urbanisme du Grand Lomé (development and town planning master plan for the Grand Lomé area).

Togo has a broader regulatory package on biodiversity, protected areas, and the environment (the most important ones are listed in annex 5).

MAIN STEPS TAKEN BY BENIN

The Benin's coastline bill initiated in 2000 is currently being amended and a roadmap for its approval was developed in 2017. The country carried out several reforms, institutional clarifications on the management of Benin's coastal areas since the 1980s:

- ⇒ In 1986, a decree was enacted to clarify responsibilities in coastal management and to create a coastal fund;
- ⇒ In 1999, a coastline protection squad was established within the national police; its mandate was updated in 2002.
- ⇒ Establishment of the Observatoire Béninois du Littoral et de la Mer (Benin's coastline and sea observatory) under the authority of the Housing and Sanitation Ministry and the Ministry of Higher Education and Scientific Research;
- ⇒ The town of Cotonou has developed since 2007 the Schéma Directeur d'Aménagement et d'Urbanisme of "Grand Nokoué"

The framework law on the environment (n°98-030) does not specifically address coastal issues but it does provide for a new institutional organization on environmental management by establishing a ministry in charge of defining the national policy, implementing community directives and international environmental conventions as well as the Agence Béninoise pour l'Environnement that implements the national environmental policy. It is in this capacity that the agency implemented the national environmental action plan.

4.1.3. CONSTITUTIONAL APPROACHES TO THE ESTABLISHMENT OF THE COASTAL GOVERNANCE

MAIN STEPS TAKEN BY GAMBIA

Gambia has established the National Environmental Management Council, which is chaired by the President. This Council includes all ministries with a responsibility in environmental issues and its task is to ensure that cross-sector environmental issues as well as the promotion of the active engagement of all the sectors of the society are integrated into the national planning and development. It supervises the implementation of the Gambia Environmental Action Plan. It is supplemented by a Technical Advisory Committee.

The National Environment Agency of the Ministry of Environment, Climate Change, Water and Wildlife) serves as secretariat to the Council, which provides it with pol-

icy guidelines. The Agency is mainly responsible for the management of the environment, coordinating all government activities on environmental issues. It supervises the implementation of the Gambia Environmental Action Plan. Its Inter-Sector Network deals with coastal and marine environment, agriculture, natural resources, environment literacy and the management of environmental information.

In particular, the Coastal and Marine Environment Program of the National Environment Agency coordinates and monitors all coastal and marine activities in Gambia. It develops and reviews policies and informs policy-making on coastal, marine and river activities. It convenes and advises task-forces on matters related to coastal erosion, marine and river environment, sand quarries and on urgent planning in the event of oil spills. The Coastal and Marine Environment Working group monitor and evaluate marine and coastal environment issues and includes representatives of several bodies.

Local Environment Committees are established in the municipal areas of Banjul and Kanifing within the framework of a decentralized model. Ward Environment Committees are set up in each ward and the Area Environment Committees provide for participation at the provincial level. These committees include village elders, NGOs, community organizations, local authorities, women's and youth groups and populations.

Gambia does not have a specific coastal regulation. The legal framework therefore consists of several instruments on forests, biodiversity protection and to natural resources management.

MAIN STEPS TAKEN BY GUINEA

For better coordinated interventions between national institutions and partners on issues related to sustainable natural resources management as well as on biodiversity protection, Guinea has established the National Biodiversity Unit which includes representatives of national civil society organizations and technical and financial partners and which is under the authority of the Ministry of Environment, Waters and Forests.

The national assembly has approved a new environment integrating new legal provisions designed to govern industrial and commercial activity development in the targeted Marine Domain. The Conakry Master Plan is being revised with the Grand Conakry - "Vision 2040 initiative".

MAIN STEPS TAKEN BY GUINEA BISSAU

Guinea Bissau benefits from the existence of the Coastal Planning Office, the mandate of which is to work on all coastal areas in partnership with other relevant institutions.

The country has created the office of the deputy minister for Environment which is supervised by the Prime Minister and is tasked with coordinating environmental policies and ensuring that these are integrated into broader decision-making processes. It hosts the focal points of the United Nations Conventions on Biological Diversity (UNF-CBD), Climate Change (UNFCCC) and the Global Environmental Fund (GEF). It also includes the body in charge of implementing government policies on environmental impact studies, on licensing and on the monitoring of such activities as forestry within and around protected areas. In Guinea-Bissau, a mangrove-focused law (*Anteprojecto da Lei do Mangal*) has been drafted and is now being discussed.

MAIN STEPS TAKEN BY SIERRA LEONE

The Sierra Leone Environmental Protection Agency, under the direct authority of the general secretariat of the presidency, is the government body in charge of any issue related to the environment and climate change. Its mandate is to coordinate, monitor and assess the implementation of national environmental policies, programs and projects. It also has the responsibility to design the country's climate change policy and to establish a national secretariat for climate change that became operational in 2012. Its natural resource management department includes three units: Geographic Information System, Oil and Gas Development and Monitoring of Natural Resources. Sierra Leone's EPA deals with marine and coastal issues and it is in such capacity that it commissioned a study on the

country's coastline sensitivity.

In 2010, Sierra Leone made public its forest policy that explicitly takes into account mangrove ecosystems and coastal forests. This policy provides for the establishment of steering committee to manage wetlands located outside protected areas. This committee includes the Forest Division, the Ministry of Fisheries and the Ministry of Tourism in order to tackle issues related to overlapping competencies and to determine the different roles and responsibilities. A draft policy on wetlands was prepared in 2014 and a draft law is under preparation.

The country initiated in 2015 a mapping of the sensitivity of its coastal area in order to prevent risks of accidental oil spills.

MAIN STEPS TAKEN BY LIBERIA

In Liberia, coastal issues are mainly entrusted to the Ministry of Lands, Mines and Energy Sector, Mineral Sector, Water Resource Management which is responsible for mineral resources water and energy development, as well as the management of all activities pertaining to mineral, hydrological and energy resource exploration and exploitation, including beach sand extraction. The Ministry designs and enforces policies and regulations in partnership with other bodies operating in the sector. *Environmental Protection Agency of Liberia et Forestry Development Authority*. Liberia does have a national draft policy on Wetlands - the draft National Wetland Policy 2015, that covers mangrove areas and coastal forests.

4.2. PROMOTING COASTAL SYSTEMS' RESILIENCE

West-Africa has a large network of marine protected areas, though the latter remains rather heterogeneous. Some Observations can be made from the analysis of this network:

- ⇒ Marine areas are still not well represented in this network, and when they are, they are included in recent protected areas. These marine areas are not yet subject to appropriate measures aimed to ensure their efficient management. It is only in the case of the Arguin Sandbank that long-standing substantial investments have yielded satisfying results. The forecast development of offshore oil exploitation as well as the increased number of ports and the management of their access and immediate surroundings make improved maritime area development indispensable and it mainly depends on offshore marine protected areas.
- ⇒ Many protected areas are located near rapidly developing areas, in an environment where climate change impacts are swiftly reshaping the spatial distribution of natural ecosystems and biological heritage. The development of prospective approaches can lead to a substantial shift in spatial priorities in terms of conservation³⁰ as shown in recent publications. Other recent studies also show that mangroves will be among the hardest-hit ecosystems by the rising sea level and that they cannot be protected without adaptation approaches based on recently developed ecosystems³¹. These different elements should encourage authorities to carefully review conservation strategies by better integrating marine protected areas into the territories they depend on and by providing resources to address on a short, mid and long-term basis the development that will characterize coastal areas³².
- ⇒ The conservation framework in the Gulf of Guinea can be considered as still too insufficient. Most of the small estuaries from southern Liberia to San Pedro in Côte d'Ivoire are not or insufficiently represented. From Ghana to Benin (particularly in Ghana) the conservation framework is mainly based on a set of Wetlands of International Importance (WII) recognized under the RAMSAR convention which still has uneven management effectiveness.
- ⇒ The Network of Marine Protected Areas of West Africa (RAMPAO) only covers 7 of the region's countries, from Mauritania to Sierra Leone. It is now undergoing restructuring.

³⁰ Oliver. T.H. & al. 2016.- *Are existing biodiversity conservation strategies appropriate in a changing climate?. Biological Conservation.* 193. 17–26.

Kendall. R.J. & al. 2016.- *Incorporating climate change into spatial conservation prioritisation: A review. Biological Conservation.* 194. 121–130

³¹ Sierra-Corea. P. C. & al. 2015.- *Ecosystem-based adaptation for improving coastal planning for sea-level rise: A systematic review for mangrove coasts. Marine Policy.* 51. 385-393

³² Gillson. & al. 2013. - *Accommodating climate change contingencies in conservation strategy .Trends in Ecology & Evolution.* Vol. 28, No. 3



The Network of Marine Protected Areas in West Africa (RAMPAO)

RAMPAO was formally established during its constituent assembly held in April 2007 in Praia, Cape Verde, after a long consultation and reflection process marked by formal and informal talks between the various stakeholders engaged in the creation and the management of MPAs in the region.

With 15 initial MPA-founding members, RAMPAO now comprises thirty-two (32) MPA-members from six of the seven countries of the Sub-regional Fisheries Commission (Mauritania, Senegal, Gambia, Cape Verde, Guinea Bissau, Guinea and Sierra Leone), with quite different objectives and management and governance models. RAMPAO's MPA now covers about 3 million hectares. There are three biosphere reserves in the geographical area of the network, including a cross-border reserve between Mauritania and Senegal, along with about 1/3 of the eighteen coastal wetlands of international importance - with RAMSAR site in each of the seven involved countries.

RAMPAO objective is to ensure, within the West-African marine eco-region composed of Mauritania, Senegal, Guinea, Guinea-Bissau, The Gambia, Cape Verde and Sierra Leone, the maintenance of a coherent set of key habitats necessary for the dynamic functioning of ecological processes on which depends the regeneration of natural resources as well as the conservation of biodiversity for the benefit of societies.

Here are RAMPAO's strategic objectives:

- (i) Network a set of MPA representing critical ecosystems and habitats necessary to the renewal of fisheries, the rehabilitation and restoration of critical habitats and biodiversity protection;
- (ii) Promote exchange and mutual learning between members on areas related to MPA's management;
- (iii) Create synergy between MPA on matters of common interest to achieve economies of scale;
- (iv) Make the region's MPA functional and operational for a good management of the natural resources of the coastal and marine area as well as socio-economic development;

- (v) Promote the exchange of experiences on the creations of new MPA in the region; and build mutual capacities for advocacy, and the integration of the region's MPA into the institutional framework.

The network is a cooperation platform that works, since its creation, through simple agreements between stakeholders and is based on the adherence to (i) a charter adopted in 2007, (ii) statutes also adopted in 2007 and amended in 2010, (iii) and to rules and regulations set up in 2013.

RAMPAO's current governing bodies are (i) the General assembly, (ii) the advisory council now called Executive committee, (iii) the scientific committee and the (iv) secretariat.

A debate was initiated in 2010 to find ways to secure institutional and financial sustainability for RAMPAO. Since then, a process has progressively been implemented in order to reinforce RAMPAO, especially through the strengthening of its secretariat.

The changes in the institutional environment of the Network's traditional donors (particularly the merger between FIBA and MAVA that played an important role in RAMPAO's funding and administrative support) made necessary to speed up reflection on how to change the Network's structure and functioning.

RAMPAO's sixth general assembly approved in November 2015 a process aimed to restructure and empower the network coordinated by the PRCM and that includes an initial phase of administrative and financial support from the IUCN to the secretariat during 2016. At the end, this process should enable RAMPAO to (i) revise the statutes, the rules and regulations, the charter, (ii) revise technical documents structuring the activities of the network: strategy, working plan, business plan, (iii) acquire an autonomous legal status for the network and (iv) and restructure the governing bodies, especially the secretariat and the network's membership.

The network collaborated with MOLOA for the integration of protected marine areas to the current SDLAO's update by sharing its database on the countries covered by RAMPAO that it developed in partnership with IUCN.

4.2.1. THE FACADE OF THE CANARY CURRENT

MAURITANIA'S SYSTEM OF MARINE PROTECTED AREAS

Mauritania's marine/coastal protected areas are made of:

- ⇒ Two national parks: (i) the [Banc d'Arguin national park](#) which has the international status of Wetland of International Importance (WII) - Ramsar Site and World Heritage site and which was supplemented by the satellite reserve of Cabo Blanco, (ii) the [Diawling national park](#) Diawling national park which is also a WII - Ramsar Site.
- ⇒ Of the Wetland of International Importance - Chat Tboul Ramsar Site.

The Banc d'Arguin and Diawling national parks are public establishments placed under the authority of the Ministry.

A classification process have been formally launched for the Baie de l'étoile site with the establishment, since 2010, of a monitoring committee as well as the design of the first management plan.

The Mauritanian part of the cross-border biosphere reserve of the Senegal River's delta, which was integrated into the world biosphere reserves network in 2010, comprises, as a central zone, the Diawling national park and the Chat Tboul Ramsar site. A project to re-launch the animation of this biosphere reserve is being developed.

Mauritania's protected areas are managed by the Protected Marine Areas and Coastline Directorate, du littoral of the Ministry in charge of the Environment. Its mandate is to (i) design the national policy on protected areas and coastline conservation, (ii) develop the network of protected areas, (iii) coordinate and organize conservation and development activities conducted by protected areas and promote the establishment of a network of scientific, technical, associative and institutional partners, (iv) implement national policies on the protection and management of coastline resources and (v) ensure the preservation of endangered species.

BACOMAB

The Banc d'Arguin and Coastal and Marine Biodiversity Trust Fund Limited: « BACoMaB Trust Fund », is a sustainable financial mechanism created in 2009. BACoMaB is a foundation registered under English law, recognized as a charity in The United Kingdom, with a headquarters agreement enabling it to operate in Mauritania, where it enjoys a public utility status since December 2010. It is funded by the Mauritanian State, the MAVA Foundation, the German Cooperation (KfW) and the Coopération Française (AFD/FFEM). This capital is invested in ethical and socially responsible financial markets, generating thus profits that will be used to provide sustainable funding to conservation and sustainable development activities for the Banc d'Arguin national park and other Marine and Coastal Areas in Mauritania.

Location	Type of PA	WDPA ID	RAMSAR ID	WDPA denomination
Baie de l'étoile	Proposed MPA	0		Baie de l'étoile MPA
BANC D'ARGUIN	National Park	797		Banc d'Arguin National Park
	Ramsar Site	17726	1MR001	Banc d'Arguin National Park
	Satellite Reserve	5174		Cap Blanc Satellite Reserve
	World Heritage Site	20388		Banc d'Arguin National Park
CHAT TBOUL	Ramsar Site	900595	1MR003	Chat Tboul
SENEGAL RIVER'S DELTA	Cross-border MaB Reserve	902500		Senegal River's Delta MAB Reserve

Location	Type of PA	WDPA ID	RAMSAR ID	WDPA denomination
DIAWLING	National Park	9310		Diawling National Park
	Ramsar Site	95349	1MR002	Diawling National Park

SENEGAL'S SYSTEM OF MARINE PROTECTED AREAS

Senegal has many marine/coastal protected areas which have various statuses from the different classification phases of these areas since the colonial era.

Wildlife reserves and national parks were the first to be created for conservation purposes at the beginning. During the 80s-90s, some national parks benefited from international status, including the Djoudj Park (Wetland of International Importance - Ramsar Site and World Heritage Site) and the Saloum Delta (World Heritage and Ramsar Site). They have a large spatial extent.

Since the 2000s, there has been a new approach to protected areas classification which, beyond conservation, is also focused on the re-appropriation of land and fishery management by local communities. This led to more small-scale protected areas: "community natural reserves" and the classification of "Marine Protected Areas" surrounding traditional fishing areas.

Two areas were integrated into the international biosphere reserves network:

- ⇒ The cross-border biosphere reserve of the Senegal River's Delta, which is integrated into the world network biosphere reserves since 2005, include many protected areas considered as central area of the Senegal side (Barbarie Strip national park, the Gandon community natural reserve, the Mpal classified forest, the Mpal reserve - the Mérinaguene, the Massara Foulane classified forest, the Tilène classified forest, the Maka Diamo classified forest, the Djoudj national bird sanctuary, the Naère classified forest...). A project to re-launch the animation of this biosphere reserve is being developed;

- ⇒ The biosphere reserve of the Saloum delta, which is part of the world biosphere reserves network since 1980 comprises many protected areas considered as the central area (the delta du Saloum national park, the Palmarin facao natural community reserve, and Joal-Fadiouth, Bamboung, Sangomar, Gandoul MPA...).

Marine and coastal protected areas are managed by several departments of the Ministry of Environment and Sustainable Development: (i) The National Parks Directorate and the Community Marine Protected Areas Directorate.

The country has established, since 2013, a "national strategy for Senegalese Marine Protected Areas" and since June 2015, a "National Policy on Wetlands".

It should be noted that Casamance is part of the bio-geographical plan, the Southern rivers complex mentioned below and that a project to create a cross-border biosphere reserve of southern rivers between Senegal and Guinea-Bissau is under consideration.

Location	Type of PA	WDPA ID	RAM-SAR ID	WDPA denomination
ABENE	MPA	352707		Abene marine protected area
BAMBOUNG	MPA	0		Bamboung Marine Protected Area
BASSE CASAMANCE	National Park	868		Casamance National Park
DAROU KHOUDOSS	Community Natural Reserve (CNR)	0		
SENEGAL'S DELTA	Cross-border MaB Reserve	902502		Senegal River's Delta MAB Reserve
DELTA SALOUM	National Park	866		Delta du Saloum National Park
	MAB Reserve	3044		Delta du Saloum Biosphere Reserve
	Ramsar Site	68153	1SN003	Delta du Saloum
	World Heritage Site	0		
DJOUDJ	National Park	867		Birds of Djoudj
	Ramsar Site	68151	1SN001	Djoudj
	World Heritage Site	2578		Djoudj National Bird Sanctuary
GANDOUL	MPA	0		Gandoul Marine Protected Area
GUEMBEUL	Ramsar Site	68154	1SN004	Gueumbeul
	Special wildlife reserve (Senegal)	11653		Guembeul special wildlife reserve
GANDON	Community Natural Reserve (CNR)	0		Gandon Natural Community Reserve
MAGDALEN ISLANDS	National Park	870		Magdalen Islands (Iles de la Madeleine) National Park
JOAL	MPA	352706		Joal Marine Protected Area
KALISSAYE	Bird sanctuary	3217		Bird sanctuary of Kalissaye Bird Reserve
KASSA-BALANTACOUNDA	MPA			Kassa-Balantacounda marine protected area
KAWAWANA	APAC	0		Kawawana APAC
KAYAR	MPA	352705		Kayar Marine Protected Area
LANGUE BARBARIE	National Park	869		Barbarie Strip National Park
NIAMONE KALOUNAYES	MPA	0		Niamone - Kalounayes Marine Protected Area
NOTTO GOUYE DIAMA	Community Natural Reserve (CNR)	0		Notto Gouye Diama Community Natural Reserve
PALMARIN	Community Natural Reserve (CNR)	0		Palmarin Community natural reserve
POPENGUINE	Nature Reserve	12263		Popenguine Nature Reserve
SAINT-LOUIS	MPA	352704		Saint Louis Marine Protected Area
SANGOMAR	MPA	0		Proposed Sangomar Marine Protected Area
SOMONE	Community Natural Reserve (CNR)	0		Somone Community natural reserve
TOUBACOUTA	Community Natural Reserve (CNR)	0		Toubacouta Community natural reserve



*Aerial view of a part of delta du Saloum marine protected areas
 at the Djiffer peak and Sangomar Island*

GAMBIA'S SYSTEM OF MARINE PROTECTED AREAS

Marine and coastal protected areas include four national parks, among which three are on the Wetlands of International Importance list - Ramsar Site, as well as one ornithological reserve and one wildlife community reserve. The Niumi national park, which is twinned with the Delta du Saloum Ramsar site in Senegal, is Africa's first cross-border Ramsar site.

Gambia's marine and coastal protected areas are managed by the Department of park & wildlife management of the Ministry of Environment, Water resources, Climate Change Affairs and Parks & Wildlife, the director of which is RAMPAO's current chair.

Location	Type of PA	WDPA ID	RAMSAR ID	DENOMINATION
BAO BOLON	National Park	31330		Bao Bolon Wetland Reserve National Park
	Ramsar Site	145529	1GM001	Bao Bolon wetland
KIANG WEST	National Park	2289		Kiang West National Park
NIUMI	National Park	2290		Niumi National Park
	Ramsar Site	109037	1GM003	Niumi National Park
GUNJUR	Community wildlife reserve	555547522		Gunjur Community Wildlife Reserve
TANBI	National Park	555547524		Tanbi Wetland National Park
	Ramsar Site	903024	1GM002	Tanbi Wetlands Complex
TANJI KARINIT	Bird sanctuary	62085		anjKarinit Reserve Nature Reserve

4.2.2. RIVIERES SUD ECOLOGICAL COMPLEX

GUINEA-BISSAU'S SYSTEM OF MARINE PROTECTED AREAS

Guinea-Bissau's marine and coastal protected areas network comprises several types of protected areas, including national parks, natural parks, community marine areas, hunting and wildlife reserves spread across the coast and the islands.

The Bijagos Archipelago includes several protected areas (Formosa, Nago & Tchedia islands community MPA, national park of the Orango islands group and Joao Vieira & Poilao marine national park) which are the central areas of the Bolama Bijagos biosphere reserve also on the WII list -Ramsar site.

Guinea-Bissau established an Institute for biodiversity and protected areas in Guinea-Bissau (IBAP), which is a semi-autonomous public body under the authority of Secretariat for the Environment, which has a mandate to manage the country's biodiversity as specified in the law on protected areas.

The General Directorate for Forestry and Wildlife of the Ministry of Agriculture and Rural Development plays an active role in the management of buffer zones between protected areas, biological corridors and in community engagement activities.

BIOGUINEA Foundation

The BioGuinea Foundation was created in 2011 with an objective to promote the conservation, protection and enhancement of Guinea-Bissau's environment and biodiversity, with a special focus on the country's national protected areas system. It's also aimed to fund activities related to sustainable natural resources management by communities and through environmental education.

BioGuinea is also a foundation registered under the English law, recognized as a "charity" in the United Kingdom, with an authorization to operate in Guinea Bissau. The preparation and start-up phases of this foundation were funded by a World Bank's GEF project. The European Union, the REDD mechanism, the GEF and the MAVA foundation are considering investing in the foundation's capital.

Location	Type of PA	WDPA ID	RAMSAR ID	Name
BIJAGOS	Community marine protected area	342655		Ilhas Formosa , Nago & Tchediã (Urok) Marine Community Protected Area
	National Park	317052		João Vieira and Poilão Marine National Park Marine National Park
	National Park	3047		Orango National Park
	MAB Reserve	145507		Bolama Bijagos
	Ramsar Site	0	1GW002	Bolama-Bijagós Archipelago
CACHEU	Natural park	33046		Rio Cacheu Mangroves Natural Park
CANTANHEZ	National Park	351088		Cantanhez Forest National Park
	Hunting reserve	33049		Cantanhez forest
CUFADA	National Park	342673		Cufada
	Ramsar Site	290806	1GW001	Lagoa de Cufada
VARELA	Proposed National park	342656		Proposed Varela National Park
PELUNDO	Proposed wildlife reserve	342657		Proposed Pelundo Faunal Reserve

GUINEA'S SYSTEM OF MARINE PROTECTED AREAS

Guinea's marine and coastal protected areas comprise a network of six Wetlands of International Importance - Ramsar Site created after the completion of a IUCN wetlands program in 1992. Three of those sites now have national statuses of (i) Integral natural reserve (Alcatraz) and (ii) Managed Natural Reserve (Tristao), (iii) Wildlife Sanctuary (Loos islands) in the framework of an initiative launched in 2003 by the Regional Program for Conservation of Coastal and Marine Zone (PRCM)

The Office Guinéen de la Diversité Biologique et des Aires Protégées (Guinean Office for Biodiversity and Protected Areas), a financially independent body under the authority of the ministry of environment, waters and forest, is responsible for the management of the country's protected areas.

Location	Type of PA	WDPA ID	RAMSAR ID	Name
ALCATRAZ	Ramsar Site	67983	1GN001	Alcatraz Island
	Integral Natural Reserve	0		Alcatraz Island's Integral Natural Reserve
LOOS ISLANDS	Ramsar Site	67988	1GN006	Ile Blanche
	Wildlife Sanctuary	0		Loos islands' wildlife sanctuary (Cabri islet, île Blanche and île Corail)
KAPATCHEZ	Ramsar Site	67985	GN003	Rio Kapatchez
KONKOURE	Ramsar Site	67987	1GN005	Konkouré
PONGO	Ramsar Site	67986	1GN004	Rio Pongo
TRISTAO	Managed Natural Reserve	19980		Tristao Faunal Reserve
	Ramsar Site	67984	1GN002	Tristao Islands

SIERRA LEONE'S SYSTEM OF MARINE PROTECTED AREAS

Sierra Leone's marine and coastal protected areas network includes a series of natural, forest and hunting reserves and one national park, the estuary of the Sierra Leone river which has the international status Wetland of International Importance - Ramsar Site.

In 2012, Sierra Leone created the National Protected Area Authority to manage the country's protected areas. The Conservation Trust Fund was established to provide the necessary funding for the management of natural resources, including protected areas.

Several processes to establish protected areas were halted by the Ebola outbreak that hit the country (Turtle Island, Lake Mape Mabesi, Yelibuya).

Location	Type of PA	WDPA ID	RAMSAR ID	Name
SCARCIES	MPA	555547921		Scarcies River Estuary
WESTERN AREA	National park	19249		Western Area Peninsula Forest National Park
	No-hunting reserve	5179		Western Area No hunting Forest Reserve
WATERLOO	Forest Reserve	29997		Waterloo forest reserve
MAPE MABESI	Proposed National park	19266		Lake Mape Mabesi National park
SHERBRO - BONTHE	MPA	555547924		Scarcies River Estuary
	Proposed MPA	0		Turtle and Sherbro Island
	Strict Nature Reserve (proposed)	19268		Bonthe Mangrove Swamp Strict Nature Reserve
SEEWA WAANJE	Proposed wildlife reserve	28367		Seewa Waanje Game Reserve
SIERRA LEONE RIVER ESTUARY	MPA	555547922		Sierra Leone River Estuary
	Ramsar Site	198331	1SL001	Sierra Leone River Estuary
SULIMA	Proposed Strict natural Reserve	19265		Sulima Mangrove Swamp Strict Nature Reserve
YAWRI	MPA	555547923		Yawri Bay
YELIBUYA	Proposed Strict natural Reserve	0		Yelibuya Island Strict Nature Reserve

4.2.3. GUINEA GULF CONSERVATION MECHANISM

THE MARINE PROTECTED AREAS SYSTEM IN LIBERIA

The network of protected areas with marine and/or coastal boundaries is composed of Wetlands of International Importance - Ramsar Site. Several projects have enabled to enter into a process of creation of a series of national parks, including some related to Ramsar sites. The Ebola crisis has slowed down the process.

Protected areas are managed by the Forestry Development Authority which is also responsible for forests, including mangroves. It has its own data management and geo-spatial analysis service.

Location	AP type	WDPA ID	RAMSAR ID	Name
GRAND-KRU	National Park (proposed)	555512169		Grand kru-river Gee National Park (WB Project)
LAKE PISO	National Park (proposed)	555542457		Lake Piso National Park
	Ramsar Site	901219	1LR001	Lake Piso
MARGIBI - MARSHALL	National Park	555542456		Margibi Mangrove National Park
	Site Ramsar	902909	1LR004	Marshall Wetlands
SENKWEHN	National Park (proposed)	36026		
MESURADO	Ramsar Site	902910	1LR005	Mesurado Wetlands

COTE D'IVOIRE MARINE PROTECTED AREAS SYSTEM

The network of protected areas with marine and/or coastal boundaries is composed of Wetlands of International Importance - Ramsar Site including two having the status of national parks and one of classified forest, three other classified forests are considered in this network. The *Ivorian Office of Parks and Reserves* is in charge of managing national parks and reserves of Côte d'Ivoire. The management of classified forests is entrusted to SODEFOR.

The Foundation for the Parks and Reserves of Côte d'Ivoire: The Foundation for the Parks and Reserves of Côte d'Ivoire is an Ivorian non-for-profit private institution, created in 2003 and recognized of public utility in 2009. The Foundation for the Parks and Reserves of Côte d'Ivoire - FPRCI-UK was also created in 2009 in England to allow the investment of the Foundation's funds in international markets. The purpose of FPRCI is to manage environmental funds intended, on the one hand, to finance conservation projects and programs of national parks and, on the other hand, build the management capacity in this sector.

The contributions to the capital of the Foundation are as follows: 2,3 M Euros from WWF, 19 M Euros through a debt conversion contract with KFW, and 4,5 M Euros as part of a debt conversion contract entered into between Côte d'Ivoire and France.

Location	AP Type	WDPA ID	RAMSAR ID	Name
AZAGNY	National Park	7522		Azagny National Park
	Ramsar Site	0	CI001	Azagny National Park
DASSIEKO	Classified forest	300966		Dassieko classified forest
EHOTILES	National park	20174		Ehotile islands national park
	Ramsar Site	902799	1CI005	Ehotile islands– Essouman
FRESCO	Ramsar Site	902797	1CI003	Fresco
GRAND BASSAM	Ramsar Site	902798	1CI004	Grand Bassam
National park	National Park	725		Banco national park
MONOGAGA	Classified forest	29640		Monogaga classified forest
NGANDA NGANDA	classified forest	300964		Nganda Nganda classified forest
	Ramsar Site	902800	CI006	N'Ganda N'Ganda
classified forest	Classified forest	300965		Port Gautier Classified Forest
SASSANDRA - DAG-BEGO	Ramsar Site	902796	1CI002	Sassandra Dagbego

GHANA MARINE PROTECTED AREAS SYSTEM

The protected areas with marine & coastal boundaries of Ghana are made up of a network of five Ramsar sites managed by Ghana Wildlife Department, the Ramsar site of the Songor lagoon is also part of the global network of biosphere reserves.

Location	AP type	WDPA ID	RAMSAR ID	Name
DENSU	Ramsar Site	67967	GH003	Densu delta
KETA	Ramsar Site	67970	1GH006	Anlo-Keta lagoon complex
MUNI	Ramsar Site	67966	1GH002	Muni Lagoon
SAKUMO	Ramsar Site	67968	1GH004	Sakumo Lagoon
MAB reserve	MAB Reserve	555547583		Songor
	Ramsar Site	67969	1GH005	Songor Lagoon

TOGO MARINE PROTECTED AREAS SYSTEM

The protected areas with marine & coastal boundaries of Togo are for the time being made up of the Ramsar site of wetlands of the coastal area covering the Togolese Coast including the whole coastal wetlands.

A project for the inclusion of the Mono delta in the global network of biosphere reserves, in collaboration between Benin and Togo, is underway with the support of GIZ.

A project of inclusion of the transboundary area of the Gbaga channel in the network of wetlands of international importance is being considered for the creation of the Gbaga transboundary Ramsar site between Benin and Togo.

The surrounding area of West Africa gas pipeline crossing Togo waters benefits from specific protection measures. It is envisaged, based on those first actions, to give a special protection status to that area.

Location	AP type	WDPA ID	RAMSAR ID	Name
COASTAL AREA	Ramsar Site	903069	Wetlands of Togo Coastal area	Togo coastal areas wetlands
MONO	Proposed transboundary Mab Reserve	0		Mono Delta Transboundary Biosphere Reserve Benin Togo
GBAGA CHANNEL	Transboundary Ramsar Site (proposed)	0		Ramsar Site of Gbaga Channel
PIPELINE	MPA (proposed)	0		Togo Benin Gas pipeline

MARINE PROTECTED AREAS SYSTEM IN BENIN

Protected areas with marine and/or coastal boundaries of Benin are currently made of two Wetlands of International Importance - Ramsar Site: (i) Couffo Low Valley, Coastal Lagoon, Aho Channel, Ahémé Lake and (ii) Ouémé Low Valley, Porto-Novo Lagoon, Nokpué Lake which cover the whole Beninese coastal area. To strengthen this sustainable management policy of coastal areas and ensure an operational management of coastal Ramsar sites, several Community Biodiversity Conservation Areas (CBCA) have been created following the conduct of several studies related to coastal and marine areas to be protected between 2007 and 2015. The CCA currently classified in the coastal area are: (i) Bymins, (ii) Adounko-Togin, (iii) Vodounto and (iv) Bouche du Roy (integrated to the zoning of the Mono biosphere reserve).

The fluvio-lacustrine structure of Ahémé benefits from an intercommunity rehabilitation program of Lake Ahémé.

A project for the inclusion of the Mono delta in the global network of biosphere reserves, in collaboration between Benin and Togo, is underway with the support of GIZ.

A project for the inclusion of the transboundary area of the Gbaga channel in the network of wetlands of international importance is being considered for the creation of the Gbaga transboundary Ramsar site between Benin and Togo.

Location	AP type	WDPA ID	RAMSAR ID	Name
COUFFO	Ramsar Site	220056	1BJ001	Couffo Low Valley, Coastal Lagoon, Aho Channel, Ahémé Lake
MONO	Mab transboundary reserve (proposed)	0		Mono Delta Transboundary Biosphere Reserve Benin Togo
OUEME	Ramsar Site	220055	1BJ002	Ouémé Low Valley, Porto-Novo Lagoon, Nokoué Lake
PIPELINE	MPA (proposed)	0		Togo Benin gas pipeline
ADOUNKO-TOGBIN	CBCA	0		Community biodiversity conservation areas of Adounko-Togbin
BOUCHE DU ROY	CBCA	0		Community biodiversity conservation areas of Bouche du Roy
BYMINS	CBCA	0		Community biodiversity conservation areas of Bymins (Houéké)
VODOUNTO	CBCA	0		Community biodiversity conservation areas of Vodounto
GBAGA CHANNEL	Transboundary Ramsar site (proposed)	0		Ramsar Site of Gbaga Channel



Convention on world heritage and West Africa coastal area

In application of the United Nations Convention concerning the protection of the world, cultural and natural heritage adopted

by the general conference of UNESCO held on November 16, 1972, West Africa coastal countries have engaged in identification processes and proposals for inclusion concerning cultural and natural heritages for their protection and valuation for current and future generations.

Currently, as regards the West Africa coastal area, eight coastal sites have an outstanding universal value and are listed in the prestigious "lists of world heritage" by the world heritage committee. Among those sites two have been retained on the basis of natural criteria: *Banc d'Arguin* in Mauritania (1989) and *National Birds Park of Djoudj* in Senegal (1981). The whole other sites being selected on the basis of cultural criteria with, in the Gambia *Kunta Kinteh island and its related sites* (2003), in Ghana *Forts and castles of Volta, of Accra and its surroundings and Central and Western regions* (1979), in Côte d'Ivoire *the historical city of Grand-Bassam* (2012) and in Senegal *Gorée Island* (1978) and *Saint-Louis island* (2000) as well as *the Saloum delta* (2011) (which is also subject to a postponement as regards an application for inclusion on the basis of natural criteria).

Except for the National Birds Park of Djoudj, those sites have not been included on the "list of endangered world heritage sites" but, they currently suffer from the adverse

effects of climate change namely coastal erosion and coastal risks which are largely documented and could have significant impacts in the short and medium term on their integrity (erosion of the islands of Gorée and Kunta Kinteh, of the city of Grand Bassam and some important sites in Ghana, flooding of Saint-Louis, erosion of the Saloum delta and salinization of lands).

The impact of climate change on natural and cultural sites of world heritage has been explained during the 29th session of the world heritage Committee in 2005. The Committee asked the UNESCO Center for world heritage, in collaboration with its advisory organizations (ICCROM, ICOMOS, IUCN), and interested party states and signatories of the petition which had raised this issue, to gather a group of experts to consider the impact of climate change on world heritage, prepare a strategy and submit a report on the management of the issue. Those documents were ratified by the Committee during its 30th session in July 2006. Since then, several actions have been carried out by supporting some party states and site managers through field projects and several publications³.

Beyond sites already included on the "list of world heritage", twenty coastal sites⁴, considered as being heritage sites of interest have been proposed by West Africa countries on the indicative list. Among them, the biosphere reserve of the Bijagos Archipelago proposed as mixed natural and cultural site has been subject to an evaluation and its inclusion postponed.

Most of those sites are also already impacted by climate changes and must be the subject of a special follow-up but also of actions to ensure the integrity of their heritage values.

³ *Climate change and world heritage - Report on the forecast and management of the impacts of climate change on world heritage and Strategy to help party States implement relevant management actions. Guidance document on climate change and world heritage sites and case studies - Climate change and world heritage*

⁴ *The detailed list comprising the criteria for sites included on the list of the heritage as well as proposed sites are presented in annex 8*

4.3. THE PROTECTION OF COASTAL STAKES

In front of sea progress and increased intensity of marine weather events, reactions are often late for some different reasons, which include administrative deadlines for funds mobilization for major works and the simple consent of the private sector to pay, when the diminution of the seaside really affects the attractiveness of tourist sites. The modification of the coastal hydrology also affects fishermen, both their means of production (namely earth facilities) and their security.

The simple review of high resolution images allows counting more than 130 more or less important works distributed over the whole coastal area of 11 countries. Here, we do not take into account the numerous works destroyed or which have disappeared, or of too reduced importance.

The most important defense developments are obviously concentrated in areas with stakes or in areas where stakes can be less important but where the hazard of a shoreline recession is acute.

We will mention as an example:

- ⇒ In Mauritania, the coastal area of Nouakchott ;
- ⇒ In Senegal, a large portion of the Cape Verde peninsula (region of Dakar), along the cornice, and the whole Petite Côte. Of course, there are other developed areas, but with a lower concentration of works;
- ⇒ In the Gambia, the whole north and north-east coastal area of Banjul, where ambitious actions have been carried out, namely of beach nourishment, but also the establishment of slant curves ;
- ⇒ In Côte d'Ivoire, the sectors of San Pedro and the coastal area of Abidjan in the east of the Vridi channel;
- ⇒ In Ghana, the whole Volta system, until the Keta site which is the subject of very important developments ;
- ⇒ In Togo, the whole Eastern coastal area of the port of Lomé, and especially in the border area with Benin (Aneho);

- ⇒ In Benin, the Grand Popo site bordering Togo, and the whole coastal area located in the east of the port.

In most cases, the purpose is to find a solution to shoreline recession following human-made actions : piers of port or perpendicular dykes to coastal drift disrupting the sedimentary flow, tourist seafront developments and beach walls, dams, for example the one of Akossombo on the Volta which reduces radically the sedimentary supplies of the Delta.

Today, it is recognized that, generally speaking, this type of protection does not provide the expected services:

- ⇒ Often, there are technical failures in the design of works (geometry, sizing, etc.) or they have short-term effects. The establishment of works in a defined sector makes it sometimes necessary to replicate them shortly after in sectors located downstream.
- ⇒ The impacts of those works are significant: impacts downstream of the coastal drift in sectors subject to direct reduction of sedimentary supplies and then of increased erosion, impacts on natural coastal environments, which natural functioning is disturbed.
- ⇒ The building cost is seldom the object of cost-benefit studies by making comparison with softest and reversible solutions, as outlined in documents listed in annex of the different issues of the MOLOA newsletter.
- ⇒ When they are built by the private sector, those works set a debate linked to the privatization of sediments which may be considered as a public property. Those are grabbed by an investor at the expense of other operators standing downstream the development, and even worse at the expense of villages which do not have the same financial means and see shoreline recession worsening.

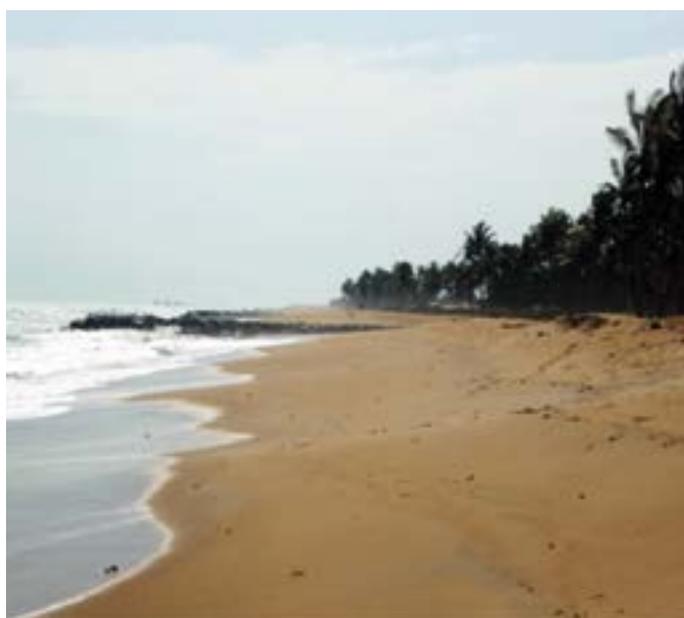
Other types of development such as dykes maintain the illusion of a false safety belied by facts like recently with the tempest Xynthia in France, all the more so as storm surge centennial values will probably be more and more frequently exceeded or simply more often recurrent.



Blockage of the sedimentary transit by a marina on the Petite Côte of Senegal



Anti erosive work leading to an increased and intense erosion of the traditional housing sector located at the bottom right of the picture



Probably under-sized works at Aného with a poor sedimentary output (between Aného and Gumukopé – 2013 – 2013) – source MOLOA Togo national office.

4.3.1. COAST PROTECTION ENDOGENOUS SOLUTIONS

Faced with coastal risks, populations and private operators of the coastal area, even with limited means, do not stay inactive and undertake often one-off coast protection actions.



Deposits of clay sediments of SNPT Agbodrafo beach in Feb. 2010 - Source MOLOA Togo national office.



Deposits of rubble downstream the port of Lomé Source MOLOA Togo national office.



Protection with sand bags - Source MOLOA Togo national office.





Protection made with tractor tyres and blocks at Buchanan (source Liberia national office)

4.3.2. INTEGRATE PROTECTION ACTIONS IN CONSISTENT ADAPTATION STRATEGIES

Even if one recognizes today internationally the numerous adverse impacts and sometimes lack of efficiency of coastal engineering solutions, they remain to be considered by addressing the following items:

- ⇒ When those solutions are required, that is to say when one tries to get a short-term effect with regard to the protection of stakes considered as high, those actions must be part of a medium term or even long-term approach, including often more structuring and sustainable actions, namely the recession, relocation and/or restoration of natural systems.
- ⇒ The choice of non-reversible engineering solutions should be preceded by an in-depth analysis of possibilities provided by soft solutions, often less costly and reversible. A technological watch must also be maintained because engineering solutions can be diversified and enhanced. For instance, artificial reefs (submerged breakwaters³³) often allow obtaining more sustainable results, while promoting the management of the adjacent marine space and enhancing biological diversity.
- ⇒ The choice of non-reversible engineering solutions should also be preceded by a critical review of similar developments done previously. The number of works disseminated along the West African coastal area is a heritage of considerable experiences which should be valued. The establishment of a database of developments should enable such à posteriori assessments, highlighting errors or shortcomings of works built and would contribute thus in valuing experiences, including those which ended in failures. Such an assignment would typically be part of the duties of MOLOA.

³³ Edwards, R.A. and Smith, S.D.A., 2005. Subtidal assemblages associated with a geotextile reef in South-East Queensland, Australia. *Marine and Freshwater Research*, 56(2), 133–142.

4.4. IMPROVING KNOWLEDGE AND VIGILANCE IN TERMS OF COASTAL RISKS

A major recommendation of the conference of environment ministers in Dakar in May 2011 related to the establishment of a West African Coast Observation Mission and recommended ***the commitment to facilitate in different countries the production and sharing of information from a network of experts***" The declaration adds, « ask in one single voice UEMOA to maintain its integration efforts, and to regional organizations and development partners operating in West Africa, to bring their technical and financial support in the implementation of the West African Coast Development Master Plan ». This provision testified to a high-level commitment and confers a strong regional legitimacy to MOLOA.

Following that recommendation, UEMOA managed to mobilize a funding over three years so as to start the initial steps of the establishment of that observation mission. The regional coordination is entrusted to the Center for Ecological Monitoring of Dakar. Nonetheless, the funding awarded by UEMOA only focused on regional actions; no funding being available for MOLOA national offices. Nevertheless, this necessity is mentioned in the document of the initial project.

The establishment of MOLOA started in April 2013 with the organization in Dakar of the regional launch workshop of MOLOA attended by representatives of partner countries and the Abidjan Convention. MOLOA three-year work program included the following actions:

- ⇒ Feedback of SDLAO results in partner countries;
- ⇒ Establishment of the data infrastructure for the monitoring of coastal systems;
- ⇒ Establishment of national offices;
- ⇒ Regular publication of the regional newsletter and of different communication products;
- ⇒ Updating of West Africa coastal areas master plan.

MOLOA is a network of national, regional and international experts, of local governments and decision-makers, created at a time of SDLAO and which is extended as it is operating, for the collection and availability of information on coastal risks in West Africa.

This network comprises nearly 500 members with very diversified profiles distributed in eleven stakeholder countries and their international partners ; environment managers, local administration (town hall, prefecture), agronomists, biologists, data managers, cartographers, land developers, planners, program officers, water resources managers, geographic information systems (GIS) designers and managers, tourist development managers, marketing officers, wetlands managers, international conventions focal points, ministry officials, communication unit officers, monitoring-evaluation officers, coastal area managers, coastal infrastructure controllers, marine and lagoon environment managers, information and documentation officers, emergency service officers, marine and small-scale fishing managers, community conservation partnership officers, mining prospection officers, marine transportation officers, land and planning officers, risk, study and prospective managers, mining facility officers, hygiene and sanitation officers, marine inspectors, policy and strategy officers, researchers, oceanographers, civil engineers, the navy, police, regional organizations (UEMOA), consultants, experts in remote sensing, biosafety, project coordinators, pollution officers and environmental police, wildlife experts, statisticians, economists, engineers, teachers-researchers, health specialists, students, environment law experts, geologists, geomaticians, meteorologists, foresters, IT specialists, tourist professionals, journalists, lecturers, professors, reporters, community marine protected area managers, research assistants, experts in renewable energies, trainees.

Since the signature of the agreement between the Center for Ecological Monitoring (CSE), the State of Senegal and the West African Economic and Monetary Union (UEMOA), the regional coordination unit, with the support of IUCN, has carried out several activities for the creation and consolidation of MOLOA network, the building of partnerships, the completion of the 2015 review of coastal areas and the establishment of a sustainable mechanism. The commitment of sub-regional experts allowed translating the political will of States into concrete actions as part of the regional program to combat coastal erosion (PRLEC). Information related as much as possible to SDLAO sectors has been produced to update the prescriptions and recommendations of 2011.

MOLOA implementation is governed by bodies created by UEMOA, at the time of the development of PRLEC, namely the regional guidance committee and the regional scien-

tific committee. The regional guidance committee is composed of 11 members, representing the ministry in charge of environment of each of the countries. In particular, this committee forwards the results of works and decisions at regional level, to the line management of national delegates to address them in national programs. The regional scientific committee ensures the methodological validity and scientific quality of works undertaken as part of PR-LEC; it guides the approaches and ratifies the results for them to be addressed by the Regional Guidance Committee.

Those two committees play almost the same role as part of MOLOA and ensure rigor and reliability. The actions of the scientific committee are required as part of the elaboration of the indicators guide for the monitoring of the West African coastal area (technical regional workshop of 13-17 January 2014) and as part of the elaboration of the 2015 evaluation of coastal areas (technical regional workshop of 20-24 April 2015). Those workshops were key moments of reflection and update of information on SDLAO sectors in terms of hazards, schemes, development projects and on the coastal legislation in different countries. The scientific committee has also interacted on strategies to be developed, aiming at MOLOA sustainability. Finally, it is the backbone of the reading committee of the coastal risks regional Atlas.

The guidance committee met in Abidjan in May 12-13, 2014 (Côte d'Ivoire), and reviewed the whole MOLOA activities since the kick-off workshop, defined the terms of information reporting towards the regional unit invested the dissemination and communication strategies around the results of the regional evaluation of West African coastal areas in 2015. Several recommendations were made by this committee on various aspects including the operation of national offices.



Meeting of the regional guidance committee in Abidjan. That meeting, held in May 13-14, 2014 in Abidjan, allowed ratifying the indicators guide, making a round-up on the progress of MOLOA and formulating several recommendations namely on the operation of national offices.

4.4.1. FEEDBACK ON SDLAO RESULTS IN PARTNER COUNTRIES

During the second and third quarters 2013, the holding of national feedback workshops on the results of the West African Coastal Area Master Plan in different partner countries mobilized MOLOA resources.

Nine workshops were organized in countries, between mid-June and mid-August 2013, according to the following schedule: Senegal, Mauritania, Guinea Gambia Côte d'Ivoire, Benin, Sierra Leone, Liberia, Ghana. Those workshops were complemented by the ones held in Togo and Guinea Bissau.

The works conducted during those workshops reflected the commitments of countries to participate in the effort to implement consistent preservation and protection actions of the West African coastal area. Opening ceremonies were chaired by senior representatives within the different States (Environment Minister, Chief of Staff of Environment Ministers, Environment Directors, etc.) Overall, the different presentations (diagnosis and regional master plan, and detailed master plan per sector, priority sectors per country and functioning of MOLOA have raised interesting and complementary debates on works carried out upstream. Once again, national experts demonstrated a clear understanding of the status of the coastal area and related stakes, of risks of coastal erosion, anthropic pres-

sure, development of tourism, climate change, etc. Workshops also allowed confirming the information provided by SDLAO.

Those meetings confirmed the existence of quality human resources, capable of ensuring the collection of reliable data and report relevant information to fill in MOLOA data base, with a view to update from time to time the status of coastal areas. The main challenge identified was the limited resources available for the functioning of national offices.



SDLAO Feedback session in June 2013

4.4.2. ESTABLISHMENT OF THE DATA INFRASTRUCTURE FOR THE MONITORING OF COASTAL SYSTEMS

The geographic information system from SDLAO has been transferred to MOLOA regional coordination. In parallel, a set of forms along with corresponding notices have been put at the disposal of national offices, with a view to collect information related (i) on the one hand, to coastal hazards, (ii) on the other hand, to the progress in stakes in different sectors. This information is used as part of the 2016 update of SDLAO.

In order to manage operational monitoring data of MOLOA activities and follow-up of sectors, a C2S application is established at MOLOA regional coordination.

The regional technical workshop, held on 13-17 January 2014 at Saly Portudal, allowed developing the indicators guide which defined the terms of documentation of hazards and monitoring of the progress of stakes (develop-

ments and occupation of the West African coastal area). Observations are made on three strips, from the shoreline : 0-300m ; 300m-2km ; 2km-5km.



Technical seminar 2014 in Saly (Senegal). The aim of that seminar was to develop the indicators guide.

4.4.3. ESTABLISHMENT OF NATIONAL OFFICES

MOLOA operational mechanism is composed of a regional coordination, and 11 national offices, with one chapter per country. Those national offices gather different ministries and are placed under the authority of the environment ministry of each of the countries. The main technical core of those national offices is composed by institutions directly represented within MOLOA scientific committee.

MOLOA national offices, in each country, correspond to a set of productive and/or user bodies of the coastal area data. They also include NGOs operating in the field and coastal bodies being in charge of managing coastal risks. The number of bodies composing chapters may be approximately thirty members. One of them is in charge of animating the network and interfaces directly with the regional coordination: it receives information and requests, collects data and reports them back.

In the initial three-year phase, those national offices have produced different types of information and especially to be reported to the regional coordination data corresponding essentially to exceptional climate weather and marine events.

They also attended two regional technical seminars held in Senegal in 2014 and 2015 with a view to update the West African coastal area master plan. Nonetheless, let us note that apart from the financing of regional events, national offices do not have a specific budget. This situation has strongly disrupted the development of a regular activity requiring, for purposes of observation, travels in the field which turn out to be expensive. Besides, the fact that many ministries and institutions are represented in chapters is not always translated into satisfactory activity coordination at national level. In this case also, the lack of a specific budget allowing convening coordination meetings has hampered the development of those possibilities.

4.4.4. REGULAR PUBLICATION OF THE REGIONAL NEWSLETTER AND OF DIFFERENT COMMUNICATION PRODUCTS

MOLOA has managed to produce on a regular basis a newsletter largely disseminated in 11 countries in two languages, French and English. The dissemination network including the whole MOLOA correspondents gathers today 477 people with the regional space. The partnership established initially between the European Atlantic Network for Coastal Risk Management (ANCORIM) and MOLOA allowed the dissemination, in annex of the liaison letter, of a comprehensive document on soft and reversible solutions to coast protection. MOLOA has also designed a regularly updated website: <http://www.cse.sn/moloa>.



2015 Technical seminar in Saly (Senegal)

We may also question the fact of entrusting the observation of the coastal area to scientific entities in charge of the geomorphological monitoring of coasts. Indeed, given the necessity for anticipation, ministries in charge of planning, land development, economic development have the responsibility of monitoring missions in so far as the evolution of coastal stakes and occupation of the coastal area are the main determinants of the evolution of risks.

The institutional developments underway in some countries with processes for the establishment of observatories of the coastal area at national levels (Senegal, Côte d'Ivoire, Benin...), must allow advancing MOLOA regional observer network. MOLOA in its functioning must adapt to those developments; the regional coordination shall also be capable of providing support in terms of organization and methodology to ensure the effectiveness of its mechanisms and their articulation with the regional system.

Séminaire sur l'identification des indicateurs de suivi du littoral ouest africain

La MOLOA a organisé le séminaire sur l'identification des indicateurs de suivi du littoral ouest africain, du 13 au 17 janvier 2014 à Saly Portudal (Sénégal). Les 11 pays membres de la MOLOA y ont participé au travers de la présence de chercheurs et techniciens, souvent également membres du Comité scientifique du PRLEC de l'UEMOA. Le séminaire s'est déroulé avec l'appui scientifique de l'IUCN et a été présidé par le président du comité scientifique du PRLEC, le Pr Papa Goumba Lo. Au travers des trois principaux ateliers, une batterie d'indicateurs a été établie dont la systématisation et formalisation sont actuellement en cours en vue de produire un guide d'évaluation des indicateurs de changement et d'évolution du littoral au sein des 179 secteurs côtiers définis par le SDLAO.



Extract of MOLOA newsletter issue 3, quarter 1, 2014

4.4.5. PARTNERSHIPS AND EVENTS

An important network of partners has been developed at regional and international level. The agreement signed with IRD allows sheltering MOLOA in the premises of the International Research and Teaching center of Mbour (CIREM). Other partnerships have been established, namely with ANCORIM (Atlantic network for coastal risks management); or else with the European project MESA based in Ghana.

MOLOA regional coordination also attended the different international events by delivering presentations on MOLOA network and works in progress. A summary of those events is in annex 7.

Strengthening the regional observation mechanism of West African coastal areas goes through a diversification of funding sources of the regional mechanism and national dynamics.

ClimDev Special Fund initiative for the strengthening of the West African coastal area observation mechanism

MOLOA through a partnership with CSE and IUCN has proposed an initiative to the funding mechanism « *ClimDev Special fund – Climate for Development in Africa* » to consolidate the regional cooperation mechanism necessary to the continuous production and dissemination of reliable and updated information on the evolution of coastal area risks intended for decision-makers and managers of coastal spaces of the eleven MOLOA party states. The main expected outcomes and activities scheduled as part of this initiative which should be launched in 2016 are :

- ⇒ the establishment of a reactive and reliable information chain on determinants of coastal risks (hazards and stakes) through :
 - the consolidation of national networks of coastal area observers with an enhanced implication of hydrometeorological services;
 - the conduct of specific studies-evaluation on evolution dynamics of coastal stakes;
 - the design of a database on coastal defense works;
 - the scaling-up of feedbacks on sites marked by exceptional events;
- ⇒ the supply of managers and decision-makers of West African coastal areas with reliable and updated information on the evolution of coastal risks with :
 - biannual updating of the assessment of the status of coastal areas in 2017 and 2019;
 - the updating of MOLOA website;
 - the writing and dissemination of the newsletter;
- ⇒ The enhancement of the regional governance of coastal risks so as to enhance the pooling of information and inter-State coordination of coastal area development action (namely in strongly interdependent transboundary coastal spaces) with :
 - The adoption of an additional protocol related to coastal risks pursuant to article 10 of the Abidjan convention;

● *The operation of regional technical and guidance committees of UEMOA Regional Coastal Erosion Control Program;*

⇒ The capacity-building of actors and managers of West African coastal areas in terms of coastal risks reduction (experience sharing, training and North-South exchange platform).



West African Coastal Areas Management Program (WACA)

The West African Coastal Areas Management Program (WACA) was established at the initiative of the World Bank in 2015 to respond to the growing demand of the region's countries for support in the management of erosion issues and more generally of coastal risks. Aware of the requirement for multi-sectoral actions - in land development, infrastructure, management of natural habitats and pollution management - those countries requested technical assistance so as to identify the main factors compounding the vulnerability of the population, ecosystems, and property along coasts. Benin, Côte d'Ivoire, Ghana, Mauritania, Sao Tomé-and-Principe, Senegal and Togo participate from now on to the program, and discussions are underway with other countries.

The WACA program is based on three pillars :

- ⇒ **Strategic planning of investments**, namely the formulation and definition of priorities of policies and key sectoral investments aimed at promoting climate change adaptation and the enhancement of socio-economic resilience;
- ⇒ **Sharing knowledge and information and capacity-building**, namely of multi-risk assessments in some urban areas, cost-benefit analyses, adaptation options, and the creation of more solid national coastal information systems;

⇒ **Commitment of countries and regions and resource mobilization**, namely the analysis of stakeholders' roles and responsibilities and identification of funding possibilities.

The World Bank has undertaken to support countries in their search for growth with low carbon emission and resilient to climate change; as well as their fight against poverty. As part of the 17th replenishment of the International Development Association (IDA), the World Bank Group has undertaken to support a number of IDA member countries in their efforts to prepare multisectoral investment plans and a better disaster risk management as well as other climate change impacts. WACA is the translation of that response for the West African coastal area.

As part of the implementation of WACA program first phase in Benin, Côte d'Ivoire, Ghana and Togo, partly financed by NDF, the World Bank has engaged in collaboration with UEMOA and IUCN. This collaboration has been ratified during the side-event dedicated to coastal risk in West Africa during the 21st Conference of Parties to the UN Convention on Climate Change.

A regional launch workshop of the project "Erosion and Adaptation in West Africa coastal areas" as part of the WACA program took place in Lomé in October 19-21, 2016 and allowed outlining the progress of a number of framework-studies engaged through the program : (i) Preliminary quantitative evaluation of sedimentary stocks and movements (<http://v-web004.deltares.nl/africa/africa/>), (ii) Cost of degradation of the coastal environment, risk assessment and cost / benefit analyses, (iii) Commitment of stakeholders, knowledge & communication on the management of West Africa coastal area and analysis of economic policies. This workshop allowed the different states involved in the program reasserting their will to manage coastal risks and their need for multi-sectoral investments in the coastal area.

4.4.6. 2015 ASSESSMENT OF WEST AFRICA COASTAL AREAS

This work results from three years of MOLOA activities. The updating methodology of the 2016 evaluation of West Africa coastal areas appears in annex 3.

5. Guidance in terms coastal risks reduction towards «no regrets» adoption¹ to climate change

ASSESSMENT 2016 WEST AFRICA COASTAL AREAS
GENERAL DOCUMENT

1 Adaptation measures known as « no regret » are cost-effective and useful; or whatever the size and nature of the climate change and would even be sometimes without climate change.

5.1. REMINDER OF SOME BACKGROUND ELEMENTS

Climate change is reflected in West Africa by different effects essentially linked to the sea-level rise and increase in climate variability, what may be translated into an increase of the frequency and intensity of exceptional climate weather or marine events. Other modifications will affect temperatures, the volume of rainfalls, their intensity and seasonal distribution. Knowledge about those effects remains largely subject to the global uncertainty which characterizes forecasts as to the evolution of causes and terms of climate change.

Overall, the West Africa shoreline appears as fragile and dynamic, generally composed of loose and erodible sedimentary formations. Rocky headlands represent less than 3% of the coastline, and are made of fractured and altered formations, also prone to erosion and recession. Loose coastal areas are particularly sensitive to the different factors from the marine and atmospheric environment (waves, currents, winds, tides) influencing their evolution. The role of continental waters during intense rain events and river flooding must be taken into account.

Sedimentary deposits are relatively limited and partially trapped by large dam impoundments, whose number is approximately 150 in West Africa. Those sedimentary deposits are redistributed on the West Atlantic coast and Guinea gulf by coastal currents and swells (coastal drift approximately parallel to the shore), whose disruption or disturbance by developments such as ports leads inevitably to erosion or accretion phenomena affecting the stability of the shoreline.

Faced with the rapid rise of social and economic stakes in the coastal area, parties and choices in terms of coastal land development have today a strategic importance. The diagnosis carried out as part of SDLAO included a prospective study towards 2020 and 2050, conducted according to an already proven methodology as part of Africa's long-term perspective study (2020) produced in 1998 (CSAO-OCDE, 1998³⁴), and demographic data provided by

the Africapolis program (Africapolis, 2008³⁵). Some findings of that prospective study were summed-up as follows:

- The coastal area (here considered on a 25 km fringe in depth) gathers 31% of the total population and 51% of the urban population of coastal states.
- The total urban population of the coastal area in 11 countries could double from 18 to 36 million inhabitants between 2000 and 2020, while the rural population should increase by half.
- From 2020 to 2050, the urban population of the coastal area would increase from 36 to 80 million according to a trend-based scenario and by 74 million according to a moderate scenario of "control of disparities".
- Almost all the administrative and/or economic capital cities are located on the coast.
- The urbanization level is there twice higher than in the hinterland.
- The current average density stands at 260 inhabitants per km², with maximums of 1 000 inhabitants per km² in Togo and Benin and in areas with fewer than 10 inhabitants per km² in Liberia or in Guinea-Bissau. Some areas remain unoccupied. In the future, those densities could largely go beyond 1,000 inhabitants per km² in some Guinea gulf countries such as Benin.
- The coastal fringe would concentrate today nearly 56% of the GDP of coastal states.
- The horizontal spreading of urban spaces is a strong trend, in so far as the surface built per inhabitant in West African cities is 150 m² against 125 on average in developing countries. The urbanized surface exceeds 200 m² per inhabitant.

34 CSAO-OCDE (1998) *Preparing for the future: a vision for West Africa in the Year 2020: West Africa Long Term Perspective Study*. OCDE. 160 p

35 Africapolis (2008) *Dynamique de l'urbanisation 1950-2020: approche géostatistique de l'Afrique de l'Ouest*. 38 p.

This prospective reflection integrated also a likely acceleration of West Africa economic growth, with rates higher than 5% over a long period. That growth supports today the urbanization pace of the whole region, which experiences a strengthening of the concentration process of the economic activity in the coastal area, with the establishment of heavy industrial facilities and development of agro-industrial productions. Global tensions on the raw materials market are already translated into different mineral port projects linked to a boom in the sector. Nevertheless, today, this is weighted by a slowdown in emerging countries' growth. In this context of favorable economic growth within the sub region, most of African ports are already and will be compelled to undertake extension works to increase their capacity. The growing penetration of the private sector in port management, or even in their building (for mineral ports) shall incite State vigilance with a view to address the environmental and coastal or even social impacts of those new facilities.

Coast defense developments are currently being multiplied in all the big West African cities, without effective inter-State coordination. Some operations are subject to in-depth studies (Banjul in the Gambia, south of Dakar, Cotonou in Benin, Keta in Ghana (Boateng I., 2009³⁶), but others are undertaken without realistically taking into account the effectiveness and impacts in the long run of those operations.

The footprint of human occupation on West African coastal areas is then and will remain dominated by the concentration of populations and the economic stakes which is expressed through urban development and its precursors (improving access, electrification, recent evolution of strategies and distribution of small-scale fishing, etc.) as well as through the rapid development of tourism and residential, generally peri-urban, spaces. Those developments go with collection of building materials on the coastal area, which speed-up the erosive phenomena observed and the development of works built on backfilled low-lands and cutting-off waterways, increasing river or storm-water flood risks. Those strong trends affect coastal swamps directly.

36 Boateng I.(2009) *Development of integrated shoreline management planning: a case study of Keta. unpublished. 19 p.*

The eutrophication phenomena of coastal waters and lagoons are also remarkable, with significant economic, sanitary consequences on small-scale fisheries. (Smetacek V. et. Zingone A., 2013³⁷).

Climate prospective remains very uncertain in West Africa. A sea level rise by 3 mm/year (Jones N., 2013³⁸) will also lead to exceptional marine storm surge that needs to be assessed on the basis of scenarios (Obeysekera J. et Park J., 2012³⁹). The interval considered by 2100 is comprised between 0.5 and 2 m (Williams S.J. 2013⁴⁰). The different subsistence phenomena of various origin, unknown and identified in West Africa play also an important role. The consequences on wave heights are also important but unknown (Weisse R. et Von Storch H., 2010⁴¹). Some recent events have shown that centennial values need to be reviewed and adjusted by taking into account those elements.

In some areas of that regional coastal space, consequences could be dramatic, as for the city of Nouakchott, which includes large spaces built under the sea level. Other big urban cities are also threatened, namely in the deltas and other fluvio-marine connections. This situation also threatens rice-growing systems in already heavily affected mangroves. Intrusions of salted water will be more frequent, altering water resources for consumption and farming (progress of salted water wedge and above all alteration of coastal areas fresh water lenses). An expected global diminution of total rainfalls in the early 21st century will lead to a diminution of big river flows such as Senegal and Volta, which will go with a sedimentary deficit and acceleration of coastal erosion.

37 Smetacek V. Zingone A. (2013) *Green and golden seaweed tides on the rise. Nature, 504, p. 84-88.*

38 Jones. N. (2013)- *Climate science: Rising tide. Nature. 501, p. 301-302.*

39 Obeysekera. J., Park J. (2012) *Scenario-Based Projection of Extreme Sea Levels. Journal of Coastal Research., 29 (1), p. 1-7.*

40 Williams S.J. (2013) *Sea-Level Rise Implications for Coastal Regions. Journal of Coastal Research. 63 (sp.1), p.184-196.*

41 Weisse R., Von Storch H. (2010) *Marine climate change: ocean waves, storms and surges in the perspective of climate change. Springer, Berlin. 219 p.*

Combining a permanent monitoring of the shoreline with a follow-up of the evolution of climate conditions shall allow producing scenarios to be regularly updated, so as to reduce the strong uncertainty existing today in any climate-related forecast in West Africa. A close monitoring of the distribution of coastal plant formations in marine protected areas, which are so numerous in West Africa, could also contribute in better understanding the evolution terms of the shoreline with a view to enhance the relevance of adaptation strategies and promote their regular assessment.

5.2. COASTAL RISK REDUCTION AND ADAPTATION STRATEGIES

The main document of West Africa coastal area master plan of 2011 presents many elements necessary for the establishment of a coastal-risk reduction and climate change adaptation approach in the coastal area. Those recommendations remain today topical and addressing them in all scales would really enable to make progress in terms of resilience of West Africa coastal societies.

What is also noticed is that adaptation remains centered on addressing hazards more than vulnerability, namely the socioeconomic one⁴², and it is particularly relevant to enlarge the circle of stakeholders in adaptation. Indeed, adaptation should be considered as a socio-political process, depending on political determinants of social change⁴³ and that implementing adaptation strategies can deeply alter some established balances and directly affect socio-economically some populations and groups of interest.

42 Bassett. T.J. 2013.- *Déjà vu or something new? The adaptation concept in the climate change literature. Geoforum. 48 (2013) 42–53.*

43 Eriksen S.H. & al. 2015.- *Reframing adaptation: The political nature of climate change adaptation. Global Environmental Change. 35: 523–533.*

Coastal risks reduction must be considered as part and parcel of climate change adaptation, in coastal spaces, which are before all multifunctional, gather various categories of actors, and concentrate most of the social and economic stakes of the region's States. Developing climate change adaptation strategies in the coastal area is also hampered by different challenges :

- ⇒ **Uncertainty** which characterizes the awareness of future effects of climate change, and then the nature of threats which will affect coastal systems. Managing that uncertainty implies (i) establishing monitoring and evaluation systems of implemented strategies; (ii) diversifying strategy elements; (iii) establishing sufficiently effective governance and decision-making mechanisms to limit the inertia in adopting corrective measures.
- ⇒ **The diversity of uses of coastal spaces and resources**, which obviously determines frequent usage conflicts and makes it difficult to control the effects of adaptation, in so far as actions generating positive effects for some interest groups may become counterproductive for others. Adaptation options affect very diverse and often contradictory interests⁴⁴. In some way, we are here faced with complex issues reminding those addressed in integrated coastal areas management (ICAM).
- ⇒ **The differential between, on the one hand, changes occurring more and more rapidly, and, on the other hand, deadlines in making decisions and implementing them** : the establishment of programs and their execution in national contexts is done in periods rarely below five or even 10 years. Given the rapidity of changes affecting coastal areas, it is likely that initial conditions are not the same at the end of those periods, and responses brought are no longer justified as at the time of the development of the program or strategy. This implies basing decisions not only on current and known situations, but above all anticipating the evolution of those situations and analyzing coastal issues in all their dynamics.

44 Harman. B.P. 2015.- *Global Lessons for Adapting Coastal Communities to Protect against Storm Surge Inundation. Journal of Coastal Research. 31(4):790–801.*

Any adaptation strategy in the coastal area may combine different attitudes in front of possible losses related to coastal risks:

- ⇒ **Preventing losses**, by developing actions aimed at reduction the exposure of stakes.
- ⇒ **Accepting losses**, when adverse impacts are considered as acceptable in the short term because they can be borne by the exposed stakes without significant damages in the long term.
- ⇒ **Distribution of losses**, when adverse impacts can be distributed over an extended area. Risk transfer insurance mechanisms are also part of that category.
- ⇒ **Changes of the terms of activities or changes of activities**, allowing to better manage the adverse climate impacts or to value their positive effects.
- ⇒ **Relocation** when maintaining an activity depends directly on its location. Here, the purpose is merely to reduce exposure.
- ⇒ **Restoration** when the purpose is to restore systems affected by climate change effects or to restore the functioning of natural systems contributing to the resilience of coastal systems.

Adaptation strategies must also combine differentiated approaches between which synergies can be developed:

- ⇒ Territorial approach to adaptation
- ⇒ Sector-based approach to adaptation
- ⇒ Governance-based adaptation
- ⇒ Improving knowledge for a better uncertainty management.

5.3. TERRITORIAL APPROACH TO ADAPTATION

It aims at acting on the development and organization of coastal territories, with a view to promote their resilience and reduce exposure to hazards of the more sensitive vital stakes.

This territorial approach to adaptation must also integrate actions aiming at preserving natural ecosystems or their restoration (river system, depolderisation, etc.).

Addressing the whole scales of space and time is here important, knowing that the territorial approach of adaptation is usefully complemented by sector-based approaches. A territorial master plan expressing a medium-long term vision and proposing a location of remote stakes of the most sensitive spaces will be complemented in its implementation by the building of facilities meeting standards relevant to the specificities of climate change, while the organization of individual, industrial or private works will also meet innovating plans and adapted to risk reduction.

Given the rapid pace of urban growth in West Africa, a territorial approach to adaptation is today better justified in cities and peri-urban spaces. The recent experience of disasters having hit major urban cities has shown the need to revise in depth urban principles⁴⁵. In particular, complying with or restoring natural systems which are part and parcel of urban territories (blue and green corridors for instance) which can increase substantially the resilience of cities in the future⁴⁶. Generally, it is recognized today that natural ecosystems and green infrastructure will play a key role in view of adaptation in coastal areas⁴⁷.

⁴⁵ Jacob. K.H. 2015 ; - *Sea level rise, storm risk, denial, and the future of coastal cities. Bulletin of the Atomic Scientists. 2015, Vol. 71(5) 40-50*

⁴⁶ Aliyu Salisu Barau*. 2015.- *Perceptions and contributions of households towards sustainable urban green infrastructure in Malaysia. Habitat International. 47: 285-297*

⁴⁷ Spalding. M.D. & al. 2014.- *The role of ecosystems in coastal protection: Adapting to climate change and coastal hazards. Ocean & Coastal Management; 90: 50-57.*

There are also obvious links between conservation approaches and the territorial approach to adaptation. Recent works have shown that natural infrastructure can reduce coastal risks by 50% if they are preserved. Plans aiming at reducing coastal vulnerabilities must combine investments targeting key coast defense infrastructure with the implementation of actions allowing the preservation and restoration of natural infrastructures⁴⁸. Natural ecosystems provide key ecological services to coastal societies, contributing namely to limiting erosion and its impacts (Temmerman S. *et al.*, 2013⁴⁹). Their conservation, already justified through commitments of States for biological diversity maintenance, contributes directly to the reduction of risks linked to the mobility of the shoreline and to adaptation strategies to climate change. The concept of natural infrastructure already mentioned during the 10th Conference of Parties to the Convention on Biological Diversity, but also during the recent global platform for risk reduction, leads to renewing approaches to land planning, especially in the coastal area. Ecological services are still poorly known and recognized by decision-makers, or even local populations in some cases (Munji C. A., 2013⁵⁰).

Among coastal ecosystems, we already know that mangroves⁵¹ will be more affected by the sea-level rise and specific adaptation techniques are currently emerging⁵². More generally, addressing the effects of climate change can also modify radically conservation space priorities, hence the need to include prospective studies and the elaboration of scenarios in any conservation initiative⁵³.

The developments expected from adaptation strategies in the territorial space should combine hard defenses when justified and reversible soft defenses whenever the latter can be considered⁵⁴. Soft beach nourishment techniques and dune preservation⁵⁵ are to be developed. Besides, it is important to integrate localized actions aiming at protection in the short term within more structuring land development plans at the level of local governments and beyond in ambitious medium to long-term development initiatives.

51 All along ten of thousands of kilometers, the West African coastal area is characterized by different -sometimes- natural ecosystems - among which mangroves (covering nearly 14 000 km²), the string of small estuaries from Sierra Leone to Benin, the lagoon and coastal swamps system of Côte d'Ivoire in Ghana and different forms of sedimentary accumulation (banks, dune cordons), which constitute as many strategic reserves of sediments contributing, in case of remobilization, to balance the coastal sedimentary budget.

52 Sierra-Corea. P. C. & al. 2015.- Ecosystem-based adaptation for improving coastal planning for sea-level rise: A systematic review for mangrove coasts. Marine Policy. 51 : 385–393.

53 Kendall. R.J. & al. 2016.- Incorporating climate change into spatial conservation prioritisation: A review. Biological Conservation. 194 :121–130.

Gillson. L. & al. 2013. - Accommodating climate change contingencies in conservation strategy. Trends in Ecology & Evolution. Vol. 28, No. 3.

54 There are many alternatives to classical defenses based on dykes, break-waters or groins. Immersed break-waters or artificial reefs are only used in some countries, but they have real advantages, namely because they provide benefits in different areas including in terms of fishery resources and the diversity of marine environments -(Edwards, R.A. and Smith, S.D.A., 2005. Subtidal assemblages associated with a geotextile reef in South-East Queensland, Australia. Marine and Freshwater Research, 56(2): 133–142.

55 Kejsers. J.G.S. 2015.- Adaptation strategies to maintain dunes as flexible coastal flood defense in The Netherlands. Mitig Adapt Strateg Glob Change. 20:913–928.

48 Barbier. E.D. 2015.- A global strategy for protecting vulnerable coastal populations. Science Insights. 345 : 1251-1252p.

Oliver. T.H. & al. 2016.- Are existing biodiversity conservation strategies appropriate in a changing climate?. Biological Conservation. 193: 17–26.

49 Temmerman S., Meire P., Bouma T.J., Herman P.M.J., Ysebaert T. et DeVriend H. (2013) Ecosystem-based coastal defense in the face of global change. Nature, 504, p. 79-83.

50 Munji C.A. (2013) Floods and mangrove forests, friends or foes? Perceptions of relationships and risks in Cameroon coastal mangroves. Estuarine Coastal and Shelf Science. 140, p. 67-75.

5.4. SECTOR-BASED APPROACHES TO ADAPTATION

They aim at developing in sectors directly faced with coastal risks adapted standards and practices : port infrastructure, roadway, urban planning, tourist sites, fishing, agriculture, mining activities, etc. Such approaches have been developed for example for the port sector in Australia⁵⁶. Like for the territorial approach to adaptation, the development of sector-based scenarios, then their combination, can contribute in highlighting potential synergies between different adaptation measures.⁵⁷ If effectively those sector-based approaches often developed at infrastructure level are complementary of the territorial approach, they mobilize different actors and follow a distinct approach and dynamics⁵⁸.

5.5. GOVERNANCE SUPPORTING ADAPTATION

Climate change effects are not partitioned, and coastal spaces are in general multifunctional. In the same way, governance must try to privilege dialogue and accountability of the different categories of actors. The need to adjust regularly adaptation approaches depending on the progress of knowledge requires establishing quick and transparent decision-making processes.

It is also about legislative governance, as testified by different sites developed by States of the region, namely in terms of Coastal Area Law, but also the executive plan through regulatory measures, such as the prohibition of the extraction of dune sand for instance.

The issues raised starting from the 90's in terms of integrated coastal areas management are thus topical again in terms of adaptation of development in coastal areas⁵⁹, namely concerning the institutionalization of coastal management through both cross-cutting and multi-sectoral entities on the one hand, but also better adapted to the articulation of scales from national policies up to the local level. The articulation between national technical services, civil society, local governments is today the key for an effective governance of adaptation in coastal areas where local-level actions seem concretely the most relevant ones, but must be supported by approaches at other scales that fall within the competence of States⁶⁰. The terms for a fair and effective assignment of duties between the different governance levels remain a research question, but are a prerequisite for the capacity for intervention in terms of adaptation. This is a key issue which should be raised upstream of any adaptation strategy in each context⁶¹.

In a context of uncertainty which characterizes the making of decision in terms of climate change adaptation, it is also important to be equipped with tools facilitating arbitrations, especially at local-level and local governments, where decisions can be made more easily and concretely be documented. Such hierarchical analysis tools have already been successfully⁶². For instance, in the USA several measures have been taken from high-level political ones to those concerning local governance with a view to promote climate change adaptation in coastal areas. Those developments also involve the making of legal decisions⁶³.

56 Ng A.K.Y. & al. 2013.- *Climate change and the adaptation strategies of ports: The Australian experiences. Research in Transportation Business & Management.* 8:186–194

57 Wachsmuth. J. 2015.- *Cross-sectoral integration in regional climate change adaptation via participatory scenario development. Climatic Change.* 132:387–400

58 Gibbs. M. T. 2015.- *Coastal climate risk and adaptation studies: The importance of understanding different classes of problem. Ocean & Coastal Management.* 103: 9-13.

59 Celliers. L. & al. 2013.- *Pathways of integrated coastal management from national policy to local implementation: Enabling climate change adaptation . Marine Policy.* 39 (2013) 72–86

60 Sarzynski. A. 2015.- *Public participation, civic capacity, and climate change adaptation in cities. Urban Climate.* 14: 52–67.

61 Nalau. J. & al. 2015.- *Is adaptation a local responsibility?. Environmental science and policy.* 48: 89-98p.

62 Hooman. M.C. & al. 2015.- *Adaptation analysis for environmental change in coastal communities. Socio-Economic Planning Sciences.* 51: 34-45p.

63 Negro, Sorel E. & al. 2013. *Recent developments in coastal climate change adaptation. Urban Lawyer.* 45(4): 8p.

The fairness and representation of stakeholders in the establishment of governance which must be systematically designed are all the more important as adaptation may also lead to undesirable effects⁶⁴ :

- ⇒ **Economic** : excessive transfer of properties or public prerogatives towards the private sector (sometimes the case of big defense projects of coastal defense or the building of port works) ;
- ⇒ **Political** : marginalization of some stakeholders by seeing their access limited to forums and decision-making circles, when decisions related to adaptation are insufficiently coordinated or originate from an unshared technocratic approach ;
- ⇒ **Ecological** : degradation of areas rich in biodiversity or ecosystemic services (often the case of coastal defense solutions based on engineering) ;
- ⇒ **Social** : Deepening inequalities affecting the most vulnerable populations following the way adaptation issues are addressed concerning other categories of stakeholders.

5.6. AWARENESS OF THE ADAPTATION SERVICE

The assessment of the effects of climate change remains largely marked by uncertainty as to its expressions, but also as for the relevance of the responses provided, as long as we do not have the time and enough experience to assess the effectiveness and viability of those responses. Pooling the technical and scientific knowledge and their translation/dissemination in concrete and operational terms underpin the whole adaptation approach.

MOLOA which was established 3 years ago participates in that system. Those three years of operation allowed highlighting the different structural and institutional constraints. Actors, directly concerned by the observation of the coastal area and monitoring of the shoreline, in general researchers, come from the academia, while the observation mission is placed under the authority of environment ministries of the relevant countries. Yet, the composition of the different national offices remains rich and diversified, including various institutional entities interested in coastal management (fishing, tourism, research institutions, port authorities, etc...). The lack of maturity sometimes witnessed in decentralization in those West African countries is reflected nevertheless by a poor representation of local authorities and elected councilors, yet primarily concerned by the evolution of coastal risks. Those constraints should, in some countries, be lifted within a short to medium term through on-going national structuring processes of national observation mechanisms, namely with the establishment of observatories.

The second challenge is didactic, and is about producing information and accessible as well as usable messages by decision-makers, while the economic valuation of impacts of shoreline mobility or responses in terms of developments or simply putting in prohibition natural coastal infrastructure remains very delicate (Jonkman S.N. *et al.*, 2013⁶⁵).

⁶⁴ From Sovacool. B. K. 2015.-The political economy of climate adaptation. *Nature Climate Change*. 5:616-618p

⁶⁵ Jonkman. S.N., Hillen M.M., Nicholls R.J., Kanning W. et Van Ledden M. (2013) Costs of Adapting Coastal Defences to Sea-Level Rise—New Estimates and Their Implications. *Journal of Coastal Research*. 29 (5), p. 1212-1226.

SDLAO has noticed the crucial role of land development policies in terms of management of coastal risks. This indeed must lead today to involving more directly the entities in charge of development planning and coastal space development. The poor resources allocated by States for the establishment and updating of a prospective vision of the quick evolution of coastal space occupation, do not contribute to the management of still more obvious multifunctional coastal areas. For West Africa, given the specificities and fragility of coastal systems, innovating development models, for example in the field of tourism, remain to be designed. Those in-depth reflections are to be conducted in relation with private operators.

A third point, common to any regional initiative, concerns the space and time integration of the different monitoring scales of the shoreline, from localized observation, for example through webcams (Guastella L.A. et Smith A. M., 2014⁶⁶) to the monitoring of regional integration and development policies of structuring networks of major infrastructure (transport, power, etc.), which are precursors of coastal area occupation. SDLAO and regional conferences have contributed in the emergence of a common vision of coastal risks which still needs support, namely through clarification of what falls within the competence of national and regional scales. The perception of problematics shared by coastal states on the West African seafront is here more difficult than in insular sets (South-West of the Indian Ocean, Melanesian Archipelago) where inter-state solidarity and reciprocities are more obvious in front of shared risks (oil spills, tsunami for example).

The future improvement of the mechanism can include some proposals generated by this three-year experience.

- ⇒ The necessity to involve actively and work directly with local coastal authorities who remain key actors in adaptation.
- ⇒ The necessity to involve economic actors in watching and monitoring coastal area systems, but also in monitoring the impacts of climate change in the different sectors linked to the coastal area.

- ⇒ The necessity to undertake sector-based assessments of adaptation opportunities by mobilizing the actors of the different sectors concerned by economic activities in the coastal area to end up with national or regional sector-based adaptation programs.
- ⇒ The necessity to maintain an effective scientific watch and to organize the dissemination of new elements within the MOLOA network.
- ⇒ The necessity to develop a database of coastal developments undertaken along the West African coastal area in order to inform the future decisions to be made (new projects) and to be able to document the experience of past investments so as to avoid replicating the failures noticed.
- ⇒ The necessity to design adaptation strategies to climate change and coastal risks by combining the different scales of time. There is a need to be able to face the issues in the short term while developing adaptation strategies in the long term. Uncertainty management implying the flexibility of policies, decision-making mechanisms, the establishment of regularly assessed scenarios, the diversification of strategies at different scales of time and space.

⁶⁶ Guastella L.A., Smith A. M. (2014) *Coastal dynamics on a soft coastline from serendipitous webcams: KwaZulu-Natal, South Africa. Estuarine Coastal and Shelf Science. p. 1-10.*

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Annexes

ANNEX I

DECLARATION OF DAKAR RELATED TO THE ESTABLISHMENT OF A WEST AFRICAN COASTAL AREA OBSERVATORY FOR THE REDUCTION OF COASTAL AREA RISKS AND THE IMPACTS OF COASTAL EROSION

ANNEX II

LIST OF NATIONAL, REGIONAL AND INTERNATIONAL EXPERTS HAVING PARTICIPATED IN THE STUDY

ANNEX III

SDLAO UPDATING METHODOLOGY

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DAKAR DECLARATION ESTABLISHING A WEST AFRICAN COASTLINE OBSERVATORY FOR THE REDUCTION OF COASTAL RISKS AND THE IMPACTS OF COASTAL EROSION

The Commission

ESTABLISHING A WEST AFRICAN COASTLINE OBSERVATORY FOR THE REDUCTION OF COASTAL RISKS AND THE IMPACTS OF COASTAL EROSION

Dakar Declaration

- Considering the importance of coastal areas in West African countries, home to most of the political and economic capital cities of our states and more than half of their population,
- Taking into account the concentration of vital economic activities of our countries along the coasts, such as fishing, international shipping and tourism,
- Recognizing that the rapidly increasing coastal population coupled with the amplification of pressure by different economic sectors, result into accelerated degradation of coastal ecosystems, a rush to ownership of the last available land resources, and conflicts for the use of resources,
- Concerned about the erosion observed, often causing severe social and economic impacts, forcing residential areas to be moved and rendering obsolete investments essential to the functioning of our economies,
- Taking into account the plausible increase of coastal hazards in the years and decades to come, resulting from increased social and economic stakes, on the one hand, and from the effects of climate change on the other hand, including the rising sea-level and the increased pace of external weather events,
- Recognizing the limited capacity for coastline monitoring and sharing of scientific information needed to establish coastal management and protection decisions to be made by the governments of our countries,
- Noting the fragility of coastal ecosystems, their importance in the provision of environmental goods and services essential to the development of our societies and the role of natural systems such as mangroves and coastal lagoons in fixing the coastline and in reducing risks of natural disasters,
- Recognizing the need for forward-looking work to anticipate constraints and future risks and provide the means to respond in a coherent approach to space planning, taking account of coastal ecosystems in an integrated regional approach to the development of the West African coastal area,
- Having cognizance of the regional study commissioned by the UEMOA and implemented by IUCN on the shoreline monitoring and the development of a master plan for the West African coastline, and taking into account the recommendations of experts appointed by our countries, gathered in Dakar on Monday 16 and Tuesday 17 of May 2011 to review and validate the results of this work,

We, Ministers in charge of Environment and Coastal Erosion, representing the Governments of the Islamic Republic of Mauritania, Senegal, The Gambia, Guinea Bissau, the Republic of Guinea, Sierra Leone, Liberia, the

Republic of Côte d'Ivoire, Ghana, Togo and Benin, gathered at Méridien President Hotel in Dakar on Wednesday May 18, 2011

1. Thank and congratulate the UEMOA for the quality of the work done, and for taking the initiative to conduct a regional study involving six non-member states alongside its five coastal Member States in order to get a broad and inclusive regional vision of coastal dynamics,
2. Approve all the work done, their results and the different mapping deliverables derived from them, recommend their wide dissemination into the public domain and that their presentation be made in particular to political authorities and scientists of each countries to promote their ownership and their transcription into national policies,
3. Make ours the proposal to establish as soon as possible the Observatory of the West African coastline to monitor the evolution of our coastal areas and guide decisions in terms of planning and coastal risk reduction,
4. Appreciate the proposal by Senegal to host the Observatory of the West African coastline within the Ecological Monitoring Centre in Dakar, and are committed to facilitate in our countries the production and sharing of information from a network of scientific and technical experts, including the academia,
5. Are requesting the UEMOA in unison to keep on its integration efforts, and requesting regional organizations and development partners involved in West Africa to give their technical and financial support for the implementation of the West African coastline development master plan.

Made in Dakar, on May 18, 2011

Ministers responsible for Environment of the UEMOA member states and guest States (The Islamic Republic of Mauritania, The Gambia, Guinea, Sierra Leone, Liberia, Ghana)

For the Secretary State for Sustainable Development, Guinea Bissau



Mrs. Maria Odete Rosa,
Chargée d'Affaires, Guinea Bissau Embassy, Dakar

Annex I

LIST OF NATIONAL, REGIONAL AND INTERNATIONAL EXPERTS HAVING PARTICIPATED IN THE STUDY

Direction of the study	Zourata LOMPO-OUEDRAOGO , Director of Environment and Water Resources UEMOA Commission
General and technical coordination	Idriss DEFFRY , Coordinator of IUCN marine and coastal program for Central and West Africa.
General and technical coordination	Moussa SALL , coordinator of MOLOA regional unit, Center for Ecological Monitoring (CSE)
General and technical coordination	Jean-Jacques GOUSSARD , president of the group of coastal experts of IUCN ecosystems management commission, EOS.D2C project leader, network of environment and development consultancy, consultant EAM-GEOME, NBS (<i>Nature-Based Solutions</i>)

REGIONAL GUIDANCE COMMITTEE

UEMOA REGIONAL CONTROL PROGRAM AGAINST COASTAL EROSION

MAURITANIA	Sidi Mohamed Abdou ould LEHLOU , Director of Protected Areas and the Coastal Area
SENEGAL	Bachir Diouf , Professor at the Geology Department of the Faculty of Science and Technology of Cheikh Anta Diop University of Dakar (UCAD)
GAMBIA	Lamin Jawara Deputy Permanent Sect Ministry of Environment, Parks and Wildlife Republic of the Gambia
GUINEA BISSAU	Joaozinho SA , Director of Gabinete de Planificacao Costeira
GUINEA	Théophile Richard , Director of the Center for the Protection of the marine and coastal environment of the Ministry of environment, water and forestry, representative of the said Ministry at the marine prefecture office
SIERRA LEONE	Haddijatou JALLOW , Director of SL Environmental Protection Agency
LIBERIA	Samuel J. Summerville Jr. Assistant Minister, Planning and development
CÔTE D'IVOIRE	Nassere KABA , Chief of Staff of the Ivorian Minister of Environment, urban health and sustainable development
GHANA	Hubert OSEI-WUSUANSAs , Head of coastal works, Directorate of hydrology
TOGO	Tchannibi Bakatimbe , Ministry of the Environment and Forestry Resources
BENIN	Moussa Bio Djara , Manager of the Observatory and shoreline monitoring

REGIONAL SCIENTIFIC COMMITTEE
OF UEMOA REGIONAL CONTROL PROGRAM AGAINST COASTAL EROSION

MAURITANIA	Mouhamed El Hacen KHOUNA , Deputy director Protected Areas and the Coastal Area
SENEGAL	Papa GOUMBA LO , Director of CEREEQ, president of the scientific committee
GAMBIA	MomodouJama SUWAREH , Director Intersectoral Network National Environment Agency
GUINEA BISSAU	Joaozinho SA , Director of Gabinete de Planificação Costeira
GUINEA	Mohamed Lamine KEITA , Researcher coastal erosion at CERESCOR
SIERRA LEONE	Ernest NDOMAHINA , Director of the Institute of Marine Biology and Oceanography
LIBERIA	Saye H. GWAIKOLO , Technical advisor Prospection at the Ministry of Mines
CÔTE D'IVOIRE	Philiber KOFFI KOFFI , Researcher at the Oceanographic Research Center
GHANA	Kwasi Appeaning ADDO , Department of Marine and Fisheries Sciences Lecturer, University of Ghana
TOGO	Adoté Blim BLIVI , Director of CGILE
BENIN	Marc OYEDE , Researcher at University of Cotonou

INTERNATIONAL UNION FOR THE CONSERVATION OF NATURE

Support to coordination :

Jean-Marc GARREAUIUCN Program Coordinator / Program for Central and West Africa (IUCN PACO)

General coordination :

Idriss DEFFRY, Coordinator of the marine and coastal program for Central and West Africa (IUCN PACO)

Contributions :

Wetlands Program for Central and West Africa :

- **Aboubacar AWAISS**, Coordinator of Wetlands program for Central and West Africa (IUCN PACO)

- **Jérôme KOUNDOUNO**, Regional coordinator of the project global water initiative in West Africa (IUCN PACO)

Protected Area Program for Central and West Africa

- **Youssouph DIEDHIOU**, Program Officer World Heritage (IUCN PACO)

REGIONAL COORDINATION UNIT
(Center for Ecological Monitoring)

Regional coordination:

- **Assize TOURE**, General Manager ;
- **Amadou Mactar Dièye**, Technical Director ;
- **Moussa SALL**, coordinator of MOLOA regional unit ;
- **Marième Soda DIALLO**, monitoring-evaluation ;
- **Fatou Bintou TRAORE**, technical and administrative assistant ;
- **Thioro Codou NIANG**, Communication ;
- **Souleymane DIOP**, Database, GIS ;
- **Alioune TOURE**, IT, website ;
- **Amadou SALL**, database management, GIS.

REGIONAL AND NATIONAL EXPERTS

MAURITANIA

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Dr. Paul Silaï TENDENG Research and Project Coordinator West Africa Marine Protected Areas Network - RAMPAO

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MAPPING AND REMOTE SENSING

- **Jean-Jacques GOUSSARD** - methodology, establishment of GIS and products.
- **Raymond LABROUSSE** – cabinet EOS.D2C - Analysis and interpretation by remote sensing.
- **Nathalie EL BAR** – ELFEE Services - Mapping
- **Graziella CLABAUT** – Spatial database.
- **Christian DEVERGER**

UPDATING OF THE PROSPECTIVE APPROACH

The heterogeneity of national data, like the time allowed does not always enable to consider the establishment of a formalized prospective project in the region. But then, other existing data at regional level had allowed in 2010 to outline different scenarios:

- Data of the Sahel Club and of West Africa, especially based on works in West Africa Vision 2010.
- AFRICAPOLIS data on the dynamics of urban extensions.
- Climate change scenario analysis works which will be entrusted to ACMAD.

The limits for that prospective reflection exercise had been established during the validation workshop of SDLAO in September 2009 in 2030 and 2050. The demo-economic prospective had been conducted for SDLAO according to a methodology developed for the OECD WALTERS study.

The 2015 evaluation of prospective scenarios which had been established in 2010 was based on documents and macro-economic forecasts quoted in the footnote in the section dealing with prospective. It turns out that those scenarios which had been established are overall and largely confirmed, the updating of prospective was then based on the demo-economic mock-up drawn up during the 2010 SDLAO.

UPDATING OF URBAN FABRICS

The updating of urban fabrics was done analogically based on available high-resolution pictures. It is worth reminding here that during the SDLAO, the work had been done through methodologies of mathematic morphology applied to remote sensing. The heterogeneity of available pictures did not allow establishing a reliable comparative protocol which would require picture correction processes impossible to implement on such a heterogeneous material.

The evolution of urban fabrics noticed is also hard to date in so far as acquisition dates are themselves varied. In the case of SDLAO, published in 2011, experts had worked on pictures acquired over a period ranging globally between 2005 and 2009. In the case of the current updating, pictures on which teams have worked have acquisition dates ranging between 2011 and 2015. The developments evidenced do not concern strictly the period 2010-2015 but are developments noticed between works related to SDLAO and the situation which can be noticed in 2015 from available high-resolution pictures.

Another item relates to the nomenclature of human occupation sites which is taken into account. In the case of SDLAO, only cities with more than 10,000 inhabitants (and main crossroads) had been considered. In the current case, the interpretation concerned all forms of human settlements identifiable on pictures in a strip of nearly 10 km away from the shoreline. The most detailed nomenclature includes the following categories :

Type of human occupation site	Description
Habitat in plantation	Rural villages under coconut plantation essentially encountered from Côte d'Ivoire to Benin. Farming depopulation sees residential housing progressing in those coastal plantations.
Rural habitat in mangrove rice-farming areas	Farmers' villages in rice-farming areas, essentially encountered in Guinea and Guinea Bissau. Villages are linear, settled on emerged terraces.
Coastal housing - fishermen's villages	Sites occupied by populations comprising a high proportion of fishermen. Those villages directly settled on the shoreline are generally sensitive to flooding.
Industrial activity areas	Ports, warehouses, industrial areas, thermal power stations, etc...
Residential areas	Those areas generally central along roads include residential tourist and individual facilities. Those spaces, generally located directly on the coastal area on the main towns along the coastal road, are often characterized by a strong land speculation.
Recent peri-urban housing	Recently occupied peri-urban spaces but already serviced and which more than 50% of surfaces are occupied by a loose and continuous housing network.
Peri-urban housing being developed	Those forms of habitat are located in the outskirts of big cities and are greatly heterogeneous in their land occupation rates. In general, these are recent housing sites not yet populated, but which street network is clearly visible on high resolution pictures. This may also be informal housing areas with a strong rural and farming component.
Dense, loose and very loose urban housing	Most of those urban housing areas had been mapped during the SDLAO. The updating is based on the typology given here in annex to that methodology document.

TYOLOGY OF THE COASTAL AREA IN OCEANIC SEAFRONT

This typology has been designed on the basis of the experience of a number of countries previously studied and after a review of the whole coastal area covered by the satellite imagery available on *Google Earth* (which resolution is highly variable), locally complemented by the review of aerial pictures. Tested on imagery processed at 1/250 000th, it seems to be convenient with the mapping

work and the objectives of the research, while considering that some local corrections are necessary.

The table below summarizes the definition criteria of each of the agreed categories. Those units relate to the physical environment and its development potential and fragility in front of erosive phenomena.

Preliminary typology of coastal areas of the oceanographic seafront (mapping at the scale of 1/250 000th)

Very unstable sandy and/or mud coastal area	Strongly dynamic environments	A1	River estuaries
		A2	Mangrove estuaries
		A3	Complex of arrows and sandy banks in active and permanent evolution, headlands, islets and peaks
	Mangrove environments	B1	Narrow sandy cordons built against mangroves
		B2	Continuous coastal area mangroves
		B3	Discontinuous mangroves and tidal mudflats
		B4	Narrow mangrove fringe built against other emerged environments
Sandy coastal area with a straight longitudinal profile	Built against sand dune formations	C1	More or less sand dune formations subject to wind erosion
		C2	Idem C1 built against more or less salty areas of low pressure
			Idem C2 with narrow and low coastal cordon
	Built against recent sandy terraces	D1	Sandy cordons and terraces more or less undulating in ripples and channels
		D2	Sandy cordons separated by vegetalized lagoon channels more or less connected to tides
		D3	Idem D2 with very narrow sandy cordon
	Built against terraces with variable age and altitude	E1	Complex of recent sandy cordons and terraces, locally ferralitic hills
		E2	Sandy cordons built against lagoon or vegetalized channels more or less connected to tides
		E3	Idem E2 with very narrow sandy cordons

Sandy coastal area with slightly undulating profile	Built against movable or very altered geological formations	F1	Long sandy coves delineated by small rocky headlands or crusts
		F2	Alternation of small caps of rocky blocks or crusts and sandy coves
Sandy coastal area, locally rocky with undulating profile	Built against soft geological formations more or less altered	G1	Sandy beaches and locally small sections of rocky coastal area
		G2	Alternation of rocky coastal area in headlands and sandy beaches
Coastal area with rocks as the dominant landscape	Built against hard and little altered geological formations	H1	Rocky coastal area in soft rocks, locally small sandy beaches
		H2	Rocky coastal area, locally falls.

Analyses carried out in West Africa have allowed underlining some key points :

- The complexity of estuarine mouths, which representative mapping shows a minimum accuracy scale of 1/50 000th.
- The fragility of sandy coastal areas built against recent isolated cordons of the continent through flood-prone channels and lagoons parallel to the shore and located at a low distance of those cordons (categories D3, E3).
- The considerable extension of sandy coastal areas without rocky obstacle and shaped by the coastal drift (categories C,D, E).
- The special case of coastal areas in sandy coves delineated by small rocky headlands affecting the coastal drift (categories F and G).
- The scarcity of rocky coastal areas which is due to the generalized and deep alteration of rocks (category H).
- The situation of Guinea Conakry and Guinea Bissau on the continental parts where almost the whole coastal area is made of a slim sandy cordon built against mangroves regularly hit by tides.
- Estuaries largely open to the ocean, regularly subject to tide on a sometimes very important distance inside continents (Gambia, Casamance, Corrubal, Konkouré, etc.) over a width of several kilometers. Their topography looks like the one of rias in the case of Guinea Bissau. The apparent shores are mainly made of mangroves, with locally a slim cordon of river alluviums and fine silty sediments carried by tides.

INFORMATION ABOUT THE NEAR OFF SHORE COASTAL AREA

They have to be considered with care because, based on available satellite imagery and depending on the time and season of shooting. Some are reliable like rocks more or less covered or uncovered by tide, others must be considered as clues to be compared with available bathymetric data. These are in particular tidal mudflats, sand banks, traces of currents and more or less turbid plumes (filled with sediments in suspension).

<p>Areas under direct and regular influence of tides</p>	<p>Those areas include different environments such as :</p> <ul style="list-style-type: none"> <input type="checkbox"/> Recent supply of tidal mudflats partially colonized by mangroves. <input type="checkbox"/> The mangrove with different stands of mangroves distributed depending on the depth and intensity of submersion by tides. <input type="checkbox"/> Degraded mangroves <input type="checkbox"/> Low areas on the fringe of the intertidal and salinized area, like salt flats. <p>Reclaimed areas in traditional rice-growing where tide flow is disrupted in cultivation season and re-established in dry season.</p>
<p>Areas under mixed influence, tides and supply of fresh water of the continent</p>	<p>They are characterized by a great variability :</p> <ul style="list-style-type: none"> <input type="checkbox"/> The level of water salinity depending on the local topography and climate season. <input type="checkbox"/> Land occupation (lagoons, swamps, small mangroves, flood-prone forested formations, etc.). <p><u>Alluvial gutters topographically subject to tides</u>, but receiving flows of fresh water, or even flood waters, likely to undergo significant variations during seasons and flowing out on estuarine areas close to the coastal area.</p> <p><u>Wetlands complexes</u> colonized by plants and small lagoons near the coastal area, isolated by a sandy cordon. The latter is open to the ocean in a permanent or intermittent way depending on seasons. This category receives generally carried by Petite Côte rivers with strong local and seasonal variations of the salinity of surface and ground waters.</p> <p><u>Narrow channels parallel to the shore</u>, sometimes isolated and in salty water regime by ground communication with the salty groundwater from the very ocean, at other times under the direct influence of tides thanks to an opening on the ocean.</p> <p><u>Great lagoons</u> communicating through a way with the ocean.</p>
<p>Areas under indirect influence of tides</p>	<p>This category covers the wetlands close to the previous lands; indirect influence is exercised at the level of the ground-waters and/or more or less long flood periods. Plants have various forms: swamps, savannahs, or other wetlands formations. They are frequently located in the periphery of big lagoons or in transition between continental alluviums and mangroves.</p>
<p>Salty low pressure areas</p>	<p>Case of sebkhas of Mauritania</p>

COASTAL FRINGE ANALYSIS

It covers an arbitrarily defined strip stretching over 5 to 10 km from the coastline and deals with (i) some characteristics of the physical area in relation with the coastal geodynamic evolution, as well as (ii) human occupation with the challenges therein,

Physical environment

Two main criteria are taken into account:

- The geological / pedological formation on which the coastal area is based and their resistance to different forms of erosion, close oceanic or mainland.
- The nature of sediments that is prone to disturbance by coastal currents.

They can include therefore:

Type of formation	Category
The sandy formations which are very loose and without rocks or crusts	1A. Current supply of backshore sandy cordons
	1B. Sandy fluvio-marine terraces of current quaternary with often a rolling topography with ripples and channels (for instance: Sierra Leone)
	1C. The formations of dunes more or less fixed and subject to erosion / wind sedimentation (for example: Senegal and Mauritania).
	Non-differentiated complexities at this map level (recent cordons, sandy terraces of varied age and altitude)
The very deep and altered geological formations, but presenting some rocky elements or resilient crust due to small headlands affecting coastal area drift.	2A. Highly sandy formations of continental terminal with discontinuous ferruginous crust (example: Casamance).
	2B. Deep and altered geological formations of the primary platform having preserved locally boulders or hard rock bars over the coastal area in the form of headlands, small rocky sections or more largely in the form of islands or reefs (example Liberia, Cote d'Ivoire). The sediments potentially mobilized because of erosion go through the coastal area by means of Petite Côte rivers and more rarely by direct action of the sea, the close hinterland being generally separated from the coastal area by a recent sandy belt.
The irregular alteration level of geologic formations or slightly resilient.	3A. Metamorphic formations made up of quartzite.
	3B. Sandstones
	3C. Limestone and marly limestone (Senegal).
The less altered and very resilient geologic formations	Their existence is exceptional on the coast studied (Dakar, Conakry, from some headlands of Ghana), with the only observed rocky coast. They are mainly intrusive rocks of basaltic type or very hard metamorphic quartzite.

Human occupation and its issues

The more or less important density of human occupation of coastal infrastructure falls within various factors:

- The colonial heritage and existence of main towns around harbor sites and urban extension and current "rurban" extension, in the edge of the coastal area.
- The latest residential and tourist development habitat at the seaside.
- The existence of rural habitat more or less dense and near the shoreline enabling an economy based on both local subsistence farming and seafood business (fishing, salt collecting, mangrove woods, etc.).
- Combined with the above-mentioned or isolated, a temporary camping habitat of fishing occupied by transhumant fishermen depending on migratory fishery resources.

The social-economic stakes are obviously concentrated on densely populated towns and their sometimes consid-

erable "rurban" extension. Such areas are fast-growing and recent studies have pointed out that the main data sources related to them are not sufficiently updated. The attractiveness of luxury residence built at the seaside, the development of tourism are all associated with public or private investments faced with coastal erosion and result in critical issues.

The impact of erosion on habitat and Petite Côte infrastructure of some dense fishery business areas should not, however, be neglected in high-density areas where renewable endangered species can be a source of further social and land conflicts.

BASIC VECTOR LAYERS GATHERED FOR THE STUDY

The need to have a homogeneous geographical baseline for the mapping of the study and the reporting of analyzed data has led to look for various reliable data whose hold may cover the whole field of study. At this stage, the following layers have been covered:

Coastline	NOAA (scale 1/75,000).corrected from images and checked with Lansat and SPOT imagery when available
Bathymetry	Curves generated from a format of 30 second arch from the general bathymetric map of oceans IOC – UNESCO / IHOs
Hydrographic network	Hydro SHEDS USGS data
Low elevation coastal zones	Generation of 10m borders from SRTM1 (calculation of submersible zones)
Protected area	IUCN World Protected Areas Commission and IUCN Marine and Coastal Program for Central and West Africa
Roads and Transportation	VMAP 1 and 0 corrected from high-resolution image
Agglomeration of more than 5,000 inhabitants	GEOPOLIS
Hypsometry	Curves generated from numerical model of field SRTM 3 (CGIAR-CSI) ⁵ from 90 meters

⁵ The quality of this numerical model was confirmed during a study carried out by CIAT: (Inter ministerial Committee for Land use planning) Comparison of SRTM derived DEM vs. Topographic map derived DEM in the region of Dapa.

PRIORITY ARBITRATION AND UPDATING PER SECTOR

Within the detailed master plan, and in sectors description, grey shaded texts correspond to the master plan for the West African Coastline of 2011. The updating elements are in black. The modifications concerning the priority for action or the priority for monitoring and observation are in red on the summary table. We will remind here that sectors for which the status in terms of priority for action, monitoring and observation have been changed are marked with red dot on the map.

The details of the master plan include the division of the entire coastline studied in 44 areas, comprising a total of **179 sectors**.

The division has been carried out on the basis of the relationship between observed characteristics of coastal sensitivity and local communities' issues.

Each area comprises one or several sectors. These sectors define relatively homogeneous shoreline portions de-

pending on the above-mentioned relationship.

These sectors represent the main spatial reference of the shoreline monitoring program.

The **areas** have been defined more flexibly and will possibly be a matter for discussion. It is especially a matter of structuring geographically sectors' reference, while respecting some discontinuity, namely inter- State borders.

DOCUMENTATION OF SECTORS

For every sector, two priority levels are identified (i) priority for action sector and that of the importance on monitoring and observation to be implemented:

- **Priority for action** : priority for action of every sector is applied on a gradient of 4 increasing priority levels:

Low	No action to be undertaken in the current situation.
Medium	Considering recommendations in projects and in development master plan that may concern probably a particular sector. No prescribed action to be undertaken in the near future.
High	A special attention should be paid to high priority sectors, consisting of integrating especially master plan prescriptions in all planning or development operations undertaken at local level, for instance assessing operations' effects and impacts and changes that might occur in the related sectors.
Very high	Actions concerning these sectors should rapidly be undertaken, observed situations being already critical or tending to become critical in the near future.

These priorities concerning in most cases the reduction of risks threatening people and goods, generally related to coastal erosion or exceptional weather events. In cases when the environment is identified in the sector as the main issue, priority is given to recommendations of conservation and prescribed areas put in prohibition.

- **Monitoring and observation** : Here also 4 levels have been considered :

No recommendation	No action to be undertaken in the current situation.
Ensure vigilance and anticipation	It is important to collect regularly general information related to the development of already noticeable and mentioned dynamics in the diagnosis and stakes in order to identify early on changes that will, should they appear, tend to speed up. The objective of this supervision is to identify early on fast changes that may be significant, to highlight them, if need be, through local planning studies and documents as well as conservative measures of prevention for risk situations.
Regular	These sectors get into the first stage of the coastline monitoring program and should be put under the observers' accountability.
Intense and Regular	The monitoring and observation in these sectors may involve regular topo-metric measures of coastline monitoring, as carried out by university teams within the framework of case studies. Concerning the sectors already covered by case studies, the comparison of results achieved with baseline conditions (featured by case studies) should be carried out on a regular basis.

UPDATING METHODOLOGY

The updating approach has collectively been conducted with all the technical stakeholders of MOLOA (West African Coast Observation Mission) various information sources have been used:

- ⇒ Data and information from national offices through sheets of a user guide on the sectors in annex 4.
- ⇒ High resolution image from *Google Earth*, *Bing* or other sources.
- ⇒ The information provided by local technical managers during the two regional technical seminars held in Senegal in January 2014 and in April 2015.
- ⇒ The information from the review of different publications and various sources.

In each case, this information has been gathered through different sources such as: high-resolution images, research on web sites, and communication with experts having knowledge on considered coastal area sectors. The master plan data have obviously been released to national offices to seek their opinion and remarks.

In most cases, priorities have been improved depending on a scaling-up or an increase of identified coastal issues. In some cases, it is the evolution in hazards that has justified the change in priorities. It is only in one case that the priorities have been lowered considering that the lack of progress in stakes would show that the priority had been overestimated during the SDLAO.

MAP REPRESENTATION

The locations and delimitations of different sectors are materialized in the map attached to the master. The distribution keys are described in the legends supporting each map.

GUIDE FOR IDENTIFIED SECTOR'S MONITORING AS PART OF SDLAO

This guide is the outcome of works conducted during the workshop on indicators, held in Saly Portudal in Senegal by January 2014. The findings of these works have been supplemented in order to install a data collection system on the West African Coast enabling to update the assessment of coastal risks at regional level. To that end, the deliverables of the workshop seminar held in Saly have been supplemented with available data within SDLAO. In the case of working groups 2 (new planning and special sites) and 3 (hazards and weather, climate, coastal and marine extreme events), the results have provided the majority of elements enabling to prepare sheets. The results of the working group 1 (spatial occupation) provide many interesting directions but some of which will require additional works to become immediately operational, above all considering the limited resources that national offices have today.

In accordance with risk assessment approaches established in 2009 within SDLAO, the sectors' monitoring will focus (i) on hazards and (ii) on changing stakes.

1. HAZARD REPORTING

Hazards sheet: The proposals from the workshop have been gathered in one risk sheet (See below) This sheet is supported by an explanatory note related to its use. The sheet is to be filled in and submitted to the regional unit whenever noticeable and significant risks are emerging or are arising in the sectors of each country. Right now, and in the absence of new exceptional event, MOLOA (West African Coast Observation Mission) national chapters are urged to fill in this sheet for the sectors where the remarkable dynamics of erosion or accretion are already known and possibly monitored.

2. EVOLUTION AND CHARACTERIZATION OF COASTAL STAKES: NEW DEVELOPMENTS OR STRUCTURING PROJECTS ON THE COASTLINE

- **Sheet EJ1:** The changing coastal stakes will be reported in the sheet EJ1 (See below). It involves the report concerning all the new settlements occurring on the coastline or near it. Three paralleled strips have conventionally been considered: (i)

From 0 to 300m from coastline, (ii) From 300 m to 2km from coastline, (iii) from 2 to 5 km from coastline.

- **Sheet EJ1:** The characterization of human occupation modalities on the coastal strip will be done from sheet EJ2 in annex 3 which will be filled in systematically for all SDLAO sectors at an annual or bi-annual time span. This sheet should be filled in for all SDLAO sectors for the publication of the 2015 assessment of coastal areas. This sheet is also supported by a simplified explanatory note related to its use.

3. SDLAO SECTORS IDENTIFICATION

The geographic identification of sectors can be done through SDLAO maps downloadable in French and in English on MOLOA website:

<http://www.cse.sn/moloa> MEMBER ACCESS link section or directly from MOLOA FTP.

MOLOA national chapters are urged to submit their observations and/or requests for specifications at any time to the regional unit.

HAZARDS SHEET :
CONSECUTIVE HAZARD REPORTING TO COASTAL MARINE AND METEOROLOGICAL EXTREME CLIMATE EVENTS
VERSION 1.0/01-2014

IN PRINCIPLE ONE SHEET PER REPORTED SECTOR

1. COUNTRY	
2. OBSERVER	
3. DATE OF ISSUE OF SHEET	

GENERAL LOCATION

4. COUNTRY		
5. AREA REF		6. AREA NAME
7. SECTOR REFERENCE		8. SECTOR NAME
9. RELEVANT COMMUNES AND SITES		

See the nomenclature of sectors in the document 2 of SDLAO master plan. The identification of these can be established from SDLAO maps. These documents are available in SDLAO sites, MEMBER ACCESS link section.

GENERAL DESCRIPTION OF EVENT

10. ALERT SOURCE	
11. BACKGROUND AND DETAILED DESCRIPTION OF THE EVENT	
12. TIME AND DURATION	
13. CHRONOLOGY	

14. PARAMETERS	
○ SWELL	<i>Height, direction, time, wavelength</i>
○ TIDE	<i>Amplitude</i>
○ WINDS	<i>Direction, speed</i>
○ RAINFALLS	<i>Rainfall amounts</i>
○ RIVER FLOODING	<i>Flow rate and score</i>
15. IDENTIFIED TRACK RECORD	

ITEMS FOUND

REF	REF	16. Estimated Spatial Extent (affected coastline, impacted coastal area and space, progress in terms of depth)	17. People affected	18. Impacts on properties and equipments	19. Damage to natural heritage
1	Marine intrusion/submersion				
2	Breach of cordon/ lidos				
3	Dam break				
3	Dam passing				
4	Sharp erosion				
4	Sharp accretion				
5	River flooding				
5	Other (to be defined)				

20. ACTORS AND MEASURES

CATEGORY OF ACTORS	ACTIONS TAKEN TO COPE WITH THE EVENTS

HAZARD SHEET NOTICE

CONSECUTIVE HAZARD REPORTING TO COASTAL MARINE METEOROLOGICAL EXTREME CLIMATE EVENTS

VERSION 1.0/01-2014

REF	TITLE	DETAILS
1	COUNTRY	Indicate the relevant country
2	OBSERVER	Provide the name of national offices' supervisor and that of the observer who authored the sheet
3	DATE OF ISSUE OF SHEET	Indicate the date of issue of the sheet
4	COUNTRY	Re-enter the name of the country to which the relevant sector belongs
5	AREA REF	Provide the area reference to which the relevant sector belongs (see SDLAO master plan report)
6	AREA NAME	Provide the area reference to which the relevant sector belongs (see SDLAO master plan report)
7	SECTOR REFERENCE	Provide the area reference to which the relevant sector belongs (see SDLAO master plan report)
8	SECTOR NAME	Provide the area reference to which the relevant sector belongs (see SDLAO master plan report)
9	RELEVANT COMMUNES AND SITES	Give any specification enabling to better locate the area concerned by the event: name of the locality, GPS coordinates, other...
10	WARNING	<p>Specify the source of the information which has enabled to be aware of the event:</p> <ul style="list-style-type: none"> ○ National weather office ○ Hydrological/hydrographical services ○ Port and airport services ○ Research institutions ○ Civil Protection Directorate ○ Civil society/Local governments ○ Program and projects (coastal and marine) ○ Security services ○ Populations/Communities ○ NGO, etc. ○ Other (specify)
11	BACKGROUND AND DETAILED DESCRIPTION OF THE EVENT	<p>We re-enter here: specific location, dates and time.</p> <p>Type of event, surprise, speed of development, extension on the field, unprecedented event, long duration, domino effect...</p> <p>Context of the situation: weather (temperature, wind speed...) geographic situation, areas of human habitation, areas of activities, difficulties caused...</p> <p>Causes of the event.</p> <p>Consequences of the event: casualties, property damage, environmental damage, traffic diversion, evacuation,...</p>
12	TIME AND DURATION	Dates and time

13	CHRONOLOGY	<p>Re-enter the detailed chronology of the event</p> <p><i>Example: On October 12, 2012</i></p> <p><i>At 8: 00 am: start of heavy rains (day and night)</i></p> <p><i>At 19:30 pm: crisis unit at the prefecture.</i></p> <p><i>At 20:00 pm: flooded homes</i></p> <p><i>At 21:00 pm: people blocked on the road, army helicopter reinforcements.</i></p> <p><i>At 22:00 pm: Garonne flooding.</i></p> <p><i>At 00:00 pm: opening of the gymnasium</i></p> <p><i>At 02:00 pm: Garonne flooding announcement.</i></p> <p>On October 13,2012</p> <p><i>At 11:00 am: rise in flood waters</i></p> <p><i>At 12:00 am: arrival of civil security reinforcements</i></p> <p><i>At 14:00 pm: new rise in flood waters</i></p> <p><i>At 18:00 pm: attainment of the highest level</i></p> <p>On October 14,2012</p> <p><i>At 11:00 am: start of retreat in waters</i></p> <p><i>At 1: 00 am: start of cleaning operation</i></p>
14	PARAMETERS	Fill in the parameters when data are available
15	HISTORY	Indicate the previous circumstances of similar events
16	Estimated spatial extent	Provide any information enabling to determine the spatial extent of the area affected by the event
17	AFFECTED PEOPLE	Reporting people affected following the event (disaster, displacement, loss of human life, etc.)
18	IMPACT ON PROPERTIES AND EQUIPMENTS	<p>Reporting impacts on goods and equipments following the events:</p> <ul style="list-style-type: none"> ○ Human habitations (Homes, Hospitals, Schools, etc.) ○ Economic infrastructure (Landing points, ports, industries, tourism, fishing, agriculture, etc. ○ Cultural heritage (mosques, churches, temples, burial grounds, etc.) ○ Equipments (roads, power, water treatment plants, etc. ○ Other...
19	DAMAGE TO NATURAL HERITAGE AND ECOSYSTEMS	Reporting damage to natural heritage, biodiversity and ecosystems
20	ACTORS AND MEASURES	Indicate per category of actors the measures taken concerning the event

SHEET EJ1 :
DEVELOPMENT/EQUIPMENT
REPORTING NEW STRUCTURING DEVELOPMENT AND EQUIPMENT ON COASTLINE
VERSION 1.0/01-2014

IN PRINCIPLE ONE SHEET PER REPORTED SECTOR

1. COUNTRY	
2. OBSERVER	
3. DATE OF ISSUE OF SHEET	

GENERAL LOCATION

4. COUNTRY			
5. AREA REF		6. AREA NAME	
7. SECTOR REFERENCE		8. SECTOR NAME	
<p><i>The nomenclature of sectors is specified in the document OBS-01. The description of sectors is made in the document OBS-01. Identification of these is possible on SDLAO maps. These documents are available on SDLAO sites, MEMBERS ACCESS link section.</i></p>			

GENERAL DESCRIPTION OF THE EVENT

10. INFORMATION SOURCE	
11. BACKGROUND AND DETAILED DESCRIPTION OF DEVELOPMENT / EQUIPMENT	
12. EXPECTED START TIME	
13. EXPECTED END TIME	
14. ALREADY EXISTING DEVELOPMENTS ON THE SITE	

DEVELOPMENTS/ EQUIPMENTS

REF	FR	15. Relevant coastal area	16. Spatial Extent estimated (Impacted coastline, coastal area and relevant space)	17. Description of development and/or equipment
1	PORTS AND LANDING POINTS			Indicate capacities and infrastructure
2	PROCESSING AND MARKETING AREAS OF FISHERY PRODUCTS			Indicate capacities and infrastructure
3	WORK BUILDING FOR COASTLINE DEFENSE AND PROTECTION			Number, linear, infrastructure nature
4	BEACH NOURISHMENT			
5	ROAD INFRASTRUCTURE OPENING UP THE COASTAL STRIP			Indicate junctions with prevailing network
6	NEW HUMAN SETTLEMENTS			Indicate estimated resident population
7	SETTLEMENT OF TOURIST FACILITIES			Indicate accommodation capacity
8	EVACUATION MISSION OF WASTE WATER AND URBAN EFFLUENTS			
9	AGRICULTURE AND HYDRO AGRICULTURE DEVELOPMENTS			
10	REFORESTATION			
11	LAND-CLEARING			
12	MATERIAL EXTRACTION			
13	MINING ACTIVITIES			
14	SALT PRODUCTION			
15	OTHER (to be specified)			

**SHEET NOTICE EJ1 :
DEVELOPMENT/EQUIPMENT
REPORTING NEW STRUCTURING DEVELOPMENT AND EQUIPMENT ON COASTLINE
VERSION 1.0/01-2014**

REF	TITLE	DETAILS
1	COUNTRY	<i>Indicate the relevant country</i>
2	OBSERVER	<i>Provide the name of national unit supervisor and that of the observer who authored the sheet</i>
3	DATE OF ISSUE OF SHEET	<i>Indicate the date of issue of the sheet</i>
4	COUNTRY	<i>Re-enter the name of the country to which the relevant sector belongs</i>
5	AREA REF	<i>Provide the area reference to which the relevant sector belongs (see SDLAO master plan report)</i>
6	AREA NAME	<i>Provide the area reference to which the relevant sector belongs (see SDLAO master plan report)</i>
7	SECTOR REFERENCE	<i>Provide the area reference to which the relevant sector belongs (see SDLAO master plan report)</i>
8	SECTOR NAME	<i>Provide the name of the relevant sector (see SDLAO master plan report)</i>
9	RELEVANT COMMUNES AND SITES	<i>Give any specification enabling to better locate the zone concerned by the event: name of the locality, GPS coordinates, other...</i>
10	WARNING	<p><i>Specify the source of the information which has enabled to know the planning:</i></p> <ul style="list-style-type: none"> <i>o Port and airport services</i> <i>o Research institutions</i> <i>o Civil society/Local governments</i> <i>o Programs and projects (coastal and marines)</i> <i>o Technical services</i> <i>o Populations/Communities</i> <i>o NGO, etc.</i>
11	BACKGROUND AND DETAILED DESCRIPTION OF THE PLANNING AND /EQUIPMENT	<i>We re-enter here a detailed description of the development / equipment identified</i>
12	EXPECTED START DATE	<i>Expected start date of the works of the project</i>
13	EXPECTED COMPLETION DATE	<i>Expected completion date of the works or the project</i>
14	ALREADY EXISTING DEVELOPMENT ON THE SITE	<i>Indicate whether other planning were already pre-existing on the site considered</i>
15	COASTAL AREA RELEVANT COASTAL STRIP	<p><i>Indicate how far from the coastline the development is completed, use the following typology:</i></p> <p><i>1-from 0 to 300m from the coastline</i></p> <p><i>2-from 300m to 2 km from the coastline</i></p> <p><i>3-from 2 to 5 km from the coastline</i></p>
16	SPATIAL EXTENT	<i>Provide any information enabling to determine the spatial extent of the area concerned by the development/equipment.</i>
17	BACKGROUND AND DETAILED DESCRIPTION OF THE DEVELOPMENT /EQUIPMENT	<i>We re-enter here a detailed description of the identified development / equipment</i>

**SHEET EJ2 :
SPATIAL OCCUPATION AND HUMAN STAKES IN THE COASTAL AREA
VERSION 1.0/01-2014**

IN PRINCIPLE ONE SHEET PER REPORTED SECTOR

1. COUNTRY	
2. OBSERVER	
3. DATE OF ISSUE OF SHEET	

GENERAL LOCATION

4. COUNTRY		
5. AREA REF	6. AREA NAME	
7. SECTOR REFERENCE	8. SECTOR NAME	

The nomenclature of sectors is specified in the document OBS-01. The description of sectors is specified in the document OBS-01. Identification of these is possible on SDLAO maps. These documents are available on SDLAO sites, MEMBERS ACCESS link section.

SPATIAL OCCUPATION

	TYOLOGY	300 meters strip (% estimated occupation)	From 300 meters to 2 km (% estimated occupation)	From 2 to 5 km (% estimated occupation)
NATURAL SPACES NOT OR LESS ARTIFICIALISED				
Densities low to zero, fewer than 5 inhabitants per km2				
9	Very low density zones or almost any human habitations (desert, mangroves), areas climatically unfit for agriculture			
10	Classified forests and terrestrial national parks, or marine protected areas			
VARIABLE ARTIFICIALISATION OF RURAL AREAS				
Very low density to low from 5 to 10 inhabitants per km2				
11	Rocky areas unfit for sustainable agriculture			
12	Sandy areas unfit for agriculture for land-related reasons			
13	Forestry exploitation under way for agriculture with relics of more or less extensive forestry formations			
14	Clear cut post forestry areas but partially intended for agricultural development			
Very low to medium density from 10 to 50 inhabitants per km2				
15	Local lands still having a very important savannah fallow or secondary forests			
16	Large plantations of industrial crops or forestry			
17	Traditional rice production area with controlled natural flooding			
Medium to high density from 50 to 200 inhabitants per km2				
18	Local lands still having arable fallow or non-farming-lands			
High density from 200 to 500 inhabitants per km2				
19	Densely populated areas, disappearing fallow, «rurban» based-economy			

OVERURBAN SPACES OR BEING URBANIZED			
Very high density, more than 500 inhabitants per km² and urbanizing spaces			
20	Industrial areas		
21	Not built intra-urban spaces		
22	Peri-urban extensions under way		
23	Recent peri -urban extensions		
24	Very loose but served urban fabric		
25	Dense urban fabric		
26	Very dense urban fabric		
27	Other indiscriminate urban spaces		

ISOLATION

	TPOLOGY	300 meters strip (% linear of served sector)	From 300 meters to 2 km (% linear of served sector)	From 2 to 5 km (% linear of served sector)
28	Accessible track only in certain seasons			
29	Accessible track by all seasons			
30	All-weather paved roads			
31	Traffic on the beach			

SHEET NOTICE EJ2 : SPATIAL OCCUPATION AND HUMAN STAKES IN THE COASTAL AREA

VERSION 1.0/01-2014

REF	TITLE	DETAILS
1	COUNTRY	<i>Indicate the relevant country</i>
2	OBSERVER	<i>Provide the name of national agency supervisor and that of the observer of the sheet author</i>
3	DATE OF ISSUE OF SHEET	<i>Indicate the date of issue of the sheet</i>
4	COUNTRY	<i>Re-enter the name of the country to which the relevant sector belongs</i>
5	AREA REF	<i>Provide the area reference to which the relevant sector belongs (see SDLAO master plan report)</i>
6	AREA NAME	<i>Provide the area reference to which the relevant sector belongs (see SDLAO master plan report)</i>
7	SECTOR REFERENCE	<i>Provide the area reference to which the relevant sector belongs (see SDLAO master plan report)</i>
8	SECTOR NAME	<i>Provide the name of the relevant sector (see SDLAO master plan report)</i>

SPATIAL OCCUPATION

The typology of coastal space settlement drawn includes three large types of spaces, characterized by human population densities which are subdivided into 18 categories.

Type of space	Human density	Categories
Not or less artificialised natural spaces	Densities low to zero, fewer than 5 inhabitants per km ²	9-10
Variable artificialisation of rural areas	From very low to low density, from 5 to 10 inhabitants per km ²	11-14
	Low to medium density from 10 to 50 inhabitants per km ²	15-17
	Medium to high density from 50 to 200 inhabitants per km ²	18
	High density from 200 to 500 inhabitants per km ²	19
OVER-URBAN OR URBANIZING SPACES	Very high density, more than 500 inhabitants per km ² and urbanizing spaces	20-27

Correlation table between types of spaces, densities and corresponding categories

A description of various categories used in the typology of Coastal area space occupation in West Africa is pictured in the tables below:

NOT OR LESS ARTIFICIALISED NATURAL SPACE		
Densities ranging between very low to zero, less than 5 inhabitants per km ²		
9	Very low density zones or almost any human habitations(desert, mangroves), areas climatically unfit for agriculture	This unit deals with uncultivated sahelian pastoral spaces or desert, human occupation is limited to breeders camping near water points or temporary campments for transhumance. This category comprises desert areas where permanent human presence is limited to some water points. It is not expected that this situation will change in the future, except occasionally within activities other than transhumant or nomadic pastoralism.
10	Classified forests and terrestrial national parks, or marine protected areas	The major parts of them have a status which excludes permanent human residence, at least in conservatory central cities other than that of the management staff and supervisors of these spaces. If some activities and visits are tolerated, even authorized agricultural use and habitation are generally excluded and the intensity of human occupation is «very low» inside the limits, but often increased in the periphery.

VARIABLE ARTIFICIALISATION OF RURAL AREAS		
From very low to low density, from 5 to 10 inhabitants per km ²		
This category includes areas for the most part unfit for sustainable agriculture, either depending on climatic conditions, or soils unfitness. It is particularly the case of dune areas in the Senegalese Grande Côte, leached sandy terraces in the South of Sierra Leone. The weakly existing population draws the great part of its incomes from other resources than agricultural production (transhumant livestock, fishing). It also includes species mainly located in Liberia and in the far South of Cote d'Ivoire in an uncompleted agricultural situation still based on traditional forestry exploitation, leaving between the latter the spaces of forestry relics and secondary vegetation.		
11	Rocky areas unfit for sustainable agriculture	These are rocky grounds surrounding Coastal Guinea, the natural environment can provide rare cultivable lands, with a very long fallow and very intense pastoral activity, without any intensification perspective in the future.
12	Sandy areas unfit for agriculture for pedological reasons	
13	Forestry exploitation for agriculture with relics of more or less extensive forestry formations	These categories are exclusively for wooded massifs under forestry exploitation or classified forest for agricultural invasion.
14	Clear cut post forestry areas but partially for agricultural development	

Low to medium density from 10 to 50 inhabitants per km²

The soils having here a high percentage of potentially cultivable lands, but the surface area assigned to fallow, to savannah, and secondary forests is still substantial. It is mainly:

- **South sahelian zone**, with the limit of climatic possibilities to get rain-fed crops, in some years, there is no yield. Out of irrigated surfaces, the resources are rather pastoral, with rural exodus or return according to resource cycles and the comeback of an effective rainfall.
- **Species which have rapidly become savannah after the disappearance of old vegetation**. In the rainfall areas higher than 2000 mm (Guinea Bissau, Guinea Conakry, Sierra Leone), lands easily leachable require long periods of fallow in agricultural system with short term traditional cycle.
- **Post forestry zones in Liberia and in the South-West of Côte d'Ivoire**, where agricultural colonization of plantations and food crops is not ended, with considerable areas of secondary forests, even already savannah.

15	Production areas still having a very important savannah fallow or secondary forests	
16	Large plantations of industrial crops or forestry	<p>Only the large ones are to be considered (rubber tree, oil palm, coco tree, pineapple, reforestations), permanent human settlement in the outskirts of these zones. Many small plantations or discontinuous and populated plantations are not included here, especially the most part of coastal area coconut grove often in a growing devastation condition as we get close to the river side.</p> <p>Very demanding topographic enabling conditions, land resources, a great number of existing plantations had been able to grow in site conditions less available today.</p> <p>To the extent that the socio-economic conditions remain favorable to these systems, the large plantations are likely to remain in occupied zones, even though crop is to be changed. Another possible scenario would be their extinction by parceling land reforms for small family business owners.</p>
17	Traditional rice production zone with controlled natural flooding	<p>There are significant spaces in Guinea Bissau, Guinea Conakry, Sierra Leone and locally today, in Casamance (Senegal). Generally, three main systems of resource mobilization in lands and in water should be distinguished:</p> <ul style="list-style-type: none"> □ Rice-growing on cleared and reclaimed but unpopulated mangrove lands. □ Rice-growing in channels and sandy terraces flooded in the rainy seasons, with concentrated habitation on sandy cordons outside the water. □ Upland rice-growing and flooding of wetlands and low lands, population living on dewatered hills nearby. <p>The future of these various forms of rice-growing always sensitive to climate vagaries are likely to be put in question in a assumption, even moderate, of sea-level rise. It is particularly the case of rice-growing in mangrove lands, where dikes making and maintenance of land reclamation is very demanding in man power. The current situation often critical (see case studies in Guinea) would largely be compounded on vast surfaces (often more fertile) thanks to the rise in sea level less than 50 cm.</p>

Medium to high density from 50 to 200 inhabitants per km²

18	Production areas still having arable fallow or non-farming-lands	<p>These areas still have vast uncultivated land surfaces every year, either because they are left fallow, but fit for agriculture, or unfit for pedological reasons or climate ones. The current situation, but more importantly the outlook for future development, is rather mixed:</p> <ul style="list-style-type: none"> □ The production areas comprising a high percentage of areas unfit for agriculture, the scaling-up being concentrated only on cultivable lands with a life system close to that of the mapping unit 2. It is the case in Senegal with areas pedologically underprivileged, located next to Dakar. □ The largely occupied and structured production areas, but which still have reserves in fallow lands over shorter and shorter periods (Guinea Bissau, Cote d'Ivoire in the surroundings of tertiary sands, in cocoa areas of Ghana). □ The production areas under insecurity situations (at the border between Senegal and Guinea, Sierra Leone, Liberia) whose rural population has stagnated or decreased.
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High density from 200 to 500 inhabitants per km²

19	Densely populated areas, disappearing fallow lands, economy with 'rurban' trend	<p>These areas are featured by a generalized agricultural occupation, made possible by farming lands with any major pedological restrictions. The fallow area is increasingly dropping, with dense habitation in a village or hamlet habitat surrounded by more or less wooded plots, with more or less large orchards. There are two situations to consider:</p> <ul style="list-style-type: none"> □ The production areas with "rurban" development, in immediate surroundings of large agglomerations: <ul style="list-style-type: none"> ▪ Groundnut production area close to Dakar. ▪ Tertiary sands areas surrounding Abidjan. ▪ The dense areas of Takoradi-Capetown, Accra-Tema ▪ The clayey lands surrounding the coastal axis of Cotonou-Lomé, served by a strong network of roads or tracks converging to the agglomerations. <p>The relationships between town and village tend to diversify especially at the level of:</p> <ul style="list-style-type: none"> ▪ The flow in foodstuff or market gardening products towards the city, marketed or within a family exchange framework. ▪ Residences and/or revenues of some categories of population inside the family unit: cyclical or occasional migrations to town to seek jobs, returns or stays in the village in housing conditions less restrictive than in town. □ The dense production areas where mainly a farming population is located on exposed areas, but earn their living from flood-prone unpopulated rice fields (mangroves, wet terraces) or sea food. This situation is recurrent in Guinea Bissau, in lower Casamance, in Guinea Conakry (Koba, Kakossa, Benty, etc.) and in Sierra Leone.
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OVER-URBAN OR URBANIZING SPACES

Very high density, more than 500 inhabitants per km² and urbanizing spaces

This category includes:

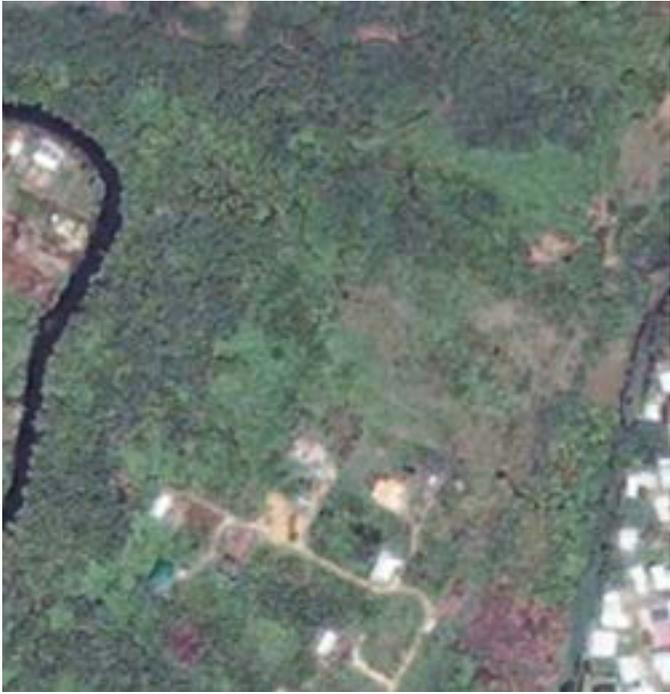
- **The largest urbanized areas**, The “spontaneous” suburban area growth where housing development projects are carried out by following the main road access, saturating gradually the space between those areas : Cotonou-Lomé, Accra-Cape town-Sekondi-Takoradi, Abidjan, Freetown, Monrovia, Conakry, Bissau, Banjul, Dakar.
- **The “rurban” areas**, in particular the shoreline, featured by the mixed residence near the sea and urban property often the most motorized one, and increasingly residual isolated agricultural activities of “traditional” villages with farmers and fishermen housing, and one part of the family having activities in town. This form of housing in coconut grove on shoreline is often springing up on both sides of Cotonou, Lomé, in the large part of Ghanaian agglomerations; on the centerline of Abidjan-Grand Bassam, the South of Freetown, etc.
- **The populated tourist areas**, with sometimes continuous hotels at the seaside and endowed with habitat sheltering populations associated with tourism. It is particularly the case of the Gambia, Casamance (Cap Skirring) the Senegale Petite Côte which is characterized today by an urbanized seafront almost continuously, hotels areas and secondary residences. It is worth pointing out the particular case of the coastline coconut groves densely inhabited by populations living on agriculture and fishing industry under the significant urban influence (for example Ivorian Axim-border in Ghana).

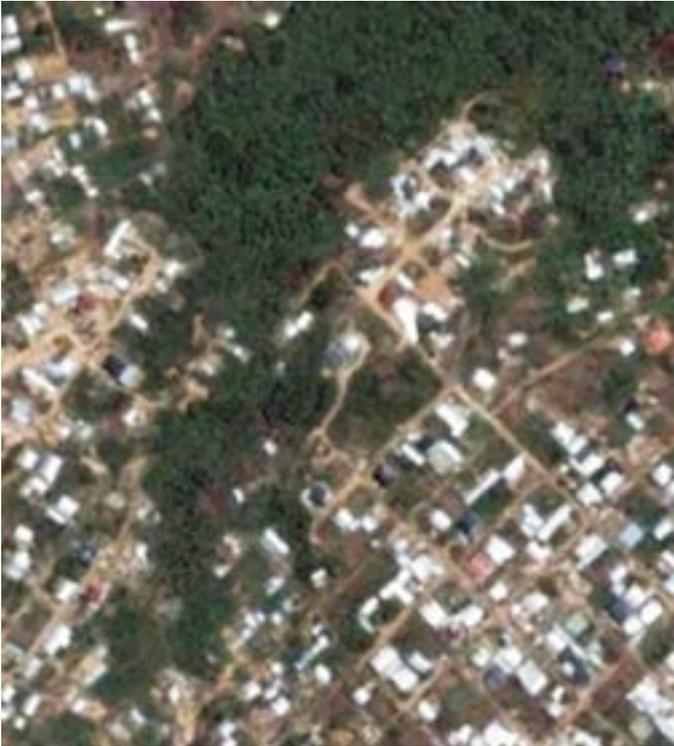
20

Industrial areas



Industrial areas, port infrastructure, etc.

<p>21</p>	<p>Unbuilt intra-urban spaces</p>	 <p>Vegetation spaces or bare soil without any surface construction covering more than 0.02km². This category includes all types of soils without development which may be a land reserve, as well as developed parks and forests, landing strip surroundings, etc.</p>
<p>22</p>	<p>Semi-urban extensions under way</p>	 <p>The constructions cover less than 20% of the space, the delimitation of served plots by a runway network is generally visible. This category can be found in peri-urban extensions.</p>

<p>23</p>	<p>Recent semi-urban extensions</p>	 <p>The later stage of the previous category 22, and prior to the following 24</p>
<p>24</p>	<p>Very loose but served urban fabric</p>	 <p>Surfaces where bare and vegetation soils are predominant compared to constructions. This category accounts for the urban areas with very loose netting, but being served by communication channels. We can find here villages with scattered habitat and scattered periphery of agglomerations corresponding to the recently urbanized areas, even under construction at the time of available shootings. However the structure covers more than 50% of the space.</p>

<p>25</p>	<p>Dense urban fabric</p>	 <p>Surfaces where more spaced constructions are separated by bare or vegetation soils corresponding to undeveloped spaces of basic plots. The meshing is mainly made of constructions but undeveloped spaces exist, as well as some trees.</p>
<p>26</p>	<p>Very dense urban fabric</p>	 <p>Surfaces where vegetation and/or bare soils are not practically visible between constructions. This category of density is characterized by a tightened meshing of constructions and communication channels. We can find in this category the centers of large agglomerations and some urban areas, slum environments and some villages where construction is very concentrated.</p>
<p>27</p>	<p>Other indiscriminate urban spaces</p>	<p>This classification concerns all the urban areas the surface of which cannot be discriminated either because of the small size, or because there is not enough image resolution.</p>

MAIN APPLICABLE LEGISLATION AND REGULATIONS TO COASTAL AREAS IN WEST AFRICA

The collection of instruments below is not comprehensive and has been selected for reference.

BENIN	
Law n°98-030 of 12 February 1999, on the framework law on the environment in the Republic of Benin	Environment
Decree n°86-516 of 15 December 1986, on the definition of responsibilities in coastal management matter	Coastal area
Order n° 0014-MET-DGM-DEP of 5 May 1987, dealing with the organization and functioning of Coastal Funds	Coastal area
Order n°862-MISD-DGPN-DAP-SA of 12 September 2002, dealing with the establishment of a national brigade for coastal area protection and pollution control within the national police	Coastal area
Law n°93-009 of 2 July 1993, on forest regulation	Forests/ Mangrove
COTE D'IVOIRE	
Law n°98-755 of 23 December 1998, on the Water Code: integrated water resource management including (article 5) 'The conservation of aquatic ecosystems, sites and wetlands'	Wetlands
Law n°96-766 of 3 October 1996 on the Environment Code	Environment
Law n°2002-102 of 11 February 2002 on the establishment, management and funding of national parks and natural reserves	Protected area
Decree 2012-163 defining procedures of national parks classification and natural reserves of February 2002	Protected area
Law N° 2014-425 of 14 July 2014 on the forest code, in substitution of the law concerning the 1965 Forest Code	Forests/ Mangrove
The framework Act, n°2014-390 of 20 June 2014 on sustainable development	Forests/ Mangrove
THE GAMBIA	
Wildlife Conservation Act, 1977 (Act No. 1 of 1977) amended in 1996	Protected area
<i>National Environment Management Act (NEMA) of 1987, and its amendment in 1994, providing the legal framework for the establishment of the National Environmental Management Council (NEMC) as well as the operational framework of the National Environment Agency (NEA)</i>	Environment
<i>Agricultural and Natural Resources Management Sector Policy, 2001 – 2020</i>	Environment
<i>Forest Act 1977 provides for the designation of 'protected forest'. Three species of mangroves - Rhizophora mangle, Rhizophora racemosa and Rhizophora harrisonii - are mentioned in the annex of protected species within the framework of this instrument.</i>	Forests/ Mangrove
<i>An addendum to the 1996 Forest Regulations which includes Risophora spp in the framework of licensing system for tree-cutting : this regulation is in Forest Act 1998.</i>	Forests/ Mangrove
<i>The Forest Act 1998 put into action the Gambian Forest Management Concept (GFMB) which has been established since 1995</i>	Forests/ Mangrove
GUINEA	
Order n°007-PRG-SGG- of 15 February 1990 on wildlife protection and the regulation of hunting	Protected area
Law n°97-038-AN- of 09 December 1997 adopting and promulgating wildlife protection and the regulation of hunting	Protected area
Order n°045-PRG-87 of 28 June 1987 on the Code for the protection and enhancement of the environment	Environment
Order n°22-PRG-SGG -89 of 10 March amending the Environment Code	Environment
Decree n°199-PRG-SGG-89 c of 8 November 1989 codifying the environmental impact assessments	Environment/EIA
Decree n°201-PRG-SGG-89 of 8 November 1989 on the conservation of the marine environment against any form of pollution	Marine/Pollution
Decree n°200-PRG-SGG-89 of 8 November 1989 legal system «Classified facilities for the protection of the Environment”	Environment
Order A/2013/474/MEEF/CAB of 11 March 2013 on the adoption of EA General Guide defining the content, methodology and the procedure of implementation of an ESIA in the Republic of Guinea.	Environment/EIA
Decree D/2014/014/PRG/SGG concerning the adoption of a guideline for the conduct of an environmental and social impact assessment of mining operations.	Environment/EIA

GUINEA BISSAU	
<i>Decreto N°96 - PA</i>	Protected area
<i>Decreto-Lei n°3-97 das areas protegidas</i>	Protected area
<i>Decree-Law No. 2-2004 establishing the basic norms for protection, promotion and exploitation of Wildlife</i>	Protected area
<i>Decreto n°2-2005 criacao IBAP</i>	Protected area
<i>Decree-Law No. 5-A-2011 establishing the legal framework of protected areas</i>	Protected area
<i>Law No. 10-2010 on Environmental Impact Assessment Regulation</i>	Environment/EIA
<i>Law No. 1-2011 approving the Basic Legislation on Environment</i>	Environment
<i>Decree-Law No. 5-2011 approving the New Forestry Law</i>	Forests/ Mangrove
GHANA	
<i>Wetland Policy and Strategy 2012</i>	Wetlands
<i>Wetland Management (Ramsar Sites) Regulations 1999.</i>	Wetland
<i>National Wetlands Policy 1999</i>	Wetland
<i>Coastal Wetlands Management Plan 1991 (status to be confirmed)</i>	Wetland/AP
<i>Forest and Wildlife Policy 2012</i>	Forest/ Mangrove
<i>Forest & Plantation Development Act of 2000 (Act 583),</i>	Forest/ Mangrove
<i>Forestry Commission Act 1999 (Act 571)</i>	Forest/ Mangrove
<i>Environmental Protection Agency Act, 1994</i>	Environment
<i>Ghana Tourism Policy 2006</i>	Tourism
<i>Water Resources Commission Act, 1996</i>	Wetland
LIBERIA	
<i>National Forestry Reform Law 2006</i>	Forest/ Mangrove
<i>National Forestry Policy and Implementation Strategy 2006</i>	Forests Mangrove
<i>Regulation on sustainability of the resource base for fuel wood and charcoal production (FDA Regulation No. 19) of March 26 199</i>	Forest/ Mangrove
<i>National Forestry Reform Law 2000</i>	Forest/ Mangrove
<i>National Wildlife Conservation and Protected Areas Management Act 2014</i>	Protected area
<i>National Environmental Policy of Liberia (NEP) 2003</i>	Environment
<i>Environmental Protection Agency Act, 2002</i>	Environment
<i>Environmental Protection and Management Law (EPML) 2002</i>	Environment
<i>Liberia National Adaptation Action Plan 2008</i>	Environment/CC
MAURITANIA	
<i>Order n° R-125 of 29 March 1998 establishing land development unit for the Mauritanian coastal area</i>	Coastal area
<i>Decree n°098-52 of 28 June 1998 on the establishment of inter ministerial committee for the Mauritanian coastal area development</i>	Coastal area
<i>Order R-888 providing the composition and mission of the technical committee in charge of assisting the inter ministerial committee for the Mauritanian coastal area development</i>	Coastal area
<i>Order n°2007-037 of 17 April 2007 on the coastal area</i>	Coastal area
<i>Decree n°2010-014 of 20 January on the organization and functioning of the National Advisory Council for the coastal area (NACL)</i>	Coastal area
<i>Decree n°2003-034 of 22 May 2003 on the approval and stating as public interest the Urban development master plan of Nouakchott)</i>	Coastal area
<i>The framework act n°2010-001 of 7 January 2010 on land use development</i>	Coastal area
<i>Decree n°2010-048 of 1 March 2010 on the establishment of an Intervention Fund for the Environment (IFE)</i>	Environment
<i>Order n°001375 of December 2002 concerning the establishment, powers and organization of Wetlands Development Unit (WADU).</i>	Wetland

Order n°2947 of 30 November 2006/FM /SEE on the establishment of a National Fund for Forest and Fauna Development	Forest/ reforestation
Order n°R-274 of 9 June 1998 on the establishment of a Wetland network and water-bird population monitoring in Mauritania	Wetlands/ Bird
Order n°R-751 of 10 October 1998 concerning the establishment of a network in Wetlands and water-bird population monitoring in Mauritania	Wetlands/ Bird
Order n°R-020 of 11 February 1985 on the creation of natural reserves or national parks	Protected area
National Strategy for Wetland Conservation in Mauritania adopted in October 2014	Wetlands
Law n°2000-045 of 27 July 2000 on the Environment Code	Environment
Decree n°2004-094 of 24 November 2004 on the Environmental Impact Assessment	Environment/EIA
SENEGAL	
Law n°2001-01 of 15 January 2001 on the Environment Code	Forests/ Mangrove
Ministerial ruling n°9468 MJEHP-DEEC of 28 November 2001 on the regulation of public involvement in the Environmental impact study	Environment/EIA
Ministerial ruling n°9470 MJEHP-DEEC of 28 November 2001 establishing the terms of issuing the Authorization to carry out activities related to the Environmental impact assessment	Environment/EIA
Ministerial ruling n°9471 MJEHP-DEEC of 28 November 2001 concerning the definition of terms of reference for impact assessments	Environment/EIA
Ministerial ruling n°9472 MJEHP-DEEC of 28 November 2001 on the content of the Environmental impact assessment report	Environment/EIA
Law n°98-03 of 8 January 1998 on the Forest Code	Forest/ Mangrove
Decree n°2004-1408 of 4 November 2004 concerning Protected Marine Areas	Protected area
SIERRA LEONE	
Draft Wetlands Policy 2014	Wetland
<i>Forestry Policy 2010</i>	Wetland/ Mangrove
<i>Forestry Regulations 2008</i>	Forest/ Mangrove
<i>Forestry Act 1988 and Forestry Regulations 1989</i>	Forest/ Mangrove
<i>Sierra Leone Conservation and Wildlife Policy 2010</i>	Protected area
<i>Biodiversity Strategy and Action Plan (2003).</i>	Protected area
<i>Wildlife Conservation Act, 1972 (No. 27 of 1972)</i>	Protected area
<i>Wildlife Conservation Act 1992</i>	Protected area
<i>Environment Protection Agency Act 2008, amended in 2010.</i>	Environment
<i>Environmental Protection Act 2000 establishing the National Environment Protection Board</i>	Environment
<i>National Environmental Policy (NEP) 1990</i>	Environment
TOGO	
Decree n°2006-058-PR of 5 July 2006 setting out the list of work, activities and planning documents submitted to EIA and the main rules of this assessment	Environment/EIA
Law n°2008-005 of 30 May 2008 on the framework Act on environment	Environment
Decree n°2009-091-PR of 22 April 2009 on the powers, organization and functioning of the National Environment Fund	Environment
Decree n°2009-090-PR of 22 April 2009 on the powers, organization and functioning of the national Agency for environmental management (NAEM)	Environment
Law n°2008-09 of 19 June 2008 on the Forest Code	Forest/ Mangrove

MAIN MINING OPERATIONS IN COUNTRIES MONITORED BY MOLOA

Sources: USGS Minerals Year book (2012 – 2013) and Mining Atlas (<https://mining-atlas.com/>) consulted in November 2015

MAURITANIA

Iron mine-Magnétite of « Guelb el Rhein » and « Gelb II » with the deposit of « Atomai » of the company *SNIM* ; Iron mine-Hematite of « MHaoudat », « Fderik », « Azouazil », « Seyala », « Rouessa », « Tazadit (Zouerate, Kedia d'Idjil », « TO14 » of the company *SNIM*

Iron ores project of « Bou Derga » and iron project-Magnetite of « Tizerghaf » of the company *SNIM* ; Iron ores project of « El Agareb » of the companies *SNIM* and *Arcelor Mittal* ; Iron ores project of « Guelb el Aouj » of the company *Glencore Xstrata* ; Iron ores project of « Ledtheinia », « Askaf » of the companies *Glencore Xstrata* and *SNIM* ; Iron ores project of « Kaouat » of the companies *Transafrika Resources* and *Agrineq*

Gold mine of « Tasiat » of the company *Kinross* ; Copper/gold mine of « Guelb Moghrein » of the company *First Quantum Minerals*

Gryphon Minerals with a Gold mine project of « Tijirit », a copper/gold mine project of « Akojoujt » and a copper mine project of « Saboussin » as well as the gold mine project of « Tasiat sud » of the company *Drake Resources*

Uranium mines projects of « Tamreikat » and « Bir en Nar » of the company *Forte Energy* and the phosphate mine project of Phosphate mine project of « Bofal » of the company *Bofal Indoo Mining*.

SENEGAL

Phosphate mines « Tobene », « Taiba » and processing plant of the company *ICS* ; Phosphate mine of « Thies (Allou-Kagne, Lam Lam, Sébikhote) » of the company *Tolsa SA* ; Phosphate mine project of « Baobab » of the company *Minemakers*

Gold mines of « Sabodala (Niakafiri) », « OJVG Sabodala » and gold mines projects « Gora », « Makana JV », « Bransan » and d'or-Argent of « Dembela Berola » of the company *Teranga Gold* ;

Gold mine projects of « Wassadou », « Woye », « Lingokoto », « Bouroubourou » of the company *Erin Ressources* ; Gold mine project of « Massawa (Tombo, Bambaraya, Kanoumba) », « Bambadji » of the company *Randgold Resources* ; Gold mine of « Dalafin » of the company *Stratex International*. Gold mine project of « Boto » of the company *lamgold*.

GUINEA-BISSAU

Bauxite project of Boe of *Sociedade Mineira de Investimentos Bauxite Angola (SMIBA)*

Phosphate project of « Farim » of *Plains Creek Phosphate Corporation* from Canada, *GB Minerals*

Bauxite Mine of « Kindia » and « Fria » with processing plant Alumine of « Friguia Alumina » *Rusal Company* exported by Conakry port terminal ;

Bauxite Mine of « Sangaredi » of the companies *Rio Tinto*, *Alcoa* and the *Government of the Republic of Guinea* processed in the plant of « Kamsar » and exported by the « Kamsar » terminal

Bauxite mine project of « Dian Dian » of the company *Rusal* and Bauxite mines project « Koba », « Koumbia », « Mamou Dalaba » of the company *Anglo Aluminium*

Aluminum refinery project « Guinea Alumina » of the companies *BHP Billiton*, *Dubai Aluminium* and *Global Alumina*

Gold mines of « Siguiri » of the company *Anglogold Ashanti and the State of Guinea*, of « Lefa » of the company *NordGold* and of « Kiniero » (Jean Gobe) of the company *New Dawn*

Gold mine projects of « Siguiri North » of the company *Bullman Minerals*, of « Kouroussa » of the companies *Cassidy Gold and the State of Guinea*, of « Mansounia » of the company *Blox inc*, of « Kodieran » (Tri-K), « Koulekoun » of the company *Avocet*, of « Mandiana » of the company *Search-Gold Resources and gold, copper and silver mine project* of « Balatindi » (Kerouane) of the company *Burey Gold*.

SIERRA LEONE

Diamond mines of « Koidu » and « Tongo » of the company *BSG Resources* and of « Magna Egoli » of the company *Waldman Diamond Compagny*. Diamond mine project of « Kono » and « Tongo » of the company *Stellar Diamonds*

Gold mine project of « Baomahun » of the company *Amara Mining*

Bauxite Mine « SML » of *Vimetco*

Iron mine of « Marampa » of the company *London Mining* where there is a processing plant, as well as a development project of iron mine ; Iron Terminal of *Pepel* of the company *African Minerals*

Iron mine project of « Marampa » in the south of Lunsar of the company *Cape Lambert Resources* and of « Tonkolili » and « Farangbaya » of the company *Shandong Iron & Steel Group*.

Project for the building of an iron mine terminal of the company *African Minerals*

Mineral sands mine « Sierra Rutile » and mining project of « Gangama » of the company *Sierra Rutile*

LIBERIA

Iron mines of « Bong » of the company Wugang Iron and Steel and of « Mount Nimba » of the company Arcelor Mittal exported by the iron terminal of « Buchana » of Arcelor Mittal.

Iron mine projects of « Mano River », of « Bea Mountains » and « Bomi Hills » (Western Cluster) » of the companies *Elenito Mineral Mining* and *Vedanta*, of « Mofe Creek » of the company *Tawana*, of « Bomi South » of the company *West Peak Iron*, of « Mount Ginka » of the companies *Hummingbird Resources* and *Petmin* and of « Wologizi Range » of the companies *Jonah Capital* and *the State of Liberia*

Gold mine « New Liberty » of the company *Aureus Mining*

Gold mine project of « Weaju » and of « Ndablama » of the company *Aureus Mining* and of « Kle Kle », « Kokoya » of the company *Amlib*

COTE D'IVOIRE

Manganese mine of « Lauzoua » of the *Republic of Côte d'Ivoire* ; Manganese mine of « Bondoukou » (Similimi) of the company *Dharni Sampda*

Gold mine of « Ity » of the company *La Mancha* and of the *Republic of Côte d'Ivoire* ; Gold mines projects of « Fetekro », of « Bondoukou » of the company *La Mancha* ; Gold mine of « Bonikro » and Gold mine project of « Hire » of the company *Newcrest* ; Gold mine of « Agbaou » (Beta, Gamma, Omega, Sigma) and gold mine project of « Allangoua » of the company *Endeavour Mining* ; Gold mine of « Tongon » of the company *Randgold Resources* and the *State of Côte d'Ivoire* ; Gold mine of « Afema » Gold mine project of « Afema » of the company *Taurus Gold* ; Gold mines projects of « Kokoumbo » and of « Boundiali » of the companies *Predictive Discovery* and *Toro Gold* ; Gold mine project of the companies *Predictive Discovery* and *Toro Gold* ; Gold mine project of « Sissingue » (Tengrela) of the company *Perseus Mining* ; Gold mine project of « Yaoure » (Angovia) of the company *Amara Mining* ; Gold mine project of « Abengourou », « Amelika » of the company *Golden Star Resources*

Iron mine project « Mount Gao » of the companies *Tata Steel* and *Sodemi* ; Iron mine project of « Mount Klahoyo » of the company *Pan African Resources*

Nickel mine project of « Samapleu » of the companies *Sama Resources* and of *Sodemi* ; Nickel-Cobalt mine project of « Biankouma » of the companies *Glencore Xstrata* and *Trillon*

GHANA

Gold mine « Obuasi » of the companies *Anglogold Ashanti* and *Randgold Resources* ; « Teberebie » « Iduapriem » of the company *Anglogold Ashanti* ; « Bonte » (Bonteso, Jeni) of the company *Akrokeri-Ashanti* ; « Chirano » of the company *Kinross* ; « Damang » of the company *Gold Fields* ; « Tarkwa » of the company *Gold Fields* and the *State of Ghana* ; « Edikan » of the company *Perseus Mining* ; « Bibiani » of the company *Resolute Mining* and the *State of Ghana* ; « Pampe » of the company *Golden Star Resources* ; « Bogoso Prestea » and « Wassa » of the company *Golden Star Resources* and the *State of Ghana* ; « Nzema » of the company *Endeavour Mining* and the *State of Ghana* ; « Akyem », « Ahafo » with the extension project « Ahafo Expansion » of the company *Newmont* ; « Konogo » of the company *Liongold* ; « Konogo Owere » of the companies *Liongold*, *Talos Ghana* and the *State of Ghana* ; Gold mines projects of « Obuasi » of the company *Pelangio Exploration* ; « Asankrangwa », « Nyankumasi » of the company *African Gold Group* ; « Kaniago », « Ashanti 2 », « Esaase », « Asumura » of the company *Asanko* ; « Asanko » of the company *Asanko* and of the *State of Ghana* ; « Bibiani » of the company *Central African Gold* ; « Homase » (Akrokerri) of the company *Goldstone Resources* ; « Dunkwa Royalty », « Banda Ahenkro », « Nkenkasu », « Cluster », « Chenchu », « Tinga » of the company *B2Gold* ; « Benso » of the company *Golden Star Resources* ; « Akoko » of the company *Castle Minerals* ; « Akorade » of the company *Castle Peak Mining* ; « Hwini-Butre » of companies *Golden Star Resources* and *NordGold* ; « Ahanta Butre » of the company *Asa Resource* ; « Kibi », of « Kwabeng » of the company *Xstar Gold Resources* ; « Akoase » of the company *Viking Ashanti* ; « Sian » of the company *Midlands Minerals* ; « Noyem » of the company *African Queen Mines* ; « Akyem North », « Bibiani North », « Ahafo North » « Bole » of the company *Kinross* ; « Bole » of the company *Takoradi* ; « Beposo » of the company *AMI Resources* ; « Mankranho » of the company *Newmont* ; « Namdini » of the company *Cardinal Resources* ; « Nangodi Bolgatanga » of the company *Endeavour Mining* ; « Enchi » of the company *Pinecrest Resources*

Bauxite Mine of « Awaso » of the company *Nanchan* and the *State of Ghana* and of « Nsuta » of the company *Consolidated Minerals and of State of Ghana*

Diamond mine of « Akwatia » of the company *Ghana Consolidated Diamonds* ; Diamond mines projects of « Osenase » (Asamankese), of « Ochisno » of the company *Paramount Mining*

Manganese mine project of « Butre » of the company *Shaw River Manganese* ; Iron mine project of « Sheini » of the company *Cardero*

TOGO

Phosphate mine of « Hahotoe » and of « Kpogame » and terminal of the company *SNPT*

Phosphate mine projects of « Bassar », « Southern Togo » of the company *Agriminco*.

mine project « Nayega » of the company *Ferrex* ; Zinc mine project « Pagala » of the company *Premier African Minerals* ; Nickel mine project « Haito » of the company *Premier African Minerals* ; Uranium mine project « Kara Niamtougou » of the company *Premier African Minerals*

BENIN

Exploration of iron deposits of *Minergie métaux BVI Ltd*, a subsidiary of the Indian company *Minergie Resources Ltd*. Exploration of iron deposits by a subsidiary of the Indian company *i of Earthstone Holdings Ltd*. And by *Neo Global Trading LLC* from Canada

MAIN EVENTS SINCE MOLOA IMPLEMENTATION

EVENTS	DESCRIPTION
<p>An exchange meeting at the Ministry for local governance, development and land use planning of Senegal (April, 12, 2016)</p>	<p>IUCN and CSE have been invited to represent SDLAO.</p>
<p>National workshop to share products and services of the MESA program with the use of Earth observation data (16 February 2016)</p>	<p>Overall, 60 representatives attended the meeting. These were various stakeholders involved namely in fishing, ministerial departments, the academia, professional organizations, national offices, oceanographic institutions, fishing agencies and private actors who are operating in marine and coastal environment for better protection of fishing areas providing a support to maritime security with services and productions of Earth observation system helping to make decision, but also with the presence of the press.</p>
<p>Eighth edition of PRCM (Regional Partnership for the Conservation of coastal and Marine areas in West Africa) forum in Praia (Cap Verde) on the following theme: "Coastal area Stakeholders: let's mobilize against climate change" (from 2 to 5 November 2015)</p>	<p>MOLOA held a side event where "The development of West African Coastal monitoring" was outlined. It is an experience sharing of the West African sub-region against coastal erosion and generally against coast vagaries through spatial planning approach in coastal areas. Furthermore, the sustainability of such a mechanism based on regional and international expert networks, as well as on a diversified partnership with Western institutions is expected.</p>
<p>'Ocean-Climate' Day within the framework of the COP 21 preparation (20 October 2015)</p>	<p>Within the framework of the event preparing the Conference on Climate Change (COP 21), in France, we took part to the conference organized in Mindello in Cape Verde by IRD and the French Embassy in the country by presenting 'Coastal erosion in West Africa: a major risk integrated within SDLAO framework'</p>
<p>Colloquium TACCOVAR Atlantic Tropical Climate and Coastal area variability (from 5 to 9 October 2015)</p>	<p>As a guest to the colloquium, we have introduced MOLOA as a regional mechanism which helps fight against coastal vagaries in West Africa.</p>
<p>MOLOA/IRD PARTNERSHIP (4 May 2015)</p>	<p>Multipurpose partnership with IRD (production areas, equipment, capacity development). MOLOA has facilities within the International Centre for Research and Teaching of Mbour (CIREM) through the convention of 4 May 2015 signed between the Centre for Ecological Monitoring (CSE) and IRD which allow the regional unit to have facilities near the coast for some observations on the coastline with possibility to organize on that site MOLOA technical meetings.</p>

<p>TECHNICAL REGIONAL WORKSHOP ON THE DEVELOPMENT OF THE 2015 WEST AFRICAN COASTAL AREAS ASSESSMENT (From 20 to 25 April)</p>	<p>Within the framework of its program of activities, MOLOA held from 20 to 24 April in Saly Portudal (Senegal), the regional workshop on the review process of coastal areas 2015. This meeting was held within the framework of SDLAO updating. The meeting gathered the experts of the coastal sector of SDLAO member States.</p> <p>During the first days, participants presented the evolution observed on the coastal area from SDLAO, the on-going projects or targeted in this sector, as well as the main risks recorded and having had remarkable repercussions.</p> <p>Then, the workshop focused on the updated mapping of the West African coastal area. The schedule was readjusted in the afternoon of the third day in order to allow participants to compare the observed trends and SDLAO sectors and to draw a regional abstract; the goal being to end up with major trends shared by different States.</p> <p>The activities, presided over by Mr. Bachir DIOUF, member of SDLAO steering committee, were carried on with a round table upon the recommendations to the Environment Minister in order to update the Dakar declaration.</p>
<p>CONFERENCE OF AFRICAN ENVIRONMENT MINISTERS- 15th SESSION (from 2 to 6 March 2015)</p>	<p>The meeting of the ministerial Conference on environment will be held every three years. This edition was held in CAIRO, from 2 to 6 March, 2015. These meetings provide guidelines to the main regional initiatives and legislation on the environment and sustainable development. The Conference of African Environment Ministers fifth session put the emphasis on the issues of the use of Africa's environmental resources, the implementation of policies and strategies aiming at promoting Africa's transformation and economic growth. This being the case, the theme of the Conference was: «Natural resources management of Africa for sustainable development and poverty eradication»</p> <p>Furthermore, the Conference would be an opportunity for ministers and experts to review and analyze the outcomes of the Conference of Paris of the United Nations Framework Convention on climate change (COP20) held in Lima, Peru in December 2014.</p> <p>The Conference was also an opportunity, inter alia, to consider the environment condition and sustainable development in Africa. Recommendations are especially made for 2015 post activities, including the sustainable development goals in Africa.</p> <p>Meetings were held within the framework of the Conference:</p> <ul style="list-style-type: none"> Capacity development workshop on the future of ecology in Africa; Regional workshop on inclusive green economy for poverty reduction and sustainable development in Africa: from inspiration to action.
<p>THE THIRTEENTH DAY OF REMOTE SENSING (from 17 to 19 February 2015)</p>	<p>Periodical meeting of AUF remote sensing network. In 2014, the thirteenth meeting was held in Dakar (At Cheikh Anta Diop University of Dakar), from 17 to 19 February 2015, with outings from 20 to 22 February in the region of Saint-Louis at Senegal river delta. MOLOA took part via a communication on coastal erosion in West Africa and a poster on the study carried out on the thematic at the tourist station of Saly Portudal. These days include thematic lectures, oral communication sessions, posters and outings as well.</p> <p>Scientific days represent a gathering of the whole francophone research community in remote sensing and related sectors. The objectives of these days are to nurture researchers to present the findings of their works to the scientific community on important thematics for the network.</p>
<p>INTERNATIONAL TRADE FAIR OF DAKAR: PANEL ON COASTAL EROSION (29 December 2014)</p>	<p>MOLOA outline during the day of the Ministry for Environment and Sustainable Development for the 23rd edition of International Trade Fair of Dakar (FIDAK).</p>

<p>NETWORK WORKSHOP OF PARLIAMENTARIANS AND LOCAL ELECTED OFFICIALS OF THE SUB-REGION (from 15 to 17 December 2014)</p>	<p>Parliamentarian alliances and Local elected officials for the Protection of the West African Coastal area (APPEL) is a network of parliamentarians and local officials working to bring their contribution to the improvement of the environmental governance of West African coastal area countries. The network has succeeded in influencing the process of international conventions ratification, making them adopt new environmental laws, and contributing to put the basis of policies and legislation coherence for the integrated management of coastal area resources.</p> <p>IUCN, within the framework of the support program to the regional network of Parliamentarians and local Officials for the conservation of west African coastal area (PREPARE II), champions the parliamentarians of the sub-region to call for a mobilization dynamic. The workshop of Banjul was an opportunity for the network to invest in more tangible results and initiatives which may impact positively on the sub-region marine and coastal environment.</p>
<p>INTERNATIONAL CONFERENCE «AWA» (from 9 to 11 December 2014)</p>	<p>The Project «AWA» Ecosystem Approach to the management of fisheries and the marine environment in West African waters «is a tripartite initiative of German, France and African researchers in the South of Sahara for an ecosystem approach of fisheries and the marine environment management. The African countries involved are : Benin, Cape Verde, Cote d'Ivoire, the Gambia, Guinea, Guinea Bissau, Mauritania and Senegal. Apart from Cape Verde, all other countries are MOLOA stakeholders. The United Kingdom, Greece, Belgium, Portugal, the United-States of America are associated partners of the project. The long-term objectives of this partnership is to develop an observation and modeling launch pad of oceans allowing to supervise, simulate and foresee variation in key parameters (temperature, sea level, chlorophyll and oxygen) and the main living marine resources in the West African continent offshore to Cape Verde.</p> <p>The project proposes to establish a strategic partnership able to develop a vision and scientific basis for an ecosystem approach of the marine environment management. It will enable to identify the main process which governs ecosystem dynamics and will result into the development of assistant adaptive tools for decision making within the framework of ecosystem approach of the marine environment management and the global change context.</p>
<p>SUBMISSION OF THE PROJECT DOCUMENT TO FUNDING CLIMDEV FUNDING (29 February 2014)</p>	<p>MOLOA has submitted to the mission of the African Development Bank (AfDB) in Dakar for a preliminary review and future guidance, the draft document entitled «Adaptation to climate changes and coastal vagaries reduction in eleven West African countries: MOLOA development»</p>
<p>PRESENTATION ON COASTAL EROSION TO THE ECONOMIC,SOCIAL AND ENVIRONMENTAL COUNCIL OF SENEGAL (26 September 2014)</p>	<p>Within the framework of the commission works for its second ordinary session for the 2014, on the theme «joint management of the coastal area and coastal erosion», The Economic, Social and Environmental Council (CESE) of Senegal has urged CSE (in collaboration with other national bodies such as the Directorate of the Environment and Classified Establishments) to make a presentation on coastal erosion.</p>

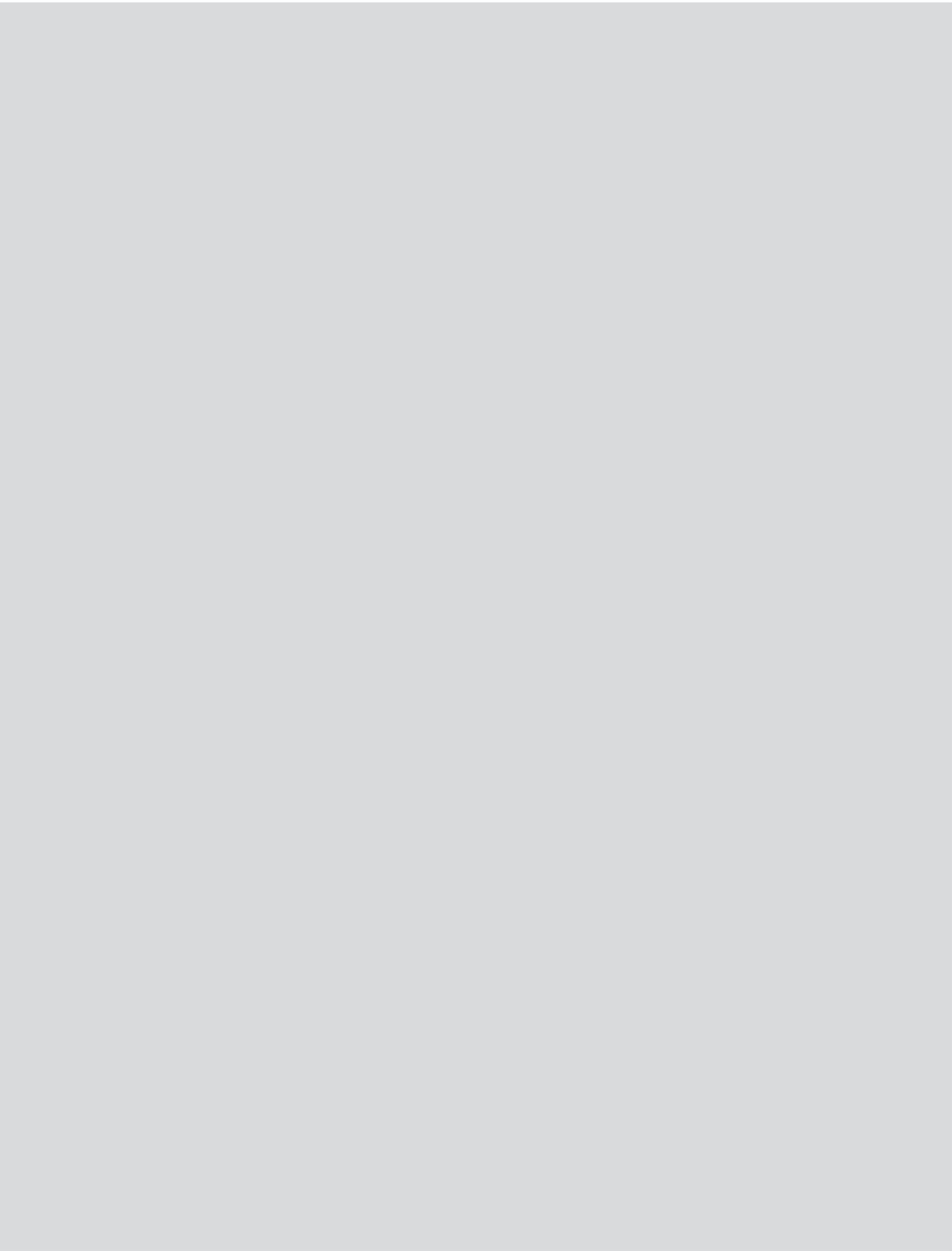
<p>THEMATIC WEEK ON COASTAL VAGARIES _BREST (FRANCE) (from 30 June to 2 July 2014</p>	<p>The thematic week «Coastal Vagaries» has been organized by the laboratory of Geomer Brest UMR LETG 6554 CNRS (European University Institute For Sea/University of Western Brittany) associated with partners of the project ANR COCORISCO namely the LABEX MER, University of Western Brittany, Brest Métropole Ocean, Finistère General Council and the Region of Brittany.</p> <p>This thematic week is composed of:</p> <ul style="list-style-type: none"> - A thematic school: Review and management of coastal vagaries» from 30 June to 2 July whose objective is to induct participants in an interdisciplinary brainstorming turned to the implementation of research strategies and coastal vagaries management. -An international colloquium: «Knowledge and Understanding of Coastal Risks»: Vagaries, Issues, Representations, Management», from 3 & 4 July 2014, whose objective is to strengthen knowledge and understanding on the vulnerabilities of areas concerning coastal risks related to the mobility of the shoreline in terms of erosion and coastal flood.
<p>MOLOA TECHNICAL AND FINANCIAL SUPERVISION-2015 (14 May 2015)</p>	<p>In accordance with contractual provisions of the Agreement signed between UEMOA and CSE, namely the provisions of article 7, a delegation of UEMOA Commission undertook, from 14 to 16 May 2015, a supervision mission of MOLOA activities compared to the work program of the year 1, 2 and 3</p>
<p>MOLOA TECHNICAL SUPERVISION -2014 (3 and 4 May 2014)</p>	<p>In accordance with contractual provisions of the Agreement signed between UEMOA and CSE, namely the provisions of article 7, a delegation of UEMOA Commission undertook, from 03 to 04 March 2014, a mission to CSE for the technical supervision of MOLOA activities compared to the work program of the year 1 and 2.</p>
<p>REGIONAL WORKSHOP ON INDICATORS OF THE WEST AFRICAN COAST MONITORING (from 13 to 17 January 2014)</p>	<p>The seminar on the indicators of the West African Coast monitoring comes upon the workshop outcomes feedback of the West African Coast Master plan (SDLAO) in countries. During workshops, a West African coast diagnosis was presented showing the different factors of coast responsiveness, especially, in comparison to coastal erosion and climate change. Issues such as: human, demographic, use of space, land use development were also addressed.</p>
<p>MOLOA/ANCORIM PARTNERSHIP (18 December 2013)</p>	<p>European Regions network for coastal risks prevention (ANCORIM-Atlantic Network For Coastal Risk Management)-www.ancorim.net, within the framework of a cooperation undertaken upon IUCN request since 2010 within SDLAO frame, has agreed to put at MOLOA disposal a range of teaching programs on coastal risk prevention which has been carried out and disseminated to European regions use. These teaching programs will be adapted to West African contexts and a publication in the form of A technical sheet enclosed to MOLOA newsletter.</p>
<p>MOLOA PARTICIPATION IN PRCM FORUM (25-29 November 2013)</p>	<p>Side event on MOLOA: presentation of the project objectives and structure.</p>

<p>SDLAO FEEDBACK WORKSHOP GUINEA BISSAU (24 January 2014) TOGO (7 November 2013) GHANA (12 August 2013) LIBERIA (06 August 2013) SIERRA LEONE (29 July 2013) BENIN (22 July 2013) COTE D'IVOIRE (15 July 2013) THE GAMBIA (24 June 2013) GUINEA (20 June 2013) SENEGAL (14 June 2013)</p>	<p>The feedback workshop has been undertaken in 11 countries. The main goal of these workshops is to provide a feedback and disseminate the results of SDLAO in the national context for an optimum ownership of these results and their operational translation in the management of coastal areas.</p> <p>This feedback should permit the different participants to:</p> <ul style="list-style-type: none"> identify coastal area issues and national coastal risks in a wide context, by putting the emphasis on inter States solidarity and reciprocity that may exist for shoreline management; identify priority issues and analyze the performance of the government's existing instruments for the management of different issues; show heavy trends which characterize the evolution of the shoreline, namely by comparing prospective scenarios established in 2010 by SDLAO, with the current situations considered; update and validate the situation of priority sectors depending on the evolution that occurred from SDLAO, identify additional detail studies to undertake to make sure monitoring is undertaken in the best conditions; identify the elements of a roadmap to include SDLAO recommendations and their internalization in national policies.
<p>REGIONAL WORKSHOP OF MOLOA LAUNCHING (18 and 19 April)</p>	<p>Following the formulation of the West African Coast Master Plan (SDLAO) which involves 11 countries (From Mauritania to Benin) it has been decided to put emphasis on the West African Coast Observation Mission. (MOLOA). MOLOA is a required and relevant regional response to coastal issues. It is at the heart of a cooperation mechanism for shoreline monitoring and the reduction of coastal risks in West Africa. It will enable to disseminate good quality information among advisory and existing decision-making bodies.</p> <p>To mark the official start of MOLOA, the Coordinating Unit in association with IUCN, organized from 11 to 12 April 2013 in Dakar, the regional workshop of MOLOA launching. That workshop was an opportunity for all the partners to better know again the SDLAO earlier results and to implement MOLOA.</p>
<p>REGIONAL UNIT IMPLEMENTATION ACTION OF MOLOA COORDINATION (14 February 2013)</p>	<p>In compliance with UEMOA Convention, CSE has officially established the Regional Unit of MOLOA Coordination and has put at its disposal premises and one part of its staff.</p>
<p>PARTNERSHIP MEMORANDUM CSE/ IUCN (17 December 2012)</p>	<p>The Partnership Memorandum between the Centre for Ecological Monitoring and the International Union for the Conservation of Nature has been formulated to define the collaboration framework between the two entities for the implementation of MOLOA activities.</p>
<p>SIGNATURE OF AGREEMENT CSE/UEMOA (5 November 2012)</p>	<p>The Agreement signed between CSE and UEMOA provides the terms and conditions of MOLOA implementation.</p>

Proposed sites by West African countries for nomination on the list of world heritage

Name of West African coastal sites proposed for nomination on the UNESCO list of world heritage sites	country	Date of Submission	Ref.	Cultural criteria						Natural Criteria									
				(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)						
<u>National Park of Magdalen Islands</u>	Senegal	2005	2077																
<u>Les Escales du Fleuve Sénégal</u>	Senegal	2005	2078																
<u>Old Rufisque</u>	Senegal	2005	2081																
<u>The Lac Rose</u>	Senegal	2005	2080																
<u>Carabane Island</u>	Senegal	2005	2075																
<u>Aviation Courier Attitude</u>	Senegal	2005	2072																
<u>Rural architecture of Lower Casamance, huts with impluvium of Bandial kingdom</u>	Senegal	2005	2076																
<u>archipelago biosphere reserve (document already submitted at the first time as mixed site whose inscription is rejected)</u>	Guinea-Bissau	2006	5081																
<u>Slave road in Africa segment of Timbo in Rio Pongo</u>	Guinea	2001	1523						1										1
<u>Bunce Island</u>	Sierra Leone	2012	5745					1											
<u>Old Fourah Bay College Building</u>	Sierra Leone	2012	5744																
<u>The Gateway to the Old King's Yards</u>	Sierra Leone	2012	5746						1										
<u>Western Area Peninsula National Park</u>	Sierra Leone	2012	5741						1										1
<u>National Park of Ehotilé Islands</u>	Cote d'Ivoire	2006	2099																
<u>Nzulezu Stilt Settlement</u>	Ghana	2000	1394					1											
<u>Agglomeration of Aného-Glidji</u>	Togo	2000	1505						1										
<u>Governors' palaces</u>	Togo	2002	1613						1										
<u>City of Ouidah : former districts and Slave Road</u>	Benin	1996	870																
<u>City of Porto-Novo : former districts and Royal Palace (#)</u>	Benin	1996	871																
<u>Lake Site of Ganvié</u>	Benin	1996	869																

Notes



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2016

West Africa
coastal
areas

GENERAL DOCUMENT
