

Assessment
2016

West Africa coastal areas

DETAILED MASTER PLAN

2016 UPDATING



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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Summary table of sectors

2016 WEST AFRICA COASTAL AREAS ASSESSMENT DETAILED MASTER PLAN

This table sums-up the main information per sectors gathered per areas and per country.

- The entries in red specify the Priority levels modified since the SDLAO during the updating.
- Sectors for which modifications have been made are in colored lines.
- The column 'potential developments' indicates if the different prospective developments anticipated in 2020 during the SDLAO have in fact been confirmed or not. Those developments concern essentially the stakes and infrastructure; as well as human occupancy dynamics
- One column has been added with regard to the SDLAO summary table which specifies the protected areas existing in each sector.

Sectors colored in red are those posing the highest risk levels. In most cases, they are already subject to a special attention by States and developments are undertaken there.

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring-observation 2011	Monitoring-observation 2016	Protected area	Core set of problem issues	Confirmed devpt 2016
	AREA	MR1								
NOUADHIBOU PENINSULA AND BAIE DU LÉVRIER										
1	Sector	MR1-a	Cap Blanc	Low	Medium	Without recommendation	Watch-keeping for the purpose of anticipation	Cap Blanc satellite reserve	ENVIRONMENT	
2	Sector	MR1-b	Pointe and Cansado Bay	Low	Medium	Watch-keeping for the purpose of anticipation	Regular		PER-URBAN & PORT	YES
3	Sector	MR1-c	Urban coastline and port of Nouadhibou	Medium	Medium	Regular	Regular		URBAN & PORT	
4	Sector	MR1-d	North Nouadhibou & Baie de l'Etoile	Medium	Medium	Intensive and regular	Intensive and regular	Baie de l'étoile protected area (proposed)	ENVIRONMENT	YES
5	Sector	MR1-e	Baie du Lévrier	Medium	Medium	Regular	Intensive and regular	Banc d'Arguin national park Banc d'Arguin Ramsar Site Banc d'Arguin World Heritage Site	ENVIRONMENT	YES

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring-observation 2011	Monitoring-observation 2016	Protected area	Core set of problem issues	Confirmed devpt 2016
	AREA	MR2								
BANC D'ARGUIN – NORTH NOUAKCHOTT										
6	Sector	MR2-a	Banc d'Arguin (BANP)	Low	Medium	Regular	Regular	Banc d'Arguin national park Banc d'Arguin Ramsar Site Banc d'Arguin World Heritage Site	ENVIRONMENT	
7	Sector	MR2-b	Mamghar – Majhrat	Low	Medium	Without recommendation	Regular	Banc d'Arguin national park Banc d'Arguin Ramsar Site Banc d'Arguin World Heritage Site	ENVIRONMENT	
8	Sector	MR2-c	Tanit – Sebkhra N'Dramcha	Low	Medium	Watch-keeping for the purpose of anticipation	Regular		ANTICIPATION	YES
9	Sector	MR2-d	Djreidrat	Low	Medium	Watch-keeping for the purpose of anticipation	Regular		ANTICIPATION	YES
	AREA	MR3								
NOUAKCHOTT										
10	Sector	MR3-a	North Nouakchott	High	High	Regular	Regular		URBAN & TOURISM	YES
11	Sector	MR3-b	South Nouakchott	Very high	Very high	Intensive and regular	Intensive and regular		URBAN & PORT	YES
	AREA	MR4								
SOUTH MAURITANIA AND RIVER SENEGAL DELTA										
12	Sector	MR4-a	PK 28 - South Tiguent	Medium	Medium	Regular	Regular		ENVIRONMENT & ANTICIPATION	YES
13	Sector	MR4-b	South Tiguent - Chott Boul	Low	Medium	Watch-keeping for the purpose of anticipation	Regular		ENVIRONMENT & ANTICIPATION	YES
14	Sector	MR4-c	Chott Boul - Ghara (RBTDS)	Low	Medium	Regular	Regular	Chat T Boul Ramsar site Transboundary Biosphere Reserve of the river Senegal delta (Mauritania) Djoudj National Park Djoudj Ramsar site	ENVIRONMENT & PORT	
15	Sector	MR4-d	Ndiago	Low	Medium	Regular	Regular	Chat T Boul Ramsar site Transboundary Biosphere Reserve of the river Senegal delta (Mauritania) Djoudj National Park Djoudj Ramsar site	ENVIRONMENT	
	AREA	SN1								
SAINT-LOUIS - GANDIOLAIS - GRANDE COTE										
16	Sector	SN1-a	Saint-Louis urban, peri-urban and patrimony sector	Very high	Very high	Intensive and regular	Intensive and regular	Transboundary Biosphere Reserve of the river Senegal delta (Senegal) Djoudj Birds National Park Djoudj Ramsar site Djoudj birds world heritage site	URBAN & PERI-URBAN	YES

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring-observation 2011	Monitoring-observation 2016	Protected area	Core set of problem issues	Confirmed devpt 2016
17	Sector	SN1-b	South Saint-Louis – Barbarie Split	High	Very high	Intensive and regular	Intensive and regular	Transboundary Biosphere Reserve of the river Senegal delta (Senegal) Gueumbel Special Wildlife Reserve (IUCN Category IV) National Park of Barbarie Split (IUCN Category II) Marine Protected area of Saint-Louis Gandon community Natural Reserve	ENVIRONMENT & TOURISM	YES
18	Sector	SN1-c	Grande Côte - Niayes	Low	Medium	Watch-keeping for the purpose of anticipation	Regular	Darou Khoudoss community Natural reserve Notto Gouye Diama Community Natural Reserve	ANTICIPATION	YES
19	Sector	SN1-d	Kayar - Guediawaye	High	Very high	Watch-keeping for the purpose of anticipation	Intensive and regular	Kayar Marine Protected area	ENVIRONMENT	YES
	AREA	SN2					DAKAR			
20	Sector	SN2-a	Dakar dune coastline North Camberene - Yoff	High	High	Intensive and regular	Intensive and regular		PERI-URBAN & URBAN	
21	Sector	SN2-b	Dakar rocky coastline West Yoff - Cap Manuel	High	Very High	Intensive and regular	Intensive and regular	National Park of Magdalen islands	URBAN	
22	Sector	SN2-c	Bay of Hann - Rufisque	Very high	Very high	Intensive and regular	Intensive and regular		URBAN & PERI-URBAN	
	AREA	SN3					PETITE COTE			
23	Sector	SN3-a	Bargny - Kene - Ndiogom	High	Very high	Regular	Intensive and regular		PERI-URBAN & ANTICIPATION	YES
24	Sector	SN3-b	Popenguine	High	High	Regular	Intensive and regular	Popenguine Natural Reserve	PERI-URBAN & TOURISM	YES
25	Sector	SN3-c	Saly - Portudal - Somone	Very high	Very high	Intensive and regular	Intensive and regular	Somone Community Natural Reserve	TOURISM	YES
26	Sector	SN3-d	Mbour urban sector	Very high	Very high	Intensive and regular	Intensive and regular		URBAN & TOURISM	YES
27	Sector	SN3-e	Mbour - Pointe Sarène	High	Very high	Intensive and regular	Intensive and regular		TOURISM	YES
28	Sector	SN3-f	North Joal - Mbodiene Beach	Medium	Medium	Watch-keeping for the purpose of anticipation	Regular	Joal-Fadiouth Marine Protected Area	TOURISM	YES
29	Sector	SN3-g	Joal	High	High	Regular	Regular	Joal-Fadiouth Marine Protected Area	ANTICIPATION	YES

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring-observation 2011	Monitoring-observation 2016	Protected area	Core set of problem issues	Confirmed devpt 2016	
	AREA	SN4									
	SINE SALOUM										
30	Sector	SN4-a	Fadiouth peninsula and island	High	High	Intensive and regular	Intensive and regular	Joal-Fadiouth Marine Protected area Saloum-Niumi transboundary complex Ramsar site Saloum Delta Biosphere Reserve	PERI-URBAN & URBAN	NOT CONFIRMED	
31	Sector	SN4-b	South Fadiouth	Medium	Medium	Intensive and regular	Intensive and regular	Joal-Fadiouth Marine Protected area Saloum-Niumi transboundary complex Ramsar site Saloum Delta Biosphere Reserve	ENVIRONMENT	NOT CONFIRMED	
32	Sector	SN4-c	Palmarin - Falcao – Ngalou peninsula	Medium	Medium	Intensive and regular	Intensive and regular	Community Natural reserve Palmarin facao Saloum Delta Biosphere Reserve	ENVIRONMENT	NOT CONFIRMED	
33	Sector	SN4-d	Djiffer – Palmarin peninsula	Very high	Very high	Intensive and regular	Intensive and regular	Community Natural reserve Palmarin facao Saloum-Niumi transboundary complex Ramsar site Saloum delta Biosphere Reserve	RURAL		
34	Sector	SN4-e	South Sine Saloum	High	Very high	Regular	Intensive and regular	Sangomar Marine Protected area Gandoule Marine Protected area Bamboung Marine Protected area Saloum delta national park Saloum delta Biosphere Reserve Saloum delta world heritage site Saloum-Niumi transboundary complex Ramsar site	ENVIRONMENT & RURAL		
	AREA	SN5									
	CASAMANCE MARITIME										
41	Sector	SN5-a	Niafarang	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation	Abéné Marine Protected Area	ENVIRONMENT	YES	
42	Sector	SN5-b	Kafountine	Medium	Medium	Watch-keeping for the purpose of anticipation	Regular	Abéné Marine Protected Area	TOURISM & ANTICIPATION	YES	
43	Sector	SN5-c	Insular coastlines or peninsula in the right bank of Casamance	High	High	Watch-keeping for the purpose of anticipation	Regular	Kalissaye bird reserve Mangagoulack (Kawawana) rural community heritage area Kalissaye Niamone - Kalounayes MPA	ENVIRONMENT & ANTICIPATION	YES	
44	Sector	SN5-d	Djembering - Pointe Nikine	Medium	Medium	Watch-keeping for the purpose of anticipation	Regular	Low Casamance National Park Kassa-Banlentacounda community MPA	ENVIRONMENT & ANTICIPATION	YES	

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring-observation 2011	Monitoring-observation 2016	Protected area	Core set of problem issues	Confirmed devpt 2016
45	Sector	SN5-e	Cap Skiring	Medium	Medium	Regular	Regular	Low Casamance National Park	TOURISM	
	AREA	GM1								
GAMBIA										
35	Sector	GM1-a	Essau - Barra and right bank of the Gambia estuary	Low	Medium	Watch-keeping for the purpose of anticipation	Regular	Niumi National Park (IUCN Category IV) Niumi Ramsar Site	ANTICIPATION	YES
36	Sector	GM1-b	Banjul Centre	Very high	Very high	Intensive and regular	Intensive and regular	Tanbi Wetland National Park (IUCN Category VI) Tanbi Wetland complex Ramsar Site	URBAN	
37	Sector	GM1-c	Banjul - Kololi Point	High	Very high	Regular	Intensive and regular		URBAN	
38	Sector	GM1-d	Kololi Point - Bald Cape	High	High	Intensive and regular	Intensive and regular		TOURISM	
39	Sector	GM1-e	Bald Cape - Sanyang	Low	Medium	Watch-keeping for the purpose of anticipation	Regular	Tanji Bird Reserve (IUCN Category II)	ANTICIPATION	YES
40	Sector	GM1-f	Gunjur	Low	Medium	Watch-keeping for the purpose of anticipation	Regular	Gunjur Community Wildlife Reserve	ANTICIPATION	NOT CONFIRMED
	AREA	GW1								
GUINEA BISSAU										
46	Sector	GW1-a	Sector maritime North - Cap Varela	High	High	Regular	Regular	Parque Nacional Varela (proposed) Parque natural dos tarrafes do rio de cacheu Pelundo wildlife reserve	TOURISM	
47	Sector	GW1-b	Central maritime sector	Low	Medium	Without recommendation	Watch-keeping for the purpose of anticipation		MANGROVE & RICE-GROWING	YES
48	Sector	GW1-c	Bissau – Urban area	High	High	Regular	Regular		URBAN & ENVIRONMENT	
49	Sector	GW1-d	South Guinea Bissau - Tite – Tombali	Low	Low	Without recommendation	Watch-keeping for the purpose of anticipation	Cantanhez National Park Cantanhez forest hunting reserve Parque Natural das Lagoas de Cufada Lagoa de Cufada Ramsar Site Rio grande de buba	MANGROVE & RICE-GROWING	NOT CONFIRMED

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring-observation 2011	Monitoring-observation 2016	Protected area	Core set of problem issues	Confirmed devpt 2016
50	Sector	GW1-e	Bijagos islands	High	High	Regular	Regular	Ilas Formosa, Nago & Tchedia (Ilas Urok) community marine protected area Joeao Vieira et Poilao marine national park Orango group of islands national park Bolama- Bijagos Site Ramsar Archipel Bolama – Bijagos Archipelago Ramsar Site	ENVIRONMENT	
51	Sector	GW1-f	South Cacine	Very high	Very high	Intensive and regular	Intensive and regular		MANGROVE & RICE-GROWING	NOT CONFIRMED
	AREA	GN1						AREA NORD CAP VERGA – TRISTAO		
52	Sector	GN1-a	Far north West mangrove islands and Tristao	Low	Medium	Without recommendation	Watch-keeping for the purpose of anticipation	Alcatraz island natural reserve Alcatraz island Ramsar site Tristao managed natural reserve Tristao islands Ramsar Site	ENVIRONMENT	
53	Sector	GN1-b	Rio Nunez - Kamsar	Medium	Medium	Regular	Regular	Kapatchez Ramsar Site	URBAN	
54	Sector	GN1-c	Kapatchez coastal plain	Medium	High	Regular	Intensive and regular	Kapatchez Ramsar Site	MANGROVE & RICE-GROWING	
55	Sector	GN1-d	Cap Verga	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ANTICIPATION	NOT CONFIRMED
	AREA	GN2						CENTRAL AREA MANGROVES		
56	Sector	GN2-a	Boffa mangrove island	Low	Medium	Without recommendation	Regular	Rio Pongo Ramsar Site	MANGROVE	
57	Sector	GN2-b	Koba peninsula	High	Very high	Intensive and regular	Intensive and regular	Konkouré Ramsar Site	MANGROVE & RICE-GROWING	
58	Sector	GN2-c	Konkouré delta estuary	Low	Medium	Without recommendation	Regular	Konkouré Ramsar Site	MANGROVE	
	AREA	GN3						CONAKRY URBAN AND PERI-URBAN AREA		
59	Sector	GN3-a	Conakry – Dubreka mangroves and rice-growing	Medium	High	Regular	Regular	Konkouré Ramsar Site	ANTICIPATION	YES
60	Sector	GN3-b	Conakry - Coyah mangrove and peri-urban edge	High	Very high	Intensive and regular	Intensive and regular		URBAN	
61	Sector	GN3-c	Loos islands	Low	Medium	Watch-keeping for the purpose of anticipation	Regular	Loos islands fauna sanctuary (Ilot Cabri, île Blanche and île Corail) Blanche Ramsar Site	ANTICIPATION	

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring-observation 2011	Monitoring-observation 2016	Protected area	Core set of problem issues	Confirmed devpt 2016
RICE GROWING ISLANDS OF SOUTHERN GUINEA										
	AREA	GN4								
62	Sector	GN4-a	Kakossa	Medium	Very high	Regular	Intensive and regular		MANGROVE & RICE-GROWING	
63	Sector	GN4-b	Kabak plain	Very high	Very high	Intensive and regular	Intensive and regular		MANGROVE & RICE-GROWING	
64	Sector	GN4-c	Benty	Medium	High	Regular	Intensive and regular		MANGROVE & RICE-GROWING	
	AREA	SL1								
NORTH SIERRA LEONE										
65	Sector	SL1-a	Kolente right bank	Medium	Medium	Without recommendation	Regular	Yelibuya Strict Nature Reserve	MANGROVE & RICE-GROWING	
66	Sector	SL1-b	Kolente Estuary	High	High	Regular	Regular	Scarries River Estuary Marine Protected Area	MANGROVE & RICE-GROWING	
67	Sector	SL1-c	Lungi	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ANTICIPATION	NOT CONFIRMED
68	Sector	SL1-d	Rokel Estuary	Medium	Medium	Watch-keeping for the purpose of anticipation	Regular		ANTICIPATION	YES
	AREA	SL2								
URBAN AND PERI-URBAN FREETOWN										
69	Sector	SL2-a	Facade urban sector North / North / East	Medium	Medium	Watch-keeping for the purpose of anticipation	Regular	Sierra Leone River Estuary Marine Protected Area Sierra Leone River Estuary Ramsar site	ANTICIPATION	YES
70	Sector	SL2-b	Goderich West façade urban sector	High	High	Regular	Regular		URBAN	
71	Sector	SL2-c	Hamilton - Lakka	High	High	Regular	Regular	Western Area No hunting Forest Reserve Western Area Peninsula National Park	URBAN	
72	Sector	SL2-d	West Façade – Tokeh West Façade	High	High	Intensive and regular	Intensive and regular	Western Area No hunting Forest Reserve Western Area Peninsula National Park	URBAN	NOT CONFIRMED
73	Sector	SL2-e	Tombou - Cape Shilling	High	High	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation	Western Area No hunting Forest Reserve Western Area Peninsula National Park	ANTICIPATION	NOT CONFIRMED

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring- observation 2011	Monitoring- observation 2016	Protected area	Core set of problem issues	Confirmed devpt 2016
74	Sector	SL2-f	Banana Island	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation	Western Area No hunting Forest Reserve Western Area Peninsula National Park	ANTICIPATION	YES
	AREA	SL3	SIERRA LEONE CENTER SOUTH							
75	Sector	SL3-a	Freetown south bay pier	Medium	Medium	Without recommendation	Watch-keeping for the purpose of anticipation	Yawri Bay Marine Protected Area	MANGROVE & RICE-GROWING	
76	Sector	SL3-b	Shenge	High	High	Intensive and regular	Intensive and regular		MANGROVE	
	AREA	SL4	AREA SHERBRO - LIBERIA							
77	Sector	SL4-a	Sherbro Estuary	Low	Low	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ENVIRONMENT	NOT CONFIRMED
78	Sector	SL4-b	Turtle Islands Banks	High	High	Regular	Regular	Turtle & Sherbro Island MPA (proposed) Sherbro River Estuary MPA	ENVIRONMENT	
79	Sector	SL4-c	Sherbro – Main siland	Medium	Medium	Regular	Regular	Sherbro River Estuary MPA Bonthe Mangrove Swamp Strict Nature Reserve	ENVIRONMENT	
80	Sector	SL4-d	Sherbro - embouchure du Moya	Low	Low	Without recommendation	Without recommendation	Sewa-Waanje Game Reserve Lake Mape Mabesi National Park	ENVIRONMENT	
81	Sector	SL4-e	Moya – Sulima mouth	Low	Medium	Watch-keeping for the purpose of anticipation	Regular	Sulima Mangrove Swap Strict Nature Reserve (proposed)	ENVIRONMENT	
	AREA	LR1	SIERRA LEONE - ROBERTSPORT - MONROVIA							
82	Sector	LR1-a	Sierra Leone - Robertsport	Low	Low	Without recommendation	Without recommendation	Lake Piso National Park (proposed) Lake Piso Ramsar site	ENVIRONMENT	
83	Sector	LR1-b	Robertsport	Low	Low	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation	Lake Piso National Park (proposed) Lake Piso Ramsar site	ENVIRONMENT	
84	Sector	LR1-c	Lake Piso	Low	Low	Without recommendation	Without recommendation	Lake Piso National Park (proposed) Lake Piso Ramsar site	ENVIRONMENT	
85	Sector	LR1-d	East Robertsport - Monrovia	Low	Medium	Without recommendation	Regular		ENVIRONMENT	
	AREA	LR2	AREA UNDER INFLUENCE OF MONROVIA							
86	Sector	LR2-a	North Saint-Paul river – Right bank	High	High	Intensive and regular	Intensive and regular		URBAN	NOT CONFIRMED
87	Sector	LR2-b	Inner lagoon	Very high	Very high	Intensive and regular	Intensive and regular		PERI-URBAN & URBAN	

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring- observation 2011	Monitoring- observation 2016	Protected area	Core set of problem issues	Confirmed devpt 2016
88	Sector	LR2-c	West Point - Mesurado mouth and port area	Very high	Very high	Intensive and regular	Intensive and regular	Mesurado Wetlands Ramsar site	URBAN	
89	Sector	LR2-d	Mamba Point - Sinkor	High	High	Intensive and regular	Intensive and regular	Mesurado Wetlands Ramsar site	URBAN	
90	Sector	LR2-e	Sinkor - Paynesville	High	High	Regular	Regular	Mesurado Wetlands Ramsar site	URBAN	
91	Sector	LR2-f	Paynesville - Mamgbali	Medium	High	Regular	Regular	Mesurado Wetlands Ramsar site	URBAN	
92	Sector	LR2-g	Mamgbali - Sopwe Town	High	High	Regular	Regular		ENVIRONMENT & TOURISM	
93	Sector	LR2-h	Sopwe Town - Dolota	Medium	Medium	Regular	Regular	Margibi Mangrove National Park (proposed) Marshall Wetlands Ramsar site	TOURISM	
	AREA	LR3								
DOLOTA – BUCHANAN										
94	Sector	LR3-a	Dolota	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation	Margibi Mangrove National Park (proposed) Marshall Wetlands Ramsar site	ENVIRONMENT	NOT CONFIRMED
95	Sector	LR3-b	Buchanan	High	Very high	Intensive and regular	Intensive and regular		URBAN	
	AREA	LR4								
BUCHANAN - RIVERCESS - GREENVILLE - GRANCESS										
96	Sector	LR4-a	Buchanan - Rivercess	Low	Low	Without recommendation	Without recommendation		ENVIRONMENT	
97	Sector	LR4-b	Rivercess	Low	Low	Without recommendation	Without recommendation		ENVIRONMENT	
98	Sector	LR4-c	Rivercess - Greenville	Low	Low	Without recommendation	Without recommendation	Senkwehn National Park (proposed)	ENVIRONMENT	
99	Sector	LR4-d	Greenville	Low	Medium	Without recommendation	Watch-keeping for the purpose of anticipation		ENVIRONMENT	
100	Sector	LR4-e	Greenville - Granceess	Low	Low	Without recommendation	Without recommendation	Grand Kru-River Gee National Park (proposed)	ENVIRONMENT	
	AREA	LR5								
GRANCESS - CAP PALMAS										
101	Sector	LR5-a	Granceess	Low	Low	Without recommendation	Without recommendation		ENVIRONMENT	
102	Sector	LR5-b	Granceess - Harper	Low	Low	Without recommendation	Without recommendation		ENVIRONMENT	
103	Sector	LR5-c	Harper	Low	Low	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ANTICIPATION	NOT CONFIRMED
104	Sector	LR5-d	Cap Palmas	Low	Low	Without recommendation	Watch-keeping for the purpose of anticipation		ANTICIPATION	NOT CONFIRMED

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring-observation 2011	Monitoring-observation 2016	Protected area	Core set of problem issues	Confirmed devpt 2016
LIBERIA BORDER – SAN PEDRO										
	AREA	C11								
105	Sector	C11-a	Cavally Estuary - Liberia Border	Low	Low	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ENVIRONMENT	NOT CONFIRMED
106	Sector	C11-b	West Tabou	Low	Low	Without recommendation	Without recommendation		RURAL	
107	Sector	C11-c	Tabou	Low	Low	Without recommendation	Watch-keeping for the purpose of anticipation		RURAL	
108	Sector	C11-d	East Tabou	Low	Low	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ANTICIPATION	NOT CONFIRMED
109	Sector	C11-e	Grand Bereby	Low	Low	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ANTICIPATION	NOT CONFIRMED
110	Sector	C11-f	West San Pedro	Low	Low	Without recommendation	Without recommendation		ENVIRONMENT	
111	Sector	C11-g	San Pedro urban area and West periphery	High	Très High	Intensive and regular	Intensive and regular		URBAN & PORT	
EAST SAN PEDRO - SASSANDRA - FRESCO										
	AREA	C12								
112	Sector	C12-a	East San Pedro	Low	Low	Without recommendation	Without recommendation	Monogaga classified forest	ENVIRONMENT	
113	Sector	C12-b	Sassandra right bank	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ENVIRONMENT & TOURISM	NOT CONFIRMED
114	Sector	C12-c	Sassandra left bank - Dagbebo	Low	Low	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation	Sassandra – Dagbebo complex Ramsar Site	ENVIRONMENT	NOT CONFIRMED
115	Sector	C12-d	Dagbebo - Fresco	Low	Low	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation	Dassieko classified forest	ENVIRONMENT	NOT CONFIRMED
FRESCO - ASSAGNY										
	AREA	C13								
116	Sector	C13-a	Fresco	Low	Low	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation	Site Ramsar de Fresco Ramsar site Port-Gautier Classified Forest	ENVIRONMENT	NOT CONFIRMED
117	Sector	C13-b	West Grand Lahou	Low	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ENVIRONMENT	NOT CONFIRMED
118	Sector	C13-c	Grand Lahou, right bank and Bandama estuary	Very high	Very high	Intensive and regular	Intensive and regular		URBAN & TOURISM	
119	Sector	C13-d	Bandama left bank	Medium	Medium	Without recommendation	Watch-keeping for the purpose of anticipation	Azagny National park (IUCN Cat II) Azagny Ramsar site	ENVIRONMENT	

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring-observation 2011	Monitoring-observation 2016	Protected area	Core set of problem issues	Confirmed devpt 2016
	AREA	CI4								
			RURAL SECTOR ASSAGNY - JACQUEVILLE - ABIDJAN WEST							
120	Sector	CI4-a	Assagny - Jacquenville	Medium	Medium	Without recommendation	Without recommendation		RURAL	
121	Sector	CI4-b	Jacquenville	Low	Medium	Watch-keeping for the purpose of anticipation	Regular		ANTICIPATION	YES
122	Sector	CI4-c	Jacquenville - Abidjan West	Medium	Medium	Watch-keeping for the purpose of anticipation	Regular		ANTICIPATION	NOT CONFIRMED
	AREA	CI5								
			ABIDJAN - PORT BOUET							
123	Sector	CI5-a	Port Bouet	Very high	Very high	Intensive and regular	Intensive and regular		URBAN & PORT	
124	Sector	CI5-b	Port Bouet East	Very high	Very high	Intensive and regular	Intensive and regular		URBAN	
	AREA	CI6								
			AREA PERI-URBANE EST ABIDJAN - GRAND BASSAM							
125	Sector	CI6-a	Abidjan East peri-urban area	High	High	Intensive and regular	Intensive and regular		URBAN	
126	Sector	CI6-b	Grand Bassam West coastline	Very high	Very high	Intensive and regular	Intensive and regular	Grand Bassam Ramsar Site	URBAN & TOURISM	
127	Sector	CI6-c	Grand Bassam left bank	High	High	Intensive and regular	Intensive and regular	Grand Bassam Ramsar Site	URBAN	
128	Sector	CI6-d	Bassam Estuary left bank	High	High	Intensive and regular	Intensive and regular	Grand Bassam Ramsar Site	TOURISM	
	AREA	CI7								
			SANDY TERRACE AND COCONUT GROVE OF EAST IVORY COAST							
129	Sector	CI7-a	Grand Bassam - Assinie	Low	Low	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ANTICIPATION	NOT CONFIRMED
130	Sector	CI7-b	Assinie and Abi lagoon mouth	Very high	Very high	Intensive and regular	Intensive and regular	Nganda Nganda Ramsar site Nganda Nganda Classified Forest Ehotilé islands – Essouman Ramsar site Ehotilé islands National Park (IUCN Cat II)	ENVIRONMENT & TOURISM	
131	Sector	CI7-c	Abi lagoon East	Low	Low	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation	Nganda Nganda Ramsar Site Nganda Nganda Classified Forest Ehotilé islands Ramsar Site - Essouman Ehotilé islands National Park (IUCN Cat II)	ANTICIPATION	NOT CONFIRMED
	AREA	GH1								
			SANDY TERRACE AND COCONUT GROVE WEST GHANA – COTE D'IVOIRE SIDE							
132	Sector	GH1-a	Côte d'Ivoire – Bonyere Border	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ANTICIPATION	NOT CONFIRMED

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring-observation 2011	Monitoring-observation 2016	Protected area	Core set of problem issues	Confirmed devpt 2016
133	Sector	GH1-b	Bonyere - Ekwe	Medium	Medium	Watch-keeping for the purpose of anticipation	Regular		ANTICIPATION	YES
134	Sector	GH1-c	Ekwe - Kikam	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ANTICIPATION	NOT CONFIRMED
	AREA	GH2								
135	Sector	GH2-a	Trois Pointes West	High	High	Watch-keeping for the purpose of anticipation	Regular		TOURISM	YES
136	Sector	GH2-b	Trois Pointes Centre	High	High	Watch-keeping for the purpose of anticipation	Regular		ENVIRONMENT & TOURISM	NOT CONFIRMED
137	Sector	GH2-c	Trois Pointes East	High	High	Watch-keeping for the purpose of anticipation	Regular		TOURISM	NOT CONFIRMED
	AREA	GH3								
138	Sector	GH3-a	Apowa - Takoradi	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ANTICIPATION	NOT CONFIRMED
139	Sector	GH3-b	Takoradi	Medium	High	Regular	Regular		URBAN & PORT	YES
140	Sector	GH3-c	Sekondi	Medium	Medium	Regular	Regular		URBAN & PORT	
141	Sector	GH3-d	Sekondi - Shama	Medium	Medium	Watch-keeping for the purpose of anticipation	Regular		ANTICIPATION	NOT CONFIRMED
	AREA	GH4								
142	Sector	GH4-a	Shama - Ankwanda	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ENVIRONMENT	NOT CONFIRMED
	AREA	GH5								
143	Sector	GH5-a	Elmina	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ANTICIPATION	NOT CONFIRMED
144	Sector	GH5-b	West Cape Coast	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ANTICIPATION	NOT CONFIRMED
145	Sector	GH5-c	Cape Coast	Medium	Medium	Regular	Regular		PER-URBAN	

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring-observation 2011	Monitoring-observation 2016	Protected area	Core set of problem issues	Confirmed devrpt 2016
146	Sector	GH5-d	East Cape Coast	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ENVIRONMENT	NOT CONFIRMED
147	Sector	GH5-e	Cape Coast – Saltpond peri-urban sector	Medium	Medium	Watch-keeping for the purpose of anticipation	Regular		ANTICIPATION	YES
	AREA	GH6								
RURAL HINTERLAND RURAL OF CAPE COAST AND ACCRA URBAN AREAS										
148	Sector	GH6-a	Saltpond - Mfantisman	High	Medium	Regular	Regular		RURAL	
149	Sector	GH6-b	Winneba	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation	Muni Lagoon Ramsar site	ANTICIPATION	NOT CONFIRMED
	AREA	GH7								
ACCRA WEST URBAN AREA										
150	Sector	GH7-a	Senya - Nyanyano	Medium	Medium	Watch-keeping for the purpose of anticipation	Watch-keeping for the purpose of anticipation		ANTICIPATION	NOT CONFIRMED
151	Sector	GH7-b	Nyanyano - Accra West urban area	Medium	Medium	Watch-keeping for the purpose of anticipation	Regular		ANTICIPATION	YES
	AREA	GH8								
ACCRA URBAN AREA AND EAST PERIPHERY AREA										
152	Sector	GH8-a	Accra Densu delta wetland	High	High	Regular	Regular	Densu Delta Ramsar site	PERI-URBAN & TOURISM	
153	Sector	GH8-b	Accra centre West	Very high	Very high	Intensive and regular	Intensive and regular		URBAN	
154	Sector	GH8-c	Accra centre	Very high	Very high	Intensive and regular	Intensive and regular		URBAN	
155	Sector	GH8-d	Break Tema West – Sakumo Wetland	High	High	Regular	Regular	Sakumo lagoon Ramsar site	PERI-URBAN & ENVIRONMENT	
156	Sector	GH8-e	Tema	Very high	Very high	Intensive and regular	Intensive and regular		URBAN & PORT	
157	Sector	GH8-f	Prampam	High	High	Regular	Regular		PERI-URBAN	
	AREA	GH9								
NINGO – ADAFOAH RIGHT BANK VOLTA DELTA										
158	Sector	GH9-a	New Ningo - Lekpoguno	Very high	Very high	Intensive and regular	Intensive and regular		RURAL	
159	Sector	GH9-b	Lekpoguno - Akplanbya	High	High	Intensive and regular	Intensive and regular		RURAL	
160	Sector	GH9-c	Akplanbya - Totopé	Low	High	Intensive and regular	Intensive and regular	Songor Biosphere Reserve Songor Lagoon Ramsar site	ENVIRONMENT	

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring-observation 2011	Monitoring-observation 2016	Protected area	Core set of problem issues	Confirmed devrpt 2016
161	Sector	GH9-d	Ada Foah	High	Very high	Intensive and regular	Intensive and regular	Songor Biosphere Reserve Songor Lagoon Ramsar site	RURAL	
	AREA	GH10						LEFT BANK VOLTA DELTA		
162	Sector	GH10-a	Dzeita - Volta left bank	Very high	Very high	Intensive and regular	Intensive and regular	Anlo-Keta lagoon complex Site Ramsar	RURAL	
163	Sector	GH10-b	Keta	Very high	Very high	Intensive and regular	Intensive and regular	Anlo-Keta lagoon complex Site Ramsar	RURAL	
164	Sector	GH10-c	Keta - digue	Very high	Very high	Intensive and regular	Intensive and regular	Anlo-Keta lagoon complex Site Ramsar	RURAL	
165	Sector	GH10-d	Adina	High	High	Intensive and regular	Intensive and regular		RURAL	
166	Sector	GH10-e	East Ghana - Togo border	High	High	Regular	Intensive and regular		PERI-URBAN	
	AREA	TG1						TOGO		
167	Sector	TG1-a	Ghana – West Lomé border	Medium	Medium	Regular	Regular	Gas pipeline transboundary marine area (proposed) Togo coastline wetlands Ramsar Site	URBAN	
168	Sector	TG1-b	Lomé centre	Medium	Medium	Regular	Regular	Gas pipeline transboundary marine area (proposed) Togo coastline wetlands Ramsar Site	URBAN	
169	Sector	TG1-c	Urban Lomé - East port	Very high	Very high	Intensive and regular	Intensive and regular	Gas pipeline transboundary marine area (proposed) Site Ramsar of Togo coastline wetlands	URBAN & PORT	
170	Sector	TG1-d	East Lomé	High	Very high	Intensive and regular	Intensive and regular	Gas pipeline transboundary marine area (proposed) Togo coastline wetlands Ramsar Site	PERI-URBAN	NOT CONFIRMED
171	Sector	TG1-e	Togoville - Agbodrafo - Aniého	Very high	Very high	Intensive and regular	Intensive and regular	Gas pipeline transboundary marine area (proposed) Togo coastline wetlands Ramsar Site Mono Delta Transboundary Biosphere Reserve (proposed) Site Ramsar Transboundary of Gbaga Channel (proposed)	RURAL	
	AREA	BJ1						BJ1 BENIN WEST AREA		
172	Sector	BJ1-a	Togo Border - Grand Popo	Very high	Very high	Intensive and regular	Intensive and regular	Mono Delta Transboundary Biosphere Reserve (proposed) Site Ramsar Transboundary of Gbaga Channel (proposed)	TOURISM	

N°	Type	Ref	Name	Priority level 2011	Priority level 2016	Monitoring-observation 2011	Monitoring-observation 2016	Protected area	Core set of problem issues	Confirmed devpt 2016
173	Sector	BJ1-b			Very high	Intensive and regular	Intensive and regular	Site Ramsar Site of the Couffo Low Valley, Coastal Lagoon, Aho Channel, Lake Ahémé Bouche du Roy Community biodiversity conservation area	RURAL & ENVIRONMENT	YES
	AREA	BJ2								
BJ2 BENIN CENTRAL WEST AREA										
174	Sector	BJ2-a	West Ouidah - Cotonou	High	High	Watch-keeping for the purpose of anticipation	Regular	Vodountô biodiversity conservation community area Togbin-Adounko biodiversity conservation community area	ANTICIPATION	YES
175	Sector	BJ2-a	Cotonou West airport	Medium	Medium	Watch-keeping for the purpose of anticipation	Regular		ANTICIPATION	YES
	AREA	BJ3								
BJ3 BENIN CENTRAL EAST AREA										
176	Sector	BJ3-a	Cotonou airport to Port	High	High	Regular	Regular	Ramsar Site Ouémé Low Valley, Porto Novo Lagoon, Lake Nokoué	URBAN	YES
177	Sector	BJ3-b	Sector Port and Cotonou channel	High	High	Regular	Regular	Ramsar Site Ouémé Low Valley, Porto Novo Lagoon, Lake Nokoué	URBAN & PORT	
178	Sector	BJ3-c	Ambassadeurs sector	Very high	Very high	Intensive and regular	Intensive and regular	Ramsar Site Ouémé Low Valley, Porto Novo Lagoon, Lake Nokoué	URBAN	
	AREA	BJ4								
BJ4 BENIN EAST AREA										
179	Sector	BJ2-e	East Cotonou	High	High	Watch-keeping for the purpose of anticipation	Intensive and regular	Ramsar Site Ouémé Low Valley, Porto Novo Lagoon, Lake Nokoué Bymins biodiversity conservation community area	PERI-URBAN	

In the sector descriptions, shaded texts refer to the 2011 West-Africa coastal master plan. Updated items are shown in black. Changes on intervention or monitoring-evaluation priorities are shown in red. It should be noted here that sectors for which statuses guiding intervention and monitoring-evaluation priorities were changed appear marked with a red dot on the map.



Mauritania

Mauritania has a Master Plan for the management of its coastline which has been in the implementation phase since 2006. This master plan is currently being updated.

MR1 NOUADHIBOU PENINSULA AND THE BAIE DU LÉVRIER

This whole area is characterized by the creation of the Nouadhibou free zone¹. A deep-water port is now under study. According to available information, the free zone would not be limited to the Nouadhibou peninsula, but would also cover the East side of the Baie du Lévrier, which is considered as an extremely sensitive ecosystem.

The Nouadhibou ore port is currently being extended to enable it to host vessels weighing up to 250 000 tonnes. The port is located in the Baie du Lévrier and it has several jetties and docks. It has a mineral terminal to export the iron ore from the Northern part of the country via the Point Central port (operated by the Société Nationale Industrielle et Minière, SNIM). Of notice is that this port is located near the Cap Blanc reserve.

The construction of a new dock of more than 600 m has just been completed. Operations were conducted between 2011 and 2012 to remove the wrecks in the port's bay and access channel. The port has been certified ISO 9001.

The extension of Nouadhibou's fishing port and the building of an agro-industrial processing plant are also significant developments in this sensitive area.

There are also some developments in mining operations in this area, especially in the Tasiast gold mine, the extension of which was officially launched in November 2015. Mauritania exports huge amounts of iron ore via the Nouadhibou ore terminal. Production is mainly concentrated in the northern area in State-run mines (SNIM), and several new iron mines are in the project phase. Other ongoing operations are focused on copper and gold. Water necessary for these mining activities would be collected from the Baie du Lévrier.

¹ Law 2013-001 of 2 January 2013 / <http://www.ndbfreezone.mr/>

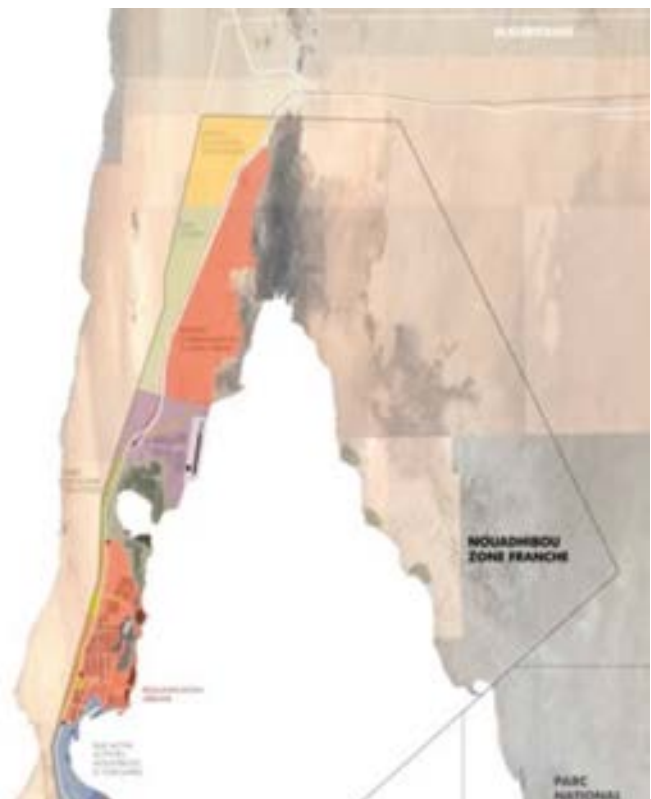
A new road has also been built between the Nouakchott-Nouadhibou route and the coast towards the village of Mamghar. This road mainly passes through the Banc d'Arguin national park. Its impacts have been highlighted in an assessment report on the UNESCO's world heritage to which belongs the Banc d'Arguin national park. The town of Chami, located on the fringes of this park, is experiencing a rapid development, mainly with the new location of the protected area's facilities.

We are witnessing a north-ward extension of the Nouadhibou conurbation and the Casado Centre.



NOUADHIBOU Développement Urbain

Réserve d'urbanisation à long terme



		ENVIRONMENT	
MR1-a	1 - CAP BLANC		
BASELINE			
Diagnostics	Rocky coastline, Cap Blanc satellite reserve located near a small population of monk seals (<i>Monachus monachus</i>). There is practically no human occupation.		
Dynamics	No remarks, there was a sand bank migration that led to the grounding of a ship. Currently the ship is a wreck and responsible for the observed migration. Reduction of the sandbank's height.		
Stakes	Pollution risks from the port traffic of Nouadhibou and the neighbouring ore port.		
Actions	Strict protection of the site. Vigilance as regards pollution risks.		
Priority level	Low	Monitoring - Observation	No recommendation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Ongoing developments around the town of Nouadhibou (free zone), and on the extension site of the SNIM's ore port can have significant impacts on the Cap Blanc site. Impacts related to the evolution of the Cansado port that need to be monitored.		
Priority level	Medium	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	YES	Hazards	Not reported
Cap Blanc Satellite Reserve WDPA ID Satellite Reserve: 5174			MR1-a
An annex to the Banc d'Arguin national park (see. MR2-a Banc d'Arguin national park) was established by decree n°86-060 of April 2 on the creation of the Cap-Blanc Satellite Reserve.			

		PERI-URBAN AND PORT	
MR1-b	2 - CANSADO POINT AND BAY		
BASELINE			
Diagnostics	Rocky plateau (sandstone). Town and mine port of Cansado. Oil terminal Landscape quality bay site, Nouadhibou urban beach.		
Dynamics	No remarks		
Stakes	Pollution risks from industrial activities. Grounding and dismantling of wrecks in the Cansado Bay.		
Actions	Vigilance as regards risks of pollution. Impact assessments need to be conducted for the establishment of a joint development zone if there are plans to build new industrial installations.		
Priority level	Low	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Extension of the Cansado ore port		
Characterization of port installations	Ongoing developments in this area are mainly characterized by the extension of the ore port (the construction of a new dock with more than 600 m has just been completed). Operations were conducted between 2011 and 2012 to remove the wrecks in the port's bay and access channel. The port has been certified ISO 9001. A free zone directly connected to the port is being established. Ripraps are being laid for the construction of a jetty between the ore port and Cansado		
Priority level	Medium	Monitoring - Observation	Regular
Protected Area	NO	Hazards	Not reported

		PERI-URBAN AND PORT	
MR1-c	3- URBAN COASTLINE AND NOUADHIBOU HARBOUR		
BASELINE			
Diagnostics	Major port and associated industrial installations. Limited residential housing. Fish processing site connected to the fishing port of the Baie du Repos		
Dynamics	No remarks		
Stakes	Treatment of the sewage from all port and industrial activities		
Actions	Seek a global sanitation solution that deals with all sewage. Development and signposting of access channels to the port areas.		
Priority level	Medium	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Extension of the Cansado ore port Extension of the fishing port, agro-industrial installations Earthmoving works to build a wharf		
Characterization of port installations	Ongoing developments in this area are mainly characterized by the extension of the ore port (the construction of a new dock with more than 600 m has just been completed). Operations were conducted between 2011 and 2012 to remove the wrecks in the port's bay and access channel. The port has been certified ISO 9001. A free area directly connected to the port is being established. Ripraps are being laid for the construction of a jetty between the ore port and Cansado		
Priority level	Medium	Monitoring - Observation	Regular
Protected Area	NO	Hazards	Not reported

2010



2013



*Evolution of the port of Nouadhibou and related infrastructures between 2010 (above) and 2013 (below)
 -Source: Google Earth*

Key developments include:

(i) building of two new wharves/breakwater in the southern part, (ii) warehouse facilities east of the fishing port.

		ENVIRONMENT	
MR1-d-e	4-NORTH NOUADHIBOU, BAIE DE L'ETOILE AND BAIE DU LÉVRIER		
BASELINE			
Diagnostics	Baie de l'Etoile: wetlands system claiming a conservation status. Outstanding natural ecosystem, tourist and housing facilities on the southern bank. South of the Baie de l'Etoile/sandy spit separated from the Nouadhibou conurbation by a salty wetland depression (hosting cord-grasses), sparse residential housings) Baie du Lévrier: Diversified, sandy, rocky shore bordering a shallow marine environment with high ecological and fish-related value. The East shore is not occupied, beginning of a land appropriation of the Western bank outside Nouadhibou. Important archaeological sites.		
Dynamics	No remarks		
Stakes	Privatization of the sea front near the Baie de l'Etoile (this entails risks in the event of a marine surge) Pollutions and risks of wetlands distortion in the Baie de l'Etoile. Baie du Lévrier: risks-related to the build-up of pollutants from port and urban activities in the Baie du Lévrier.		
Actions	Strict protection of all sites, both biological and landscape heritage. Control of urban development near Nouadhibou. Development of a guideline on coastal development, also known as sector scheme. The classification of the Baie de l'Etoile is yet to be materialized. Strict protection of all sites, both biological and landscape heritage. Control of the urban development near Nouadhibou.		
Priority level	Medium	Monitoring-observation	Intense and regular
Remarks	Recommended engagement of IUCN teams and local NGOs in the observation process		
Developments since 2010			
Evolution of stakes	Ongoing developments in this sector are mainly characterized by the expansion of mining and the construction of related infrastructure, especially a seawater intake facility in the Baie du Lévrier. The eastern shore sector of the Baie du Lévrier (MR1-e) was linked to the whole Banc d'Arguin, since it does not present any stakes. The evolution of mine stakes on this shore and the fact that both the East and the West banks are directly affected by pressures and pollution from Nouadhibou's facilities, justify the association of MR1-e and MR1-e sector, though these are differentiated by distinct levels of stakes concentration that are obviously more important on the West shore. It is necessary to monitor the impacts related to the extension of the fishing port and agro-industrial facilities, the organic and chemical pollution as well as the extension of the Cansado mine port		
Priority level	Medium	Monitoring - Observation	Intense and regular
Protected Area	YES	Hazards	Not reported

Protected area of the baie de l'étoile (in the process of registration)	MR1-d
No ID WDPA	
The drive for the conservation of the baie de l'étoile was initiated in 2010 with the establishment of the Commission d'Orientation et de Suivi de la Directive d'Aménagement du Littoral de la Baie de l'étoile (Joint Order n°2346/MDEDD/MPM on the establishment of the Commission d'Orientation et de Suivi de la Directive d'Aménagement du Littoral de la Baie de l'étoile de Nouadhibou and on the operating rules of the latter).	
A «plan for the development and management of a multi-purpose marine protected area in the baie de l'étoile» was prepared and proposed in December 2013.	
A «scientific report on the study of the baie de l'étoile» was jointly prepared by IMROP and IUCN in January 2014.	

MR2 BANC D'ARGUIN - NORTH NOUAKCHOTT

The MR2 zone is mainly centred on the Banc d'Arguin national park.

Developments in this area mainly include:

- The development of the town of Chami on the Eastern limit of the natural park, that hosts the park's management infrastructure.

- The construction of a road linking Mamghar to the Nouakchott - Nouadhibou route. The major part of this road is located within the national park.

- The construction of the Tannit fishing port, capable of accommodating 300 pirogues. The project has a total cost of 80 million Euro.

		ENVIRONMENT	
MR2-a	6- BANC D'ARGUIN (BANP)		
BASELINE			
Diagnostics	It is a land and marine area with a high ecological and fishing-related value that motivated its classification on the list of World heritage national parks. It is currently subjected to a tourist development in line with conservation objectives. Imraguen populations of the BANP, many spontaneous settlement sites located at the park's edges on the road connecting Nouakchott to Nouadhibou.		
Dynamics	Complex, wide fossil delta, extensively documented by the PACOBA project		
Stakes	Conservation of the ecological complex of Banc d'Arguin in a context of economic strains and growing trade incentives, especially with regards to fisheries from the park. Control of access conditions, especially those related to the prohibition of trawling in shallow waters. Tourism to be developed. Endemic subspecies nesting sites (spatulas), flooding risks for some villages (Iwik and R'gueiba)		
Actions	Implementation of the BANP development and management plan.		
Priority level	Low	Monitoring-observation	Regular
Remarks	Recommended engagement of the Banc d'Arguin National Park's teams in the observation-monitoring process. Banc d'Arguin Observatory established in the framework of the PACOBA project. Establishment of a watchdog on the sea level.		
Developments since 2010			
Evolution of stakes	Expansion of mining and building of related infrastructure, especially with the project of a seawater intake facility near the park. Construction of a wind turbine plant. The remote impacts of the port of Nouadhibou should be taken into account. The construction of a road linking Mamghar to the Nouakchott - Nouadhibou route. The expansion of the town of Chami can be an attractive centre right next to the Park.		
Priority level	Medium	Monitoring - Observation	Regular
Protected Area	YES	Hazards	Not reported

<p>Banc d'Arguin National Park (IUCN Category II) National park WDPa ID 797</p> <p>Banc d'Arguin Ramsar Site WII / Ramsar site: WII ID: 1MR001 – 250 / WDPa ID : 17726</p> <p>Banc d'Arguin World Heritage Site UNESCO WH ID : 506 / UNESCO WH WDPa ID : 20388</p> <p>Cap Blanc Satellite Reserve WDPa ID Satellite Reserve: 5174</p>	<p>MR1-e</p> <p>MR2-a</p> <p>MR2-b</p>
<p>The Banc d'Arguin National Park was created on 24 June 1976 by decree N°76/147/P.R on the creation of the Banc d'Arguin national park.</p> <p>It has been identified as a wetland of international importance / Ramsar site on 22 October 1982 (1 200 000 ha).</p> <p>An annex to the Banc d'Arguin national park was created by decree n°86-060 of April 2, 1986 on the creation of the Cap-Blanc Satellite Reserve.</p> <p>Visits were regulated by order n°R-132 of 11 August 1986 on the regulation of visits to the Banc d'Arguin national park and the Cap-Blanc satellite reserve.</p> <p>The Banc d'Arguin National Park was put on UNESCO's world heritage list in 1989 based on natural criteria (ix) and (x).</p> <p>Law n°2000/024 of 19 January 2000 on the Banc d'Arguin national park specified the boundaries, development, conservation, protection and management modalities, as well as the criminal policy framework and surveillance.</p> <p>The park's organization and functioning were specified by decree N°2006-058 of 14 June 2006 on the rules governing the organization and functioning of the Banc d'Arguin national park.</p> <p>The rules implementing law n°2000/024 of 19 January 2000 was set by decree n°2006-068 of 03 July 2006.</p> <p>The 2010-2014 development and management plan of the Banc d'Arguin National Park was completed in December 2009 and approved by the park's governing council on 28 January 2010.</p>	

		ENVIRONMENT	
MR2-b	7 - MAMGHAR – MAJHRAT		
BASELINE			
Diagnostics	Sandy shore that can be crossed at low tides, backed by important dune formations. A few settlement points		
Dynamics	Shifting, coast subject to the shore drift, a few points vulnerable in the event of marine surges. Probably important wind sediment inputs circulated through the regional coastal drift.		
Stakes	Lack of drinking water, reducing the prospects for development. Protection of stabilizing plants in a context of nomadic cattle breeding.		
Priority level	Low	Monitoring-observation	No recommendation
Developments since 2010			
Evolution of stakes	Ongoing developments in this sector are mainly characterized by the construction of a road connecting Mamghar to the Nouadhibou-Nouakchott route and partly crossing the Banc d'Arguin National Park.		
Priority level	Medium	Monitoring - Observation	Regular
Protected Area	YES	Hazards	Not reported

		ANTICIPATION	
MR2-c	8 - TANIT – SEBKHRA N'DRAMCHA		
BASELINE			
Diagnostics	Sandy shore that can be crossed at low tides, backed by unstable low dune belts Hinterland characterized by the sebkhra N'Dramcha. Project to develop the Tanit fishing port. Very small residing population concentrated in a few settlement points.		
Dynamics	Shifting, littoral subject to the coastal drift, a few points vulnerable in the event of marine surge. Very low wind sediment inputs at the level of the great sebkhra.		
Stakes	Lack of drinking water, reducing the prospects for development, searching for viable alternatives in the development of the N'Dramacha sebkhra. Protection of stabilizing plants in a context of nomadic cattle breeding.		
Actions	Anticipation of peripheral development, in case the Tanit port project is launched.		
Priority level	Low	Monitoring-observation	Watch-keeping for the purpose of anticipation
Developments since 2010			
Evolution of stakes	Ongoing developments in this sector are mainly characterized by the creation of the port of Tanit, the construction of which started in 2014. This port should accommodate about 300 pirogues.		
Priority level	Medium	Monitoring - Observation	Regular
Protected Area	NO	Hazards	Not reported

		ANTICIPATION	
MR2-d	9 - DJEIDRAT		
BASELINE			
Diagnostics	Sandy shore that can be crossed at low tides, backed by unstable dune belts with variable heights. In the southern adjacent to Nouakchott, there is a surf terrace that can easily be developed. This sector also hosts the new Djreida airport project.		
Dynamics	Shifting, coast subject of the shore drift, a few points vulnerable in the event of marine surge.		
Stakes	Protection of stabilizing plants in a context of nomadic cattle breeding.		
Actions	Anticipation of a potential housing development (reserve of land) in the northern part of Nouakchott induced by the Nouakchott-Nouadhibou route and the Djreida airport project.		
Priority level	low	Monitoring-observation	Watch-keeping for the purpose of anticipation
Developments since 2010			
Evolution of stakes	Ongoing developments in this area are mainly characterized by the construction of the new airport in the area proposed by SDLAO Extractions of conchitic sands		
Coastal protection	Stabilization of dunes in several points		
Priority level	Medium	Monitoring - Observation	Regular
Protected Area	NO	Hazards	Movement of dunes requiring stabilizing works

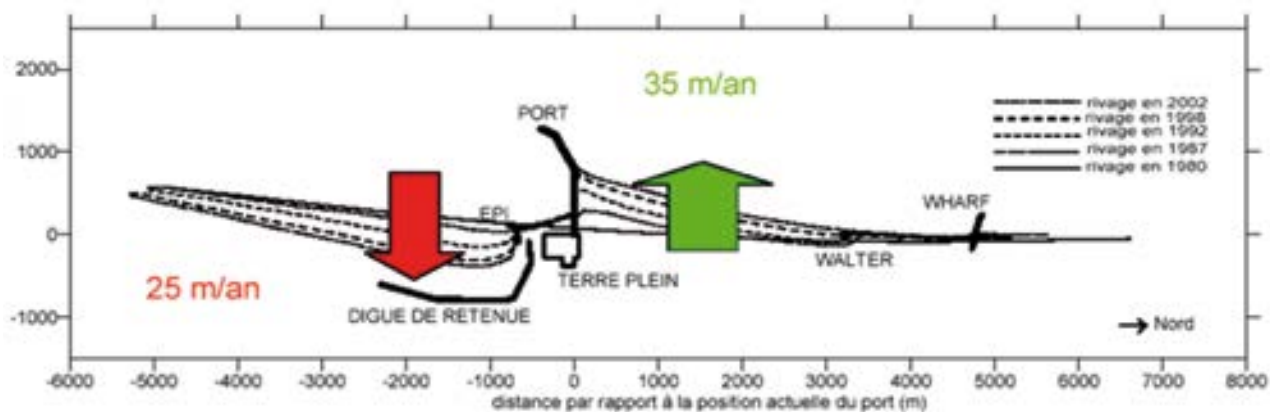
MR3 NOUAKCHOTT

Note the Aftout es-saheli South-North depression, which is parallel to and near the shoreline and is located along Mauritania's coast, from the Senegal River delta to Nouakchott. This long "gutter" considerably increases extended flood risks in the event of major marine intrusions.

The construction of the Port of Nouakchott that has a jetty perpendicular to the longshore drift flow, triggered serious erosion issues south of the port which are currently being handled.

		URBAN & TOURISM	
MR3-a	10 - NORTH NOUAKCHOTT		
BASELINE			
Diagnostics	Coastal part of Nouakchott's urban area. Very important fishing centre in the northern part, wharf. Despite the considerable accretion noted north of the Nouakchott port embankment, the offshore bar is generally low and even very low at the local level. Conquest of the maritime public domain in the North of the fishing port, walls separating different «concessions» on the beach.		
Dynamics	In the North of the sector (in the area of «hut»), we noticed a sharp reduction of the shoreline. Despite the presence of the port and its jetty, located further in the south, we noticed an upper beach berm and an erosion of hard materials in the duneline. Between the fishing port and the wharf, there is a narrow offshore bar with local saddle that favours marine intrusion in the event of surges.		
Stakes	Sand extractions in several points. Constructions (mainly hotels) on the dune. High attendance leading to the subsidence of the dune ridge. Development of the urban coast and protection of the dune ridge. Prohibition of sand extractions. A project to establish a semi-urban neighbourhood on 5 km of coastline that is likely to affect the dune ridge as well as the scarce natural vegetation.		
Actions	Development of accesses to the shore and protection of the dune ridge. Plan to connect sensitive spaces. Prohibition of sand extractions. Prohibition of constructions. Protection of stabilizing plants.		
Priority level	High	Monitoring-observation	Regular
Developments since 2010			
Evolution of stakes	Nouakchott further urban expansion northward. Changes in the jetty/main wave quelling of the port by a perpendicular work in the second semester of 2015.		
Coastal protection	Stabilization of dunes in several points		
Priority level	High	Monitoring - Observation	Intense and regular
Protected Area	NO	Hazards	Heavy erosion

			PERI-URBAN AND PORT
MR3-b	11 - SOUTH NOUAKCHOTT – PK28		
BASELINE			
Diagnostics	Coastal part of Nouakchott's urban area highly subject to erosion. A few protection schemes. Very thin littoral rim, completely invisible in some points, wide back swamp near the shore that can be connected to the sea in the event of marine intrusion through lower points.		
Dynamics	High erosion, private areas providing sediment inputs via the port's jetty. Major marine intrusions already noticed. Scoured and unearthened protective breakwater.		
Stakes	Very high risks of marine intrusion with submersion in precarious neighbourhoods in sebkhra and potential flooding of the depression near the Eftout es Sahéli. Deterioration of facilities located south of the port. Risks of increased groundwater table level that can permanently rise to the surface.		
Actions	Consolidation and strengthening of anti-erosion facilities. Relocation of the populations living in most vulnerable areas. Establishment of an early-warning system and a flood risk prevention plan. Total protection of dune ridges as well as stabilizing plants. Prohibition of any construction. A by-pass solution should be envisioned in the port.		
Priority level	Very high	Monitoring	Intense and regular
Developments since 2010			
Evolution of stakes	Southward continuation of Nouakchott's urban expansion. Extension works at the port of Nouakchott. At the southern end of the area: finalization of the tourist complex in 2014. Construction of half a dozen fish-processing plants on the beach in the southern part of the area from 2011 to 2015.		
Characterization of port infrastructures	The port of Nouakchott, also known as China-Mauritania friendship port is located south of the town of Nouakchott, on the Atlantic Coast. It comprises a jetty/wave quelling located in the northern part and that gave rise to phenomena of accretion north of the port and erosion in the southern part (a wave quelling/embankment was built in the area in 2011 to mitigate such a phenomenon: T-shaped riprap). The port's extension works started in September 2009 and were carried out by China Road and Bridge Corporation - SNCTPC (construction of an oil wharf, a protective breakwater and a 5km protective embankment), that increased the port's capacity by 3 to 3 million tonnes per year, were completed in August 2014 (with a total cost of 220 million dollars of Chinese loans).		
Coastal protection	Operations have been carried out to clog the gaps of and strengthen the dune ridge, drain and treat the rainwater in lower sebkas. Construction of a wave quelling/embankment (T-shaped riprap) in 2011 to mitigate the erosion phenomenon caused by the port facilities in the southern part.		
Priority level	Very high	Monitoring - Observation	Intense and regular
Protected Area	NO	Hazards	High erosion and flooding episodes



Historic evolution of the shoreline in the port of Nouakchott (according to Ould Moustapha)



Consolidation works on the dune ridge in Nouakchott.



*Evolution of the port of Nouadhibou and related infrastructure between 2011 (above) and 2015 (below)
-Source: Google Earth)*

Key developments include: (i) Construction of a new wharf (2013), (ii) 5 km westward extension of the wave quelling/protective embankment and (iii) construction of a wave quelling/ ripraps south of the port so as to mitigate the erosion.

MR4 SOUTH MAURITANIA AND SENEGAL RIVER DELTA

Note the Aftout es-saheli South-North depression, which is parallel to and near the shoreline and which is located along Mauritania's coast, from the Senegal River delta to Nouakchott. This long "gutter" considerably increases extended flood risks in the event of major marine intrusion.

This whole area is characterized by a certain development of tourist activities with the creation of some accommodation structures. At the same time, some sand mining

activities have also been noticed. In the southern part, oil exploitation is ongoing.

It should also be noted that an important gas deposit has recently been discovered on the Senegalese border, off Saint-Louis.

		ENVIRONMENT & ANTICIPATION	
MR4-a	12 - PK28 – SOUTH TIGUENT¹		
BASELINE			
Diagnostics	Sandy coast backed by a narrow offshore bar (sometimes less than 100m) limited in the east by the Aftout as Saheli depression, occasionally submersible. Low human occupation mainly on the four served points (fishing centres).		
Dynamics	High natural instability		
Stakes	Protection of the dunes' stabilizing plants in a context of populations settling around the few existing villages, with a cattle-breeding activity less subject to water-availability constraints. Persistent local risks of marine intrusion in the Aftout marine depression.		
Actions	Consolidation of the facilities surrounding the villages, total protection of the plants of the adjacent dune. Limitation of constructions and urban scattering in inter-village spaces. Control on material extractions.		
Priority level	Medium	Monitoring-observation	Regular
Developments since 2010			
Evolution of stakes	The construction of a hotel and a factory should help increase the attractiveness of this sector for further developments.		
Mining activities	Sand mining and oil and gas exploration		
Priority level	Medium	Monitoring - Observation	Regular
Protected Area	NO	Hazards	Not reported

¹ The precise delimitation of this sector will have to be confirmed during the next regional technical events

		ENVIRONMENT & ANTICIPATION	
MR4-b	13 - SOUTH TIGUENT – CHOTT BOUL		
BASELINE			
Diagnostics	Slightly curved straight coastline. Wider sand formations (1 to 2km) between the shore and the Aftout depression. Area farther away from the asphalted-road connecting the area to Nouakchott, so it is relatively inaccessible, except via the beach. Chott Boul protected area, a former outlet of a branch of the Senegal's river. This small marine protected area has an ornithological interest, as do the Tumbos I and II marshes (or North and South), located away from the duneline and hosting a nesting population of dwarf flamingos. The West shore of these marshes is bordered by acacia plantations located at the duneline's base, with important regeneration capacities in an isolated environment where the grazing pressure is still Medium.		
Dynamics	This sector is more stable than the previous ones; however, it is subject to the long shore drift and to active winds.		
Stakes	Oil prospecting? Development of a discovery tourism favoured by the close biosphere reserve of the Senegal river? An increased human occupation is unlikely.		
Actions	No remarks, preservation of natural environments in the framework of the Cross-border biosphere reserve of the Senegal river's delta.		
Priority level	Low	Monitoring-observation	Watch-keeping for the purpose of anticipation
Remarks	Recommended engagement of the Diawling National Park's teams in the observation-monitoring process.		
DEVELOPMENTS SINCE 2010			
Evolution of the concerns	Development of some low-capacity tourist-accommodation structures ²		
Mining activities	Black sand mining and intensification of oil and gas exploration. Aftout water pipe (Source: MOLOA 2014 Regional Technical Workshop)		
Priority level	Medium	Monitoring - Observation	Regular
Protected Area	NO	Hazards	High erosion and flooding episodes
		ENVIRONMENT	
MR4-c	14 - CHOTT BOUL – GHARA (RBTDS)		
BASELINE			
Diagnostics	This area is an integral part of the the Senegal's Delta Cross-border Biosphere Reserve (RBTDS), which was classified by UNESCO on 27 June 2005. The Diawling National Park is the area's main conservation centre. The refilling with seasonal water, from the OMVS dams, the Diawling National Park's ponds, enabled an impressive ecological rehabilitation of this area since 1996. It is a wide floodplain sprinkled with clay basin, the monotony of which is only broken by terraces, dykes and dunes. There is a set of embankments and gates structuring the basins across the river. The altitude is generally very low, peaking at about 20 metres. Some areas are below the sea level (up to 0.5m). There is a population of migrating birds.		
Dynamics	There is a wide duneline facing the ocean, though it is certainly unstable and subject to important wing movements. It heavily depends on the modalities for freshwater inputs management. This area, which is subject to tidal influence (including from saltwater wedge) seems to have increased when a breach was opened in the Barbarie Split in neighbouring Senegal, thus disrupting various activities, especially fishing activities in brackish areas.		
Stakes	Conservation of a set of unique wetlands of international importance of migrating birds, promotion of a tourist development consistent with the constraints related to the sites' preservation and that benefits from the proximity of Saint-Louis as well as from the favourable context of the RBTDS. Challenges drinking water supply.		
Actions	Implementation of the RBTDS development and management plan. POLMAR Plan and anti-oil-spill measures.		
Priority level	low	Monitoring	Regular
Observation	Recommended engagement of the Diawling National Park's teams in the observation-monitoring process.		
Developments since 2010			
Evolution of stakes	A project to build a multi-purpose port is being considered		
Mining activities	Sand mining and oil and gas prospecting		
Priority level	Medium	Monitoring - Observation	Regular
Protected Area	YES	Hazards	Not reported

Ramsar du Chat Tboul Site	MR4-c
WII / Ramsar site: WII ID: 1MR003 / WDPa ID : 900595	MR4-d
The Chat Tboul area was put on the Wetland of International Importance site/ Chat Tboul Ramsar Site on 10 November 2000 (WII ID: 1MR001 – 1044 / WDPa ID: 900595 (1 200 000 ha)).	

Diawling National Park	MR4-c
National park WDPa ID 9310	MR4-d
Diawling Ramsar Site	
WII / Ramsar site: WII ID: 1MR001 – 666 / WDPa ID : 95349	
Decree n°91-005 of 14 January 1991 on the creation and organization of an administrative public body, called Diawling National Park.	
The body's by-laws were approved through order n°R-204 of 2 April 2000 on the approval of the Diawling National Park's by-law.	
A 1996-2001 master development plan for the Diawling National Park and its peripheral region was drafted in December 2001.	
The park was identified as a wetland of international importance / Ramsar site on 23 October 1994 (15 600 ha). It was put on the Montreux Record on 28 February 2002.	

Senegal river Delta cross-border biosphere reserve (Mauritania)	MR4-c	SN1-a
RBTDS: WDPa ID 902500	MR4-d	SN1-b
The Senegal river Delta cross-border biosphere reserve (Mauritania-Senegal) was included in the world biosphere reserves network by UNESCO's International Coordinating of the Man and Biosphere Programme on 29 June 2005.		
The reserve mainly comprises the following protected areas:		
Mauritania: The Diawling National Park, the Chat Tboul Ramsar Site, Moedina's Reserves Forest.		
Senegal: The Barbarie Split National Park, the Gandon Natural Classified Reserve, the Mpal-Mérinaguène Reserved Forest, The Massara-Foulane Reserved Forest, the Tilène Reserved Forest, the Djoudj National Birds Park, the Naère Reserved Forest.		

		ENVIRONMENT	
MR4-d	15 - NDIAGO		
BASELINE			
Diagnostics	Isolated sector located on a very narrow offshore bar. A few villages (Moyo, Ndiago) mainly inhabited by fishermen. Mangrove natural areas of regional importance in the Mboyo islands, especially for the reproduction of migrating mullet populations.		
Dynamics	Very narrow offshore bar (about 200m) with flood-prone areas on its margins. Very unstable area, though the dune-line's volume is considerable in some areas.		
Stakes	Preservation of the mangroves of the Mboyo islands. Drinking water supply for the communities living in the area. Some communities living in risky sites in the event of surges.		
Actions	The development of human occupation should be limited. Measures aimed at preserving mangrove trees.		
Priority level	Low	Monitoring-observation	Regular
Remarks	Recommended engagement of the Diawling National Park and RBTDS teams in the observation-monitoring process.		
Developments since 2010			
Evolution of stakes	Sand mining and oil and gas prospecting: discovery of a major gas deposit off Saint-Louis, across the border.		
Priority level	Medium	Monitoring - Observation	Regular
Protected Area	YES	Hazards	Non-reported



Sénégal (North)

A major proportion of the Senegalese Coast is affected by growing erosion. Coastal stakes are rising in the meanwhile, triggering more and more common situations of risk.

Senegal has recently adopted an anti-coastal erosion strategy, as well as various framework plans and documents on land development.

SN1 SAINT-LOUIS – GANDIOLAIS – GRANDE COTE

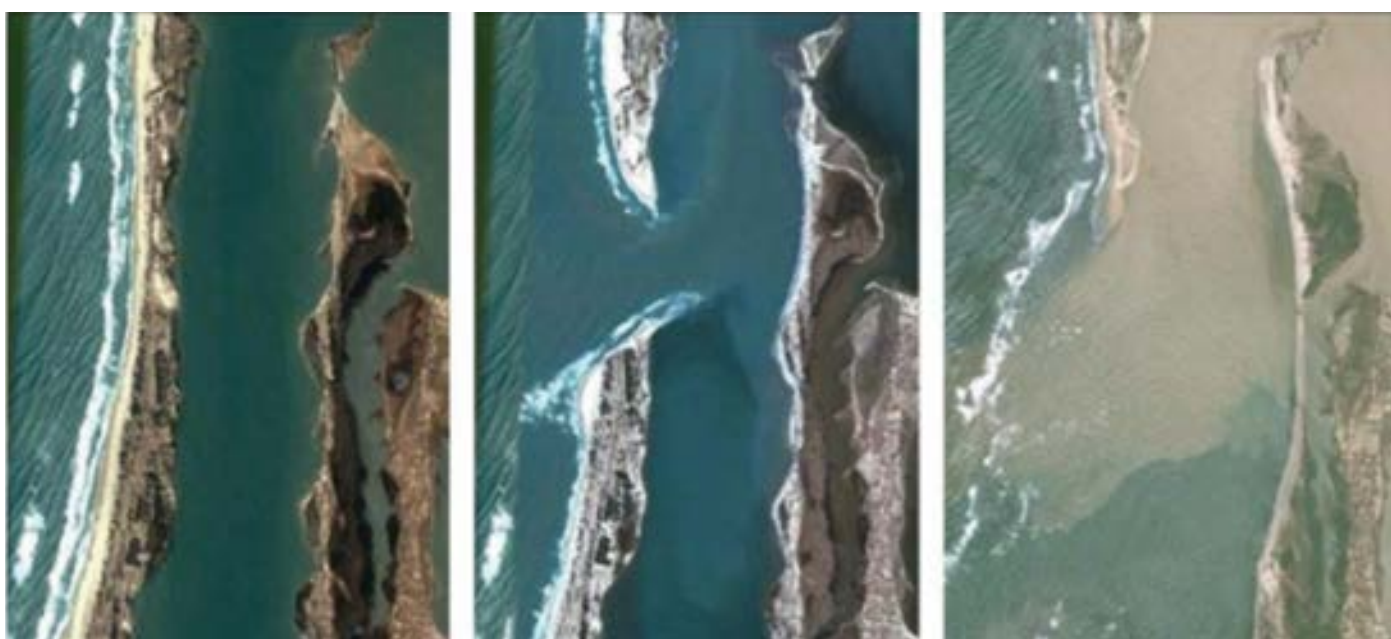
A saltwater wedge progression has been noticed in the whole Gandiolais area. The sea level rise is certainly not the only phenomenon behind what is apparently a general pattern. The impacts of over-pumping in fresh-water lenses must also be taken into account.

The building of the Rufisque-Saint-Louis road should help revitalize developments on the Grande Côte. Note the discovery of an important gas deposit off Saint-Saint, across the Senegal-Mauritania border: exploitation is expected to start in 2020.

However, a climate change adaptation plan for the 2015-2020 period was drafted in partnership with Saint-Louis' traditional fishing council with the support of CSE and the USAID-funded COMFISH project.

		URBAN AND PERI-URBAN
SN1-a	16 - URBAN, PERI-URBAN AND HERITAGE AREA OF SAINT-LOUIS	
BASELINE		
Diagnostics	<p>This is a complex area that includes Saint-Louis' urban centre and the historic island of Saint-Louis, the Barbarie Split, a thin and long sandy-arrow as well as lower environment located on the river's left bank. Many sandy islands. Major fishing and tourist activity. The opening of a breach in the Barbarie Split in 2003 following the submersion risks facing the town of Saint-Louis then, has profoundly changed a set of particularly complex hydrological and sediment balances that characterizes a wide and very low delta area.</p> <p>These modifications today affect a good part of the economic activities (fishing, tourism, vegetable growing and salt production). The concentration of population in the town itself, but also and especially in the peripheral villages and districts (Guet Ndar, Ndar-Toute, and Goxxu mbac,- 57% of the population of the municipality of Saint-Louis) determines a high-risk situation. Still uncertain location of a future ore port related to the objective of making the Senegal river navigable (OMVS).</p>	
Dynamics	<p>Rapid erosion observed in several sites, but also sectors in accretion in places. The reconfiguration of the mouth following the opening of the breach is still underway, with changes directly affecting not only the exposed sea front, but also the "inland coastline" of the river banks, with a considerable increase in the intertidal zone.</p> <p>Wind erosion is also intense, leading to sand invading infrastructure. The sector is globally low-lying and completely unstable. Disappearance of the village of Doun Baba Dieye located opposite the breach, reduction of surface area the îlot aux oiseaux (from 2 ha to 0.5 ha in less than ten years), collapse of houses at Goxxu mbacc and Guet Ndar in 2010</p> <p>The breach created initially is today more or less in equilibrium, with seasonal oscillations observed (see 1). This new mouth is approximately 2 km wide.</p>	

Stakes	Reduction of risks for the populations exposed, conservation of the heritage of Saint-Louis, but also of the entire unusual life system of the delta that is largely dependent on the salinity gradient and the configuration of the delta. Requalification and reorganization of catch landing areas and the areas where the fish is processed once landed.		
	Different protection solutions are being examined with a main alternative, excluding non-intervention, consisting in consolidating the existing breach, also securing its depth (protecting Saint Louis against floods, an advantage for fishermen), but at the cost of a deterioration of the natural delta habitats, or the attempt to restore the initial situation. ³		
Actions	Secure the safety of exposed populations, including through relocation. Prevention plan for submersion risks. Study possible solutions for the protection and development of the coast (in particular for the historical town of Saint Louis), taking into account the strong dynamics of the delta areas. Accompany relocation of the economic activities affected. Redesign a tourism development plan taking into account the evolution of the Barbarie Split to be integrated into a sector scheme.		
Priority level	Very high	Monitoring-observation	Intense and regular
Remarks	High involvement of the municipal team of Saint-Louis which could play the role of engine driving observation and monitoring if supported by competent technical and scientific resources.		
Developments since 2010			
Evolution of stakes	Port project and river dredging. Construction of the Saint-Louis-Rufisque road, investment in irrigation-infrastructure, tourist development project; discovery of a major gas deposit off Saint-Louis: 450 billion m3		
Priority level	Very high	Monitoring - Observation	Intense and regular
Protected Area	YES	Hazards	Many submersion episodes, including recent ones (on 100 to 150 km with destruction of houses), progressive breach enlargement



Dynamics around Baba DIEYE Island from 2003 to 2009 (source: case study)

³ US Army Corps of Engineers. Barry . K.M. & N.C. Kraus. 2009. – *Stability of Blocked River Mouth on West Coast of Africa: Inlet of Senegal River Estuary. Coastal and Hydraulics Laboratory. ERDC CHL TR-09-20. 56p.*

Senegal river Delta cross-border biosphere reserve (Mauritania) RBTDS: WDPa ID 902502	MR4-c	SN1-a
	MR4-d	SN1-b

The Senegal river Delta cross-border biosphere reserve (Mauritania-Senegal) was classified in the world biosphere reserves network by UNESCO's International Coordinating of the Man and Biosphere Programme on 29 June 2005.

The reserve mainly comprises the following protected areas:

Mauritania: The Diawling National Park, the Chat Tboul Ramsar Site, Moedina's Reserves Forest.

Senegal: The Barbarie Split National Park, the Gandon Classified Natural Reserve, the Mpal-Mérinaguène Reserved Forest, The Massara-Foulane Reserved Forest, the Tilène Reserved Forest, the Djoudj National Birds Park, the Naère Reserved Forest.

Djoudj National Bird Sanctuary National park WDPa ID 867 Djoudj Ramsar Site WII / Ramsar site: WII ID: 1MR001 – 138 / WDPa ID : 68151 Djoudj bird sanctuary world heritage site 506 / UNESCO WH WDPa ID : 2578 / UNESCO WH WDPa ID : 25	SN1-a
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The Djoudj natural reserve was classified on 26 February by decree n°62-065 (3ha).

The park was created on 14 April 1971 by decree n°71/41 on the creation and integration into the forest domain of the Djoudj national birds sanctuary (Senegal river's delta) as well as of an adjacent zone (13 000ha).

The first classification decree was amended on 10 December 1975 by decree 75 -1222 repealing and replacing articles 2 and 3 of decree n°71/41 of 14 April 1971 on the creation and integration into the forest domain of the Djoudj national birds sanctuary (Senegal river's Delta) as well as of an adjacent zone (13 000ha).

The Djoudj was named a Wetland of international importance/ Ramsar site on 11 July 1977 (16 000ha), and the latter was put on the Montreux list on 4 July 1990 before being removed on 16 June 1993.

The Djoudj bird sanctuary was put on UNESCO's world heritage list in 1981 for natural criteria (vii) and (x).

A five-year integrated management plan (1994-1999) for the park and its bordering area was finalized in June 1994.

The 2010-2014 Djoudj national park's management plan was finalised in March 2010.



Collapsed houses in Guet Ndar following wave assaults

(Original photograph-March 2010, source: case study)



*Collapse of the protective wall in Guet Ndar (built in 1910 and which is has already crumbled in a major part).
Picture Marsh 2010, Leïdi (source; case study).*



The South-Western part of Saint-Louis, observed from a plane (Source: national Diagnostics)

		ENVIRONMENT & TOURISM	
SN1-b	17 - SOUTH SAINT-LOUIS – INSULARIZED BARBARIE SPLIT		
BASELINE			
Diagnostics	Long, thin sandy rim, practically insular since the breach was opened in 2003. Today it is once more connected to the continent with the gradual filling in of the former river mouth.		
Dynamics	High rate of wind erosion, siltation of vegetable plots and tourist facilities. Alternate sites of erosion and accretion. Filling in of the former outlet of the Senegal river at the South limit of the sector.		
Stakes	Viability of two tourist establishments situated South of the breach. Organic pollution and salinisation of the branch of the river situated between the sandy spit and the continent since the former river outlet has been filled in. Conservation of the Barbarie Split National Park and particularly the île aux Oiseaux (surface area reduced from 2 ha to 0.5 ha). Viability of vegetable production in a context of gradual salinisation of coastal fresh water lenses.		
Actions	Secure the safety of exposed populations, including by relocation. Prevention plan for the risk of submersion. Study possible solutions for the protection and development of the coast (in particular for the historical town of Saint Louis), taking into account the strong dynamics of the delta areas. Accompany the relocation of the economic activities affected. Redesign a tourism development plan taking into account the evolution of the Barbarie Split to be integrated into a sector scheme.		
Priority level	High	Monitoring-observation	Intense and regular
Remarks	High involvement of the Barbarie Split National Park team which could play the role of engine driving observation and monitoring if supported by competent technical and scientific resources.		
Developments since 2010			
Evolution of stakes	Construction of the Saint-Louis-Rufisque road, investment in irrigation-infrastructure, tourist development project; discovery of a major gas deposit off Saint-Louis:		
Priority level	Very high	Monitoring - Observation	Intense and regular
Protected Area	YES	Hazards	Incremental fragmentation of the Barbarie Split and natural opening of a second breach. Salinization of the ground water and impacts on market gardening and access to fresh water in the Gandiolais.

The Gueumbeul Special Wildlife Reserve (IUCN Category IV) RSF Gueumbeul : WDPa ID 11653 Gueumbeul Ramsar Site WII / Ramsar site: WII ID: 1MR001 – 338 / WDPa ID : 68154	SN1-b
The Gueumbeul special Wildlife reserve was classified in 1983. Gueumbeul was identified as a wetland of international importance / Ramsar site on 23 October 1994 (15 600 ha).	

The Barbarie Split National Park (IUCN Category II) National park WDPa ID 869	SN1-b
The Barbarie Split National Park was created on 09 January 1976 by decree N°76/0016 on the creation of the Barbarie Split national park. Its by-law was established by order n°007165/24 JUIN 76/PM/DGT.	

Marine Protected Area of Saint-Louis MPA St-Louis WDPa ID 352704	SN1-b
Saint-Louis' Marine Protected Area was classified by decree n°2004-1408 of 4 November 2004 on the creation of Marine Protected Areas. The development and management plan of Saint-Louis' MPA was revised for the 2014-2018 period. The governing bodies of Saint-Louis' MPA was established on 20 January 2015 by the prefectural order n°0024/PSL/AMP. They include an Organizing Committee, a Management Committee and a Scientific and Technical Committee (prefectural order n°25/PSL/AMP for the latter committee). The MPA's by-law was validated by the prefectural order n° 0026/PSL/MPA on 20 January 2015.	

Gandon Natural Community Reserve	SN1-b
Gandon NCR WDPa ID: non-existent	
Gandon Rural Council deliberation n°05/CRG/ARR/RAD of 16 July 2003 on the designation of a 2 000 ha site as Community Natural Reserve was approved by the prefectural order of 23 July 2003.	
Gandon's CNR is not listed in WDPa.	

		ANTICIPATION	
SN1-c	18-GRANDE CÔTE-NIAYES		
BASELINE			
Diagnostics	Very monotonous coastal area. Scattered vegetable growing in the Niayes. A few tourist sites such as Mboro Beach, with residential settlements related to the phosphate extraction areas. Ambitious project for the improvement and economic development of the Niayes (Grande Côte master plan) centred around the new town located between Lompoul and Diogo, which would balance out the twin centres of Dakar-Saint-Louis. The Grande Côte master plan comprises 5 hubs: (i) Urban development and land structuring; (ii) Agriculture; (iii) Ecology; (iv) Technology and the industrial network; (v) Tourism;		
Dynamics	Strong wind erosion nonetheless offset by a considerable casuarina replanting, siltation of the Niayes, observed advance of the salt water wedge.		
Stakes	Important from the point of view of the application of the Grande Côte master plan, with development of mining (zircon), the creation of a panoramic route, development of tourism, agriculture, industry, etc., with concurrent usages to be reconciled in the same space.		
Actions	Maintain and preserve the stabilizing plants on the dunes (bands of casuarina).		
Priority	Low	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Following the Grande Côte master plan, this sector is experiencing some progress: A building of pontoon in Lompoul Building of a thermal power plant The final stage of zircon mining prospecting.		
Mining activities	Zircon mine «Grande Côte» of Mineral Deposit and Eramet companies operationalisation is in progress.		
Priority	Medium	Monitoring-Observation	Regular
Protected area	YES	Hazards	Not reported

Local Natural Reserve of Darou Khoudoss	SN1-c
LNR of Darou Khoudoss: WDPa ID: non-existent	
Darou Khoudoss rural Council deliberation n° 04 of 15 October 2003 on the classification of a land area of 1.500 square for Local Natural Reserve has been approved by the prefectural order n°07/AM in Thiès Region/Tivaouane Department/ Méoune District.	
The LNR of Darou Khoudoss is not listed in WDPa.	

Notto Gouye Diama Local Natural Reserve	SN1-c
Notto Gouye Diama LNR: WDPa ID: non-existent	
The deliberation of Notto Gouye Diama rural Council n°03 of 03 July 2003 on the grant of a land area of 1.180 square for Local Natural Reserves has been approved by prefectural decree n°21/1P on 04 September 2003.	
The LNR of Notto Gouye Diama is not listed in WDPa.	



Stabilizing the overall dunes using a band of vegetation (national diagnostics source)

			ENVIRONMENT
SN1-d	19 - KAYAR - GUEDIWAYE		
BASELINE			
Diagnostics	Important market-gardening sector. Kayar fishing centre. Straight coastline. Areas of extension of the Dakar periphery towards Guediawaye. Large landfill site at Mbeubeuss (Malika) and intense sand extraction site for building.		
Dynamics	Wind erosion always present despite the rows of casuarina. Observed progression of the salt water wedge.		
Stakes	Urban encroachment approaching the agglomeration of Dakar. Sanitation at Malika – resorption of the open landfill.		
Actions	Control land ownership and urban sprawl, in particular regarding the stakes with respect to the protection of the band of casuarina. Where necessary, sector master plan to be anticipated. Analyze impacts of sand extraction.		
Priority	High	Monitoring	Watch-keeping and anticipation
Comment	High priority related to environmental issues in Malika.		
DEVELOPMENTS SINCE 2010			
Evolution of stakes	The development of urbanisation with housing development for the resettlement of toll motorway displaced people, the drop in farming land. Storm water evacuation by draining towards lakes. Construction Project of a tide gauge station (project from Norway); Construction in progress at the 3 th section of the clearing track in the North: Guediawaye side was paved in 2015. Oil prospecting (offshore)		
Mining activities	dune sand extraction		
Priority	Very high	Monitoring-Observation	Intense and regular
Protected area	YES	Hazards	Recurrence of flooding

Kayar Marine Protected Area	SN1-d
AMP Kayar : WDPA ID: 3527065	
Kayar Marine Protected Area was classified by decree n°2004-1408 of 4 November 2004 on the creation of Marine Protected Areas.	
A diagnostic assessment in order to formulate a land development and management plan of Kayar MPA was finalised in March 2007.	
The management committee of Kayar MPA was created and its status validated by prefectural decree n°139 of Thiès department on 3 November 2010.	
The land development and management plan of Kayar MPA was reviewed during the period 2014-2018.	

SN2 DAKAR

The entire coastline of Dakar is artificialised. Erosion affects as well as Cape Verde peninsula cliffs and the beach of the Bay of Hann. There are significant stakes, namely urban ones relating to the coastline, especially on the Eastern and Western coastal road.

		PERI-URBAN AND URBAN	
SN2-a	DAKAR DUNE COAST NORTH CAMBERENE -YOFF		
BASELINE			
Diagnostics	Considerable stretch of beach at Dakar, landing of catches, urbanization encroaching to the top of the beach, discharge of sewage and solid waste. Extraction of materials. Exposed to ocean swell. Uncoordinated individual initiatives to protect the shoreline.		
Dynamics	Sector undergoing rapid erosion around Yoff, could possibly be related to sand extraction at Malika.		
Stakes	Viability of an old and traditional landing site of Lebou fishermen faced with erosion and shrinking of the space for parking canoes. Habitat and threatened populations in the event of marine incursion.		
Actions	Protection systems could be contemplated but should be associated in a global sector scheme for the coastal area North of Dakar.		
Priority	High	Monitoring	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Significant urbanisation development of the seaside. Wall of the beach, landscape significant impacts. Work of VDN establishment 2 nd section.		
Mining activities	Dune sand collection site		
Protection	Several works, often old and dispersed (hotel des Almadies and hotel King- Fadh)		
Priority	High	Monitoring-Observation	Intense and regular
Protected area	NO.	Hazards	Beaches erosion, landslide of rock formations

		URBAN	
SN2-b	21- DAKAR ROCKY COAST WEST YOFF-CAP MANUEL		
BASELINE			
Diagnostics	Rugged, ablated coast with cliffs, headlands and coves, very heterogeneous topography with alternate gentle slopes and vigorous landform. This heterogeneousness is in relation to a highly diversified substrate, essentially rocky, fractured and weathered. Dolerite, basalt, infrabasaltic sandstone, clay-marl and loamy cliffs constitute a complex geological system. Quite dense, predominantly tourism and residential urbanization in the North and central part (Ngor, Almadies and Mamelles); denser and older in the central parts (Mermoz and Fann). Residential districts in the South part of Cap Manuel. Urbanization to the water's edge to the North and South, limited by the recently improved coast road in the central part. The privatization of this rugged coast is underway and almost complete. This sector is highly exposed to ocean swell with predominantly North-Westerly waves. Numerous filling and individual protective schemes, with no overall consistency;		
Dynamics	Various differential forms of erosion observed, should be seen in relation to the lithological discontinuities of the formations that are fractured and weakened by the advent and infiltration of water from the continent. Typically, various forms of rock fall, landslides and disconformities.		

Stakes	Viability of recent development to the coastal road and of high-value-added tourism investments. Security of population in at risk situation (habitat on the cliff edge). Development and conservation in a public domain accessible to urban populations of the panoramic, landscaped corridor of the coast road. Planting on embankments and cliff tops.		
Actions	Building prohibition to be respected at all at risk sites. Improve the collection of rainwater and wastewater, and drainage in the most sensitive sites. Time and viability perspectives to be taken into account in impact assessments, which ideally should be carried out for each new implementation in this sector. The requalification accompanied by withdrawal of certain exposed districts should be envisaged. Protective developments justified by the density of the stakes, but should be part of a coherent, overall scheme.		
Priority level	High	Monitoring	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Significant urbanization of the seaside (residences, hotels, shopping facilities) Illegal extraction of basaltic materials on cliffs. Building of a fishing wharf in progress in Soumbédioune. Backfills on the sea near the amusement park "Magic land" (between hotel Terrou-Bi and the beach of Soumbédioune). Resort project of seawater desalination in Mamelles/Ouakam		
Mining activities	Illegal extraction of basaltic materials in cliffs.		
Coastal protection	The reinforcement structures of cliffs/ Marina breakwater of hotel Terrou-Bi/Rock fills in front of Radisson hotel.		
Priority	Very high	Monitoring-Observation	Intense and regular
Protected area	YES	Hazards	Fast-growing erosion in several points namely in front of UCAD (Cheikh Anta Diop University of Dakar). Landslides, Exceptional episodes of heavy swells (> a ten-year cycle) with a sea wall in 2013 and 2014.

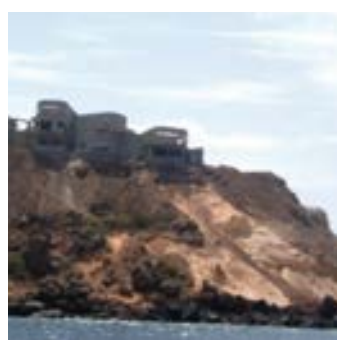


2008

Backfills for the development of the recreational space "Magic Land" between Radisson Hotel and the Beach of Soumbédioune



2015



Buildings on an at high risk site at Pointe Diop (source: SDLAO case study 2010)



The erosion of coastal road formations is largely dependent on storm water management (Source: MOLOA country branch of Senegal)

The National Park of the Magdalen Islands (IUCN Category II) National park WDPA ID: 870 Proposed world heritage site of the National Park of the Magdalen Islands National park 2077	SN2-b
<p>The National Park of the Magdalen Islands was established on 16 January 1976 by decree n° 76/0033 on the creation of the national park of the Magdalen Islands. The bylaws were defined by order n°007164/24 JUNE/PM/DGT. The National Park of the Magdalen was inscribed on the tentative list of the world heritage that Senegal intended to propose for inscription since 2005. The delimitations of the NP of the Magdalen Islands are not available in WDPA.</p>	

		URBAN AND PE-RI-URBAN	
SN2-c	BAY OF HANN-RUFISQUE		
BASELINE			
Diagnostics	This sector includes the port of Dakar, the urban beach, Bay of Hann and the coastal area from Rufisque to Bargny; 87% of industries in Dakar are located in this sector. The sector is densely populated, and the land used down to the shoreline. Many protection systems, rock fills, groynes, protecting walls, often weathered or destabilised. Building project of dykes underway. Populations largely exposed in the event of surge, despite the geographic situation which offers some protection from ocean waves. The topographic situation of Rufisque also determines risks of flooding from the continent.		
Dynamics	Generalised erosion, except perhaps at the level of Diokoul power station (the cooling water supply channel acts as a groyne). Depending on the site, recession estimated at between 1 and 2 metres per year.		
Stakes	In spite of the improvements that are still possible, withdrawal would be the long-term solution, at a cost that would obviously be high given the density of the stakes. Major problems of pollution of urban, industrial and organic origin in the Bay of Hann, generating a real health risk for the local population. At sub-regional level, the port of Dakar has considerable development potential as a top hub port which could receive rapidly expanding container traffic; various extensions should be planned.		
Actions	Developments to be planned but, except for radical solutions (that are difficult to make sustainable) of fixing the shoreline, the withdrawal and requalification of sea front settlements are difficult to avoid. Action has already been undertaken to reduce the levels of pollution in the Bay of Hann.		
Priority	Very high	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Increased urbanisation in Thiaroye-Mbao area; Processing area of sea products (Bata Beach). Storm water sanitation and industrial effluents project (decontamination project of the Bay of Hann). Project of "future port". Building of a bulk carrier area. Urban restructuring following a sanitation project of Hann and petit Mbao. Building of a thermal power plant;		
Characterisation of port installations	<p>The port autonomous of Dakar is located in the Bay of Hann of Dakar. It is made of an internal anchor and several piers protected by two jetties both in the north and south of the entrance of harbour. It comprises namely one ore terminal of phosphate, a petroleum terminal and a fishing area.</p> <p>The concession of the containers terminal of Dakar port was granted to <i>Dubai Ports World</i> in 2007 for a 25 year-term after being run for 80 years by Bollore group.</p> <p>It is the third port in West Africa (behind that of Abidjan and Lagos).</p>		
Mining activities	Offshore oil exploration. Dune sand extraction.		
Protection	<p>Construction of Rufisque dyke (Thiawlène) (5 m x 730 m) works started since May 2012 and inaugurated in July 2013. Dyke project of Diokoul. Protecting project of Goree Island.</p> <p>The existence of previous works in the north and south of the port: breakwater (i) of the east coastal road (ii) and the float base (built before 1942)</p> <p>Some isolated groynes in the bay of Hann in front of Rufisque and Grand Mbao.</p>		
Priority level	Very high	Monitoring-Observation	Intense and regular
Protected area	NO	Hazards	Marked erosion, pollution of the Bay of Hann. Exceptional episodes of high swell (> a ten-year cycle) with surge in 2013 and 2014 having affected the built protections.



*Dakar port in 2015 (Source: Google earth)
No major work done in the port of Dakar since 2010 except renovation and refurbishment of existing piers*



*Rock fall in front of the mosque of Gorée Island (in yellow, background)
Source: MOLOA country branch of Senegal, May 2014*



The Bay of Hann Dalifort: destruction of homes in December 2013 (source: country branch of Senegal)



The Bay of Hann Dalifort: destruction of homes in August 2015 (source: MOLOA Senegal country branch)



High erosion in Mbao in May 2014 (source: MOLA0 country branch of Senegal)



Building of Thiawlene dyke in 2012



Dyke of Thiawlene (cost > 3 000 000 000 CFA)



*Wake waves on Thiawlene dyke during an exceptional storm surge (May 2014)
(Source: MOLOA Senegal country branch)*



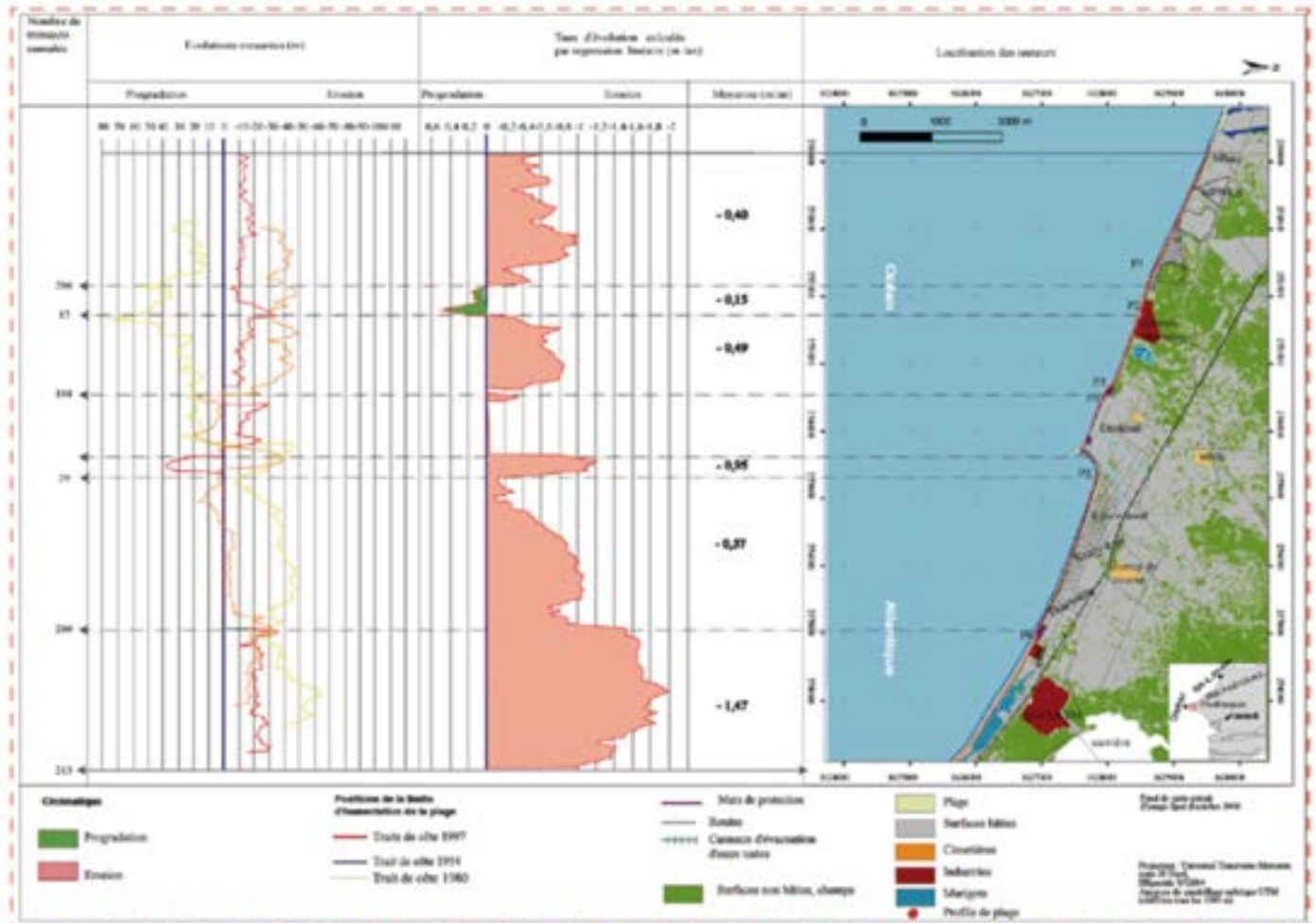
*Damage after Thiawlene wave surge during an exceptional storm surge (May 2014)
Source: MOLOA Senegal country branch*



*Cemetery flooding
(source: MOLOA Senegal country branch, May 2014)*



*Protecting wall construction in progress in Mbao
(Source: national Diagnostics)*



Rufisque coastline progress 1954-2006 (source: MOLOA case study 2010)

SN3 PETITE COTE

The observed level of impacts related to coastal erosion, and the extent to which these impacts are due to individual, uncoordinated protection decisions in a context of (i) low sediment supply, (ii) low sediment reserves; (iii) extraction of probably high volumes of sand; (iv) seasonal variation in the direction of ocean waves, advocate for a full review of the development methods of the Petite Côte, within a consistent sector scheme arbitrating among conflicting uses.

Regaining control of land ownership and the regulation of spontaneous land development to combat pollution (undertaken in the public domain) are the key preconditions before envisaging new protection investments. These “spontaneous” developments should also be associated with de facto “privatisation” of the public maritime domain, which is increasingly evident on the Petite Côte.

The same applies to the projected extension of tourist areas, which may hardly boost the economy, given the past experience, and a better integration of coastline dynamics. These developments also constitute an opportunity to draw up a new doctrine in terms of coastal tourism. The building of an airport and a future ore port in Bargny, with

extension in the South of Dakar, will not simplify the management of erosion on the Petite Côte characterised by the weakness of the low sediment supply.

In Senegal, tourism yields 4.6% of the GDP and accounts for 100,000 employments. It is the second sector for foreign currencies source after fishing. A survey conducted by MOLOA has pointed out to what extent this sector on the pole area of Saly is devastated, especially because of erosion resulting from the exposure of hotel constructions nearby the beach.

The initial service of Bargny international airport and the Special Economic Zone (SEZ) of Diamniadio /Ndiass should result in a population influx and a fast-growth of the tourist sector anticipated by the master plan for territorial planning and development of Dakar area-Thiès-Mbour designed in January 2015.

		PERI-URBAN & ANTICIPATION	
SN3-a	23 - BARGNY – KENE - NDIOGOM		
BASELINE			
Diagnostics	Practically urban sector, linear. Characterized by an often very narrow but continuous strip (even when the coast is adjacent to wetland) of seafront residential settlements, with a few traditional villages included. Rocky coast to the South of the sector.		
Dynamics	Generalized erosion as witnessed by the number of protection systems.		
Stakes	General stakes of the Petite Côte, numerous improvements, dykes, walls, rock fill to protect individual homes. Materials available nearby. Highly likely growth and extension of coastal settlements inland beyond the coastal road. Uncertain future of low-lying land in the vicinity of the South of Bargny, depending on the growth of future land-intensive activities of Dakar (land accessible in particular with backfill). In particular, future facilities of ore port of Dakar.		
Actions	Protections could be made consistent on the scale of the sector, but more probably the shoreline will be completely backfilled and artificialised, with a view to delaying withdrawal which is probably inevitable in the long run.		
Priority level	High	Monitoring-observation	Regular

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Construction project of an ore port and coal-fired thermal power plant in Sendou. Diamniadio development centre/Ndiass integrated ZES. The urban encroachment reaches the isolated South of Bargny which remained relatively unpopulated.		
Priority level	Very high	Monitoring-Observation	Intense and regular
Protected area	NO	Hazards	Marked erosion. Exceptional episodes of high swell (> a ten-year cycle) with Storm surge in 2013 and 2014 having affected the built protections.



The destruction of twenty houses and canoes damaged in Bargny during an episode of high swell and storm surge in May 2014(source: MOLOA Senegal country branch)



Destruction of home in Yene (source: MOLOA Senegal country branch)

		PER-URBAN & TOURIST	
SN3-b	24 - POPENGUINE		
BASELINE			
Diagnostics	Very particular type of coast, segments of cliffs in hardpan, substrate soft in depth, natural tendency to crumble. Alternating small cliffs and more or less narrow beaches. Surrounding landscape practically bare of plants (hardpan exposed). Rock fill materials available locally facilitating individual protection initiatives at low cost: dyke protecting a hamlet (fishing point), a few residences on the edge of small cliffs with risk of rockslide. In the North, still relatively unurbanised, numerous plots closed off awaiting construction, scattered residences on the sea front, etc.		
Dynamics	Very dynamic shoreline and narrow unstable beaches		
Stakes	Anticipation of human land use on an unstable coast where encroachment is underway. Efficiency and viability over time of walls-dykes and protective armoring.		
Actions	Actions to prevent installations on at-risk sites. Sector scheme recommended, taking into account the kinds of substrates and the risks of rock fall.		
Priority	High	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Marina construction project in Ndayane		
Priority level	High	Monitoring-Observation	Intense and regular
Protected area	YES	Hazards	Marked erosion. Exceptional episodes of heavy swell (> a ten-year cycle) with storm surge in 2013 and 2014.

Popenguine Natural Reserve Popenguine NR: WDPA ID: 12263	SN3-b
<p>Popenguine natural reserve was created on 21 May 1996 by decree n°86/605.</p> <p>The bylaws were defined by decree n°0053-3 JANV.87/MPN on the bylaws of Popenguine Natural Reserve</p> <p>Popenguine NR has no delimitation in WDPA.</p>	

		TOURISM	
SN3-c	25 - SALY – PORTUDAL –SOMONE		
BASELINE			
Diagnostics	Littoral strip almost totally developed and artificialised: hotel complexes, holiday homes and village enclaves. Littoral zone undergoing rapid change, beach North of Somone, with six groynes in rock fill, small marina with piers, various protections, walls and beach armouring. Several coves with visible erosion. Obvious conflicting uses between tourism and fishing in a context of gradual decrease in the width of the beach.		
Dynamics	Generalised erosion throughout the sector. A few sites undergoing accretion upstream of the protection works.		
Stakes	A coordinated sea front scheme is required to avoid disrupting a fragile balance of the dynamics of the coastal current system. Bringing together the different stakeholders and broader awareness raising work targeted at all the players concerned with risk prevention.		
Actions	Actions to prevent installations on at-risk sites. Sector scheme recommended, with evaluation and harmonisation of spontaneous protections. Improvements should be planned within the framework of an overall, coordinated approach. Regaining control of the land ownership system is in any case a prerequisite.		
Priority level	Very high	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Construction project of tourist facilities (SAPCO). Development of artificial beaches on terraces with beach wall aggravating erosion.		
Coastal protection	Construction project of different protection works (World Bank). Proliferation of uncoordinated individual protection actions, especially rock filling in the West of Lamantin Hotel between 2010 and 2013 in the crafted port of Saly in 2015.		
Priority level	Very high	Monitoring-Observation	Intense and regular
Protected area	YES	Hazards	Generalised erosion, beaches disappearing

Natural Reserve for Somone Community interest. NRCI of Somone: WDPA ID: non-existent	SN3-c
<p>The natural reserve for Somone community interest was established on 25 October 1999, following the prefectural approval of deliberation n°003 of Sindia Rural Council of 19 July 1999.</p> <p>The bylaws were defined by Mbour prefectural order n° 0033/ASD-of 22 October 2008.</p> <p>The order providing the governance bodies, was taken on 18 January 2013. The management committee was established in March 2013.</p> <p>The land development and management plan was updated for the period 2014-2018.</p> <p>Somone NRCI has no delimitation in WDPA.</p>	



*Saly, residence Les Filaos, situation in 2007
(source: MOLOA Senegal country branch)*



*Saly, residence Les Filaos, situation in 2013
(source: MOLOA Senegal country branch)*



Saly, consequences of individual protection actions (source: MOLAO Senegal country branch)

		URBAN & TOURISM	
SN3-d	26 - URBAN SECTOR OF MBOUR		
BASELINE			
Diagnostics	Town currently growing (around the periphery), with numerous plots surrounded by low walls awaiting construction. Large agglomeration, almost a satellite 60 kilometres from Dakar, local tourism centre, rural area close to groundnut cultivation areas. Important fishing port (fresh fish markets and trucks). Undulating coast with beautiful beaches in marked coves, changing continuously in sections of erosion/accretion. Balance of current system highly sensitive to any changes in the shoreline. Conquest of the beach as far forward as possible, sometimes in two phases with extensions built on the maritime domain adjacent to the initial concession. The hotel area closes off the majority of public access to the beach.		
Dynamics	Very dynamic coastal area, phases of erosion/accretion largely induced by the works and improvements on the sea shore.		
Stakes	Consequences of the individual protection decisions with no consistency among them. Maintain the sector's tourism appeal with a beach heritage that is continuously shrinking. Evident privatisation of a long stretch of beaches. Efficiency and viability over time of walls-dykes and protective armouring. For the future, the population's access to the beach could be limited to the urban beach used for landing fish with all its various nuisances.		
Actions	Sector development recommended with a view to harmonisation and respect for the functionality of improvements. Reclamation in certain extreme cases when the stakes justify it and as part of an overall scheme.		
Priority level	Very high	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Significant extension of agglomeration		
Coastal protection	Numerous protection works		
Priority level	Very high	Monitoring-Observation	Intense and regular
Protected area	NO	Hazards	Generalised erosion, beaches disappearing



*Destruction of homes in Mbour
 (source: MOLOA -Senegal country branch)*

			TOURISM
SN3-e	27 - MBOUR – POINTE SARENE		
BASELINE			
Diagnostics	The most striking phenomenon is the growth of concessions of all sizes, closed, hedged, with protected natural vegetation tending to close off access to the coast leaving only the openings of original village enclaves (with fishing and fish drying – Warang). Well served by the coastal road which is hard surfaced to Joal. Coastal area with an undulating longitudinal profile with alternate sectors of erosion and accretion.		
Dynamics	Average erosion of 1 m per year (source: case study). Considerable at Warang, and also downstream of the groyne protecting the Adiana club beach.		
Stakes	No significant hotel complexes, holiday homes, some of which are very close to the beach, with walls, section of rock fill of individual protection. Complete lack of coordination of individual protective actions. In the land planning of the South area, planned breaks in residential urbanisation to preserve beach accesses for the inland population, to prevent the complete privatisation of the coastal area outside the village enclaves.		
Actions	Sector development recommended with a view to harmonisation and respect for the functionality of improvements. Reclamation in certain extreme cases when the stakes justify it and as part of an overall scheme. In the land planning of the South area, planned breaks in residential urbanisation to preserve beach accesses for the inland population, to prevent the complete privatisation of the coastal area outside the village enclaves.		
Priority level	High	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Significant extension of Mbour agglomeration. Tourist development project of Pointe Sarène by SAPCO: roadway under development		
Priority level	Very high	Monitoring-Observation	Intense and regular
Protected area	NO	Hazards	Generalised erosion, beaches disappearing

			TOURISM
SN3-f	28 - NORTH JOAL – MBODIENE BEACH		
BASELINE			
Diagnostics	This sector marks the end of the tourism and residential settlements on the Petite Côte, with vast residential concessions and the latest luxury hotel complexes. One of these closes off the coast along a stretch of several hundred hectares. Apart from the hotel complex built in a potentially flood-prone area South of the village of Pointe Sarene, most of the hotels and holiday homes have been situated further back, reducing the risks of settlements closer to the shore. Urban sprawl in progress inland around Mbodiène. The functioning of the estuary zone is largely disturbed by the blocking of sediment supply East of the village of Pointe Sarene.		
Dynamics	The coastal area South of Pointe Sarene takes the form of a narrow lido that ends in a sandy spit in the vicinity of Joal. Unstable coastal area. This spit is part of the former estuary of the coastal river, the functioning of which has been profoundly altered by the building of a dam at the level of the North Mbodiène tourist complex.		
Stakes	Control of the development of residential and hotel building in this complex sector bordered with wetlands, also forming sediment reserves.		
Actions	Preserve wetlands complex. Locate possible future tourist and residential development areas back from the beach. Control land ownership to prevent urban sprawl in this wide break in urbanization before Joal and Sine Saloum.		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Joal back dyke, Desalination project; mouthpiece migration of the Mbodiène lagoon affecting the two tourists complex of North Mbodiène		
Priority level	Medium	Monitoring-Observation	Regular
Protected area	YES	Hazards	Located erosion

Marine Protected Area of Joal- Fadiouth PMA Joal-Fadiouth: WDPA ID: 352706	SN3-f SN3-g	SN4-a SN4-b
<p>Joal-Fadiouth Marine Protected Area was classified by decree n°2004-1408 of 4 November 2004 on the creation of Marine Protected Areas.</p> <p>A management plan 2009-2013 of Joal-Fadiouth PMA was established in October 2008 and a review of the document during the period 2014 is effective.</p>		

		Anticipation	
SN3-g	29 - JOAL		
BASELINE			
Diagnostics	<p>Growing town forming a conurbation with Fadiouth. Very important centre for collecting catches and the processing of fish, salting, cold storage, smoking, with air pollution, etc. No quay or wharf infrastructure, catch landing on the urban beach, with considerable concentration of boats.</p> <p>The cape acts as a relative shelter. A certain number of scattered buildings on the beach, more or less protected by walls and armoured exposed to storms.</p>		
Dynamics	Straight littoral, tendency to undulation with local accretion/erosion. Relatively unstable sector.		
Stakes	Control of building on the beach (to avoid the situation observed at Fadiouth see following sector).		
Actions	Inform local residents and authorities of the risks related to densification of built-up area.		
Priority level	High	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Improving fishing dock and fish product processing, tourist development of pointe Fignon.		
Coastal protection	Building of defense works of fishing port in 2012-2013.		
Priority	High	Monitoring-Observation	Regular
Protected area	YES	Hazards	Localised erosion affecting fishing facilities



Joal anti-salt dyke
 (source: MOLAO Senegal country branch)

SN4 SINE SALOUM

		PERI-URBAN & URBAN	
SN4-a	30 - FADIOUTH PENINSULA AND ISLAND		
BASELINE			
Diagnostics	<p>Rim and urbanised terraces in continuity with Joal in a more continental situation. Interesting site, but fragile and exposed. Narrow beach built-up to the limit of the tide. Only the vast cove where canoes are landed, which extends to the port of Joal, has conserved a segment of beach between the densely built-up part and the sea. On the residential point, three hotels and residences, built on the tide limit, with protective systems (walls, armouring). The extreme point, with no buildings, is partially planted (to be protected) and is in danger of disappearing. Vast zone of salt production.</p> <p>A densely urbanised island (shell island), but more sheltered from the ocean waves and storm surges, connected by walkways to (i) the peninsula; (ii) the nearby cemetery island.</p> <p>Peninsula connected to the North-East by a dyke track that crosses the salt wetlands.</p>		
Dynamics	Unstable sector undergoing erosion.		
Stakes	<p>Possible development of built-up area in a high-risk situation on the extremity of the peninsula, visibly already subdivided into plots. Maintain the current footprint of constructions in the future in a situation where shoreline recession is more than likely.</p> <p>The most at risk sector seems to be situated in the residential part with walls/armouring on the beach. The extreme point should be more vigorously planted with casuarina type plants (the low, ligneous vegetation seems to be vigorously used as wood for fuel, as is the case for what remains of the mangroves). As the buildable urban site is saturated, future growth (in addition to that on Fadiouth) could well attack the area more or less dyked by the dyke road (but the majority of which is taken up by fish drying). Possible future reclamation on the tannes (brackish swamp) islands?</p>		
Actions	Preserve natural vegetation, in particular on the extremity of the Fadiouth peninsula. Ban the extraction of materials on the whole of the sector and adjacent sectors. Vigilance in order to prevent the development of uncoordinated individual protective initiatives. Possible study of a protection system for the whole sector.		
Priority level	High	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	High	Monitoring-Observation	Intense and regular
Protected area	YES	Hazards	Not reported

National Park of Saloum Delta National park WDPa ID: 866	SN4-a
Ramsar Site of Saloum Delta ZHII / site Ramsar : ZHII ID : 1SN003 – 288 / WDPa ID : 68153	SN4-b
Biosphere Reserve of Saloum Delta RBDS WDPa ID: 3044 /	SN4-c
World Heritage Site of Saloum Delta RBDS WH ID: 1359	SN4-d
Cross border Ramsar Site of Saloum - Niimi complex WDPa ID: non-existent	SN4-e

The National Park of Saloum Delta was established on 28 May 1976 by decree n° 76/577 on the creation of the national park of Saloum Delta.

The bylaws were defined by order n°008127/13 JULY/PM/DGT.

One part of Saloum Delta joined in 1980 the international network of Biosphere reserves.

Saloum Delta was nominated as a wetland of international importance/ Ramsar site on 03 April 1984 (73 000 square).

A process of classification of Niomi-Saloum on cross-border Ramsar site was initiated in 2008.

UNESCO World heritage Committee has nominated Saloum Delta as a cultural landscape on the list of world heritage on the criteria basis (iii), (iv) and (v) has sent the proposal of Saloum Delta Inscription on the criteria basis (x) to allow Senegal to continue additional studies on endangered species and biological diversity (decision 35/COM/8B.14, June 2011).

Management plan 2010-2014 of National Park of Saloum Delta was finalised in January 2010.

ENVIRONMENT

SN4-b

31 -SOUTH FADIOUTH

BASELINE

Diagnostics	Coastal area physiographically diversified (narrow, discontinuous sandy rims, mudflats, tannes, etc.). Sector hemmed in (track along the edge and then crossing the area in a difficult situation, wetland and flood-prone areas) and practically uninhabited. Limited tourist developments not excluded in the future.		
Dynamics	Very unstable sector.		
Stakes	Conservation of an unconstructible wetland area of biological interest.		
Actions	Maintain the break in urbanisation		
Priority level	Medium	Monitoring-observation	Intense and regular

DEVELOPMENTS SINCE 2010

Evolution of stakes	Not reported		
Priority level	Medium	Monitoring-Observation	Intense and regular
Protected area	YES	Hazards	Not reported

ENVIRONMENT

SN4-c

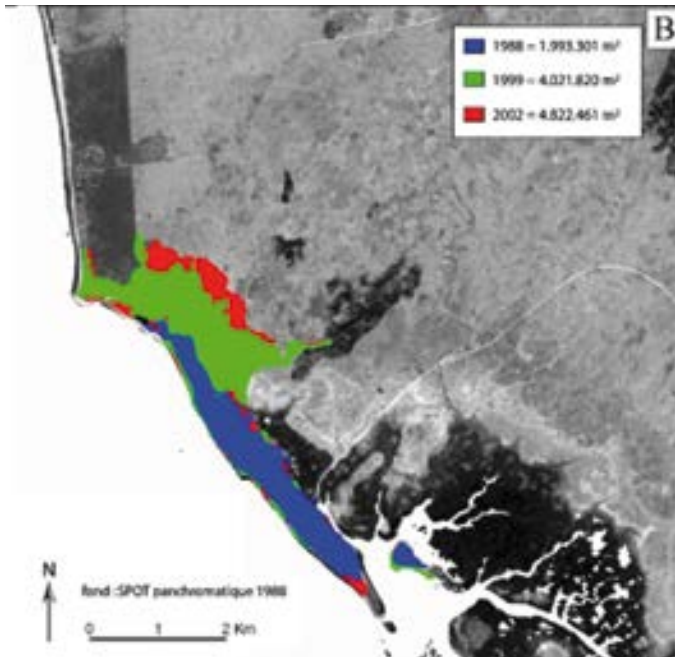
32 - PALMARIN-FACAO-NGALOU PENINSULA

BASELINE

Diagnostics	Linkage with the continent by track, very fragile in sections crossing saltwater marshes. Important salt extraction activity (sites sensitive to rise in sea level but locally more easily relocated).		
	Despite a very exposed situation, presence of beach edge settlements, tourist facilities being developed and residential cabins (Palmarin – Ngalou), located in the places where the terrace is slightly higher and of even topography.		
Dynamics	Terrace very low, littoral rim interrupted in places, very complex, changing coastal area. Unstable sector.		
Stakes	Human settlements at risk (erosion and especially storm surges).		

Actions	Encourage plant coverage of the coastal area (defensive measures, etc.). Relocation of certain settlements should be considered in the long term. Moderate the development of building, in particular for tourism, on the whole of the sector.		
Priority level	Medium	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring-Observation	Intense and regular
Protected area	YES	Hazards	Not reported

Local Natural Reserve of Palmarin facao	SN4-c
LNR Palmarin: WDPA ID: non-existent	SN4-d
<p>The Palmarin Facao Rural Council deliberation n°20/AF/CRPF of 14 May 2008 on the adoption of compounds exploitation and Local Natural Reserve management and economic interest group (GIE) of ecoguide and the game guard.</p> <p>An assessment of development and management plan of Palmarin local natural reserve was conducted and a review of this plan for the period 2014-2018 was delivered.</p> <p>The LNR of Palmarin Facao is not listed in WDPA.</p>	

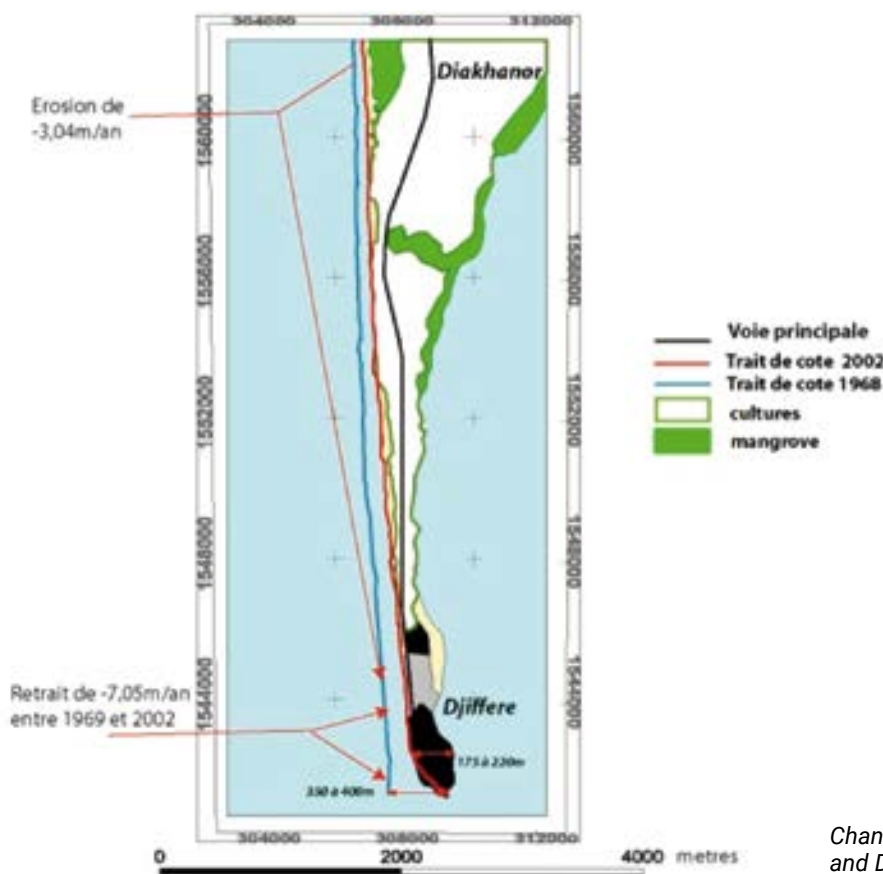


Evolution of developed areas in Fadiouth between 1988 and 2002
(According to Ackermann, G. & al. 2006.- *Dynamics of sustainable development landscape and prospective on the Petite Côte in the delta of Sine-Saloum. VertigO. 7(2) : 9p*)



Palmarin, the consequences of exceptional marine weather episode
From 20 August 2013 (Source: MOLOA Senegal country branch)

		RURAL	
SN4-d	33 - DJIFFER PENINSULA – PALMARIN		
BASELINE			
Diagnostics	Extremely unstable area in particular for Djiffer, fishing center in the estuary. Particularly exposed and risk of being cut off from road network by the disappearance of part of the track linking Djiffer and Joal Fadiouth. The breach of the Sangomar spit (Lagoba breach) in 1987 corresponds to an episode of recession with a rate of 137m per year recorded. This beach led to the displacement of the village of Palmarin and of Djiffer camp.		
Dynamics	Extremely unstable sector.		
Stakes	Withdrawal of population outside the critical area of Djifer.		
Actions	Protective stabilising plants to slow down for a time the uncontrollable dynamics. Relocation of populations and permanent installations.		
Priority level	Very high	Monitoring-observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Discovery of an oil deposit; Establishment of oil extraction infrastructure ; Project to build a protection structure for Sangomar spit		
Priority level	Very high	Monitoring – Observation	Intensive and regular
Protected area	YES	Hazards	Not reported



Changes in the sector between Diakhanor and Djiffere (source: case study).

ENVIRONMENT AND RURAL

SN4-e

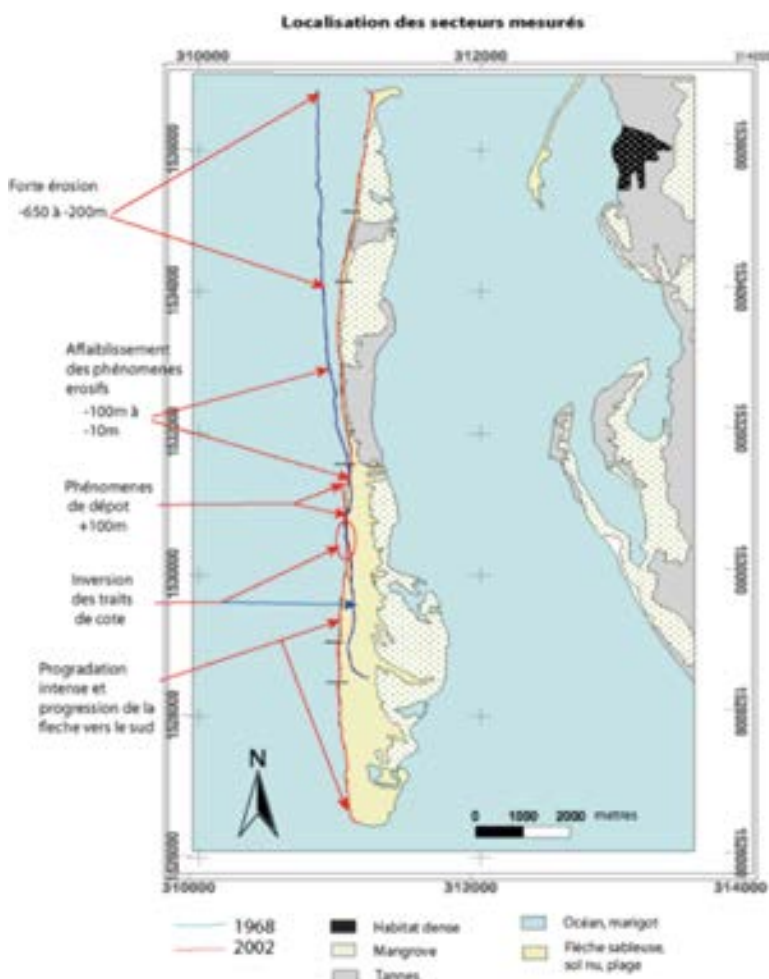
34 - SINE – SALOUM SOUTH

BASELINE

Diagnostics	Coastline of predominantly sandy spits adjacent to mangroves actively and continuously changing (Sangomar point). Small insular terraces, sheltering small fishing villages as in all the islands inside the Saloum delta, with the usual constraints in this type of situation: isolation, drinking water, precarious settlements in the event of storms. Niodon, the largest village, with a small fishing point and a few (eco) tourism facilities.		
Dynamics	Continuously changing, extremely unstable sector. Rapid siltation observed on the occupied sites.		
Stakes	Littoral portion of the Saloum delta marine national park with another, mangrove zone nearby (community marine protected area of Bamboung). Settlements at Niodor and Dionewar in at-risk sites.		
Actions	Comply with the National Park management provisions. Limit the development of agglomerations in at-risk situations. Stabilising plants to slow down the rate of siltation.		
Priority level	High	Monitoring-observation	Regular
Case study	Changes in the shoreline of the coastline of Palmarin.		

DEVELOPMENTS SINCE 2010

Evolution of stakes	Construction of a quay-equipped port in Foundiougne; Project for the construction of a 700 m bridge connecting Ndangane and Mar Lodge; SAPCO Tourism Facilities		
Priority level	Very high	Monitoring – Observation	Intensive and regular
Protected area	YES	Hazards	Not reported



Sector changes in the coastline of Sangomar island (source: case study)

The Marine Protected Area of Sangomar	SN4-e
The MPA of Sangomar : WDPa ID : inexistent	
The Marine Protected Area of Sangomar was designated by Decree n°. 2014-338 of March 25, 2014 establishing the Marine Protected Area of Sangomar.	
The MPA of Sangomar has a development and management plan covering the period 2014 to 2017.	
The MPA of Sangomar is not listed in the WDPa.	

The Marine Protected Area of Gandoul	SN4-e
The MPA of Gandoul: WDPa ID : inexistent	
The Marine Protected Area of Gandoul was designated by Decree n° 2014-416 of March 31, 2014 establishing the Marine Protected Area of Gandoul.	
The MPA of Gandoul has a development and management plan covering the period 2014 to 2017.	

The Marine Protected Area of Bamboung	SN4-e
The MPA of Bamboung WDPa ID : inexistent	
The Protected Marine Area of Bamboung was created on October 10, 2002 by deliberation n° 06/CR of the Rural Council of Toubacouta and designated by Decree n° 2004-1408 of November 4, 2004 creating Marine Protected Areas.	
A Management Committee was established on March 28, 2003. Bamboung MPA entities were created on May 28, 2013 by Prefectoral Order n° 014/AT/SP.	
A Steering Committee of Bamboung MPA was established on December 10, 2013 by Prefectoral Order n° 118/AT/SP	
The MPA of Bamboung has a development and management plan covering the period 2014 to 2017.	
The MPA of Bamboung is not listed in the WDPa.	



The Gambia

For more than 50 years The Gambia has experienced considerable problems related to coastal erosion. These are a result of its situation, the lithology of the shoreline, and the installation of tourism infrastructure and other sources of anthropic pressure, such as the extraction of beach sand, today banned. The tourism development plan for the 1970s and 1980s instigated ostensibly quite vigorous control of the distribution of hotel facilities, for which almost the entire area close to the coast was reserved. Holiday homes are still very rare today on the whole coastline, even in situations highly suitable for building. This textbook case of planning is not to be found in any other country in the sub-region. On the other hand, the issues

related to the risks associated with coastal erosion, to the risks of storms, have been underestimated and approached on a case-by-case basis. The tourism development plan for the Gambia was updated in 2007.

The coastline of Banjul has been subject to important improvements since 2000, including the refilling of certain beaches (2,400,000 m³). The results seem to be encouraging, but should be confirmed over the next decade.

GM1 THE GAMBIA



Zoning of tourism development in the Gambia (source: national diagnostic study)

		ANTICIPATION	
GM1-a	ESSAU - BARRA AND RIGHT BANK OF THE GAMBIA ESTUARY		
BASELINE			
Diagnostics	<p>Small historical town with a fort dominating the entrance to the sheltered estuary. Small of port infrastructure for the ferry and fish landing point. Urban growth inland along the road in particular towards Senegal and at a distance from the coastline.</p> <p>Barra point extends north in a sandy terrace in a peninsular situation, bordered on the inside by channels and mangrove lagoons as far as the border with Senegal. Fragile coastline, crescent-shaped beaches. There is little human land use in the area close to the shore, on the first terrace rim. Further in, vegetable growing ("niaye type") using the freshwater lens exploited by individual wells.</p>		
Dynamics	Unstable coastline.		
Stakes	<p>Relatively isolated (in spite of the ferry) by the estuary, with a much less attractive coastline, this sector has been totally excluded from the tourism development plan for the Gambia. On condition that there are facilities inland of the coastline, it represents a possible long-term potential, if the coastline becomes saturated one day like nearby Senegal.</p> <p>Conservation of the trees growing on the uncultivated terrace, current extraction of wood for fuel. Protected forestry area?</p>		
Actions	Vigilance regarding the dynamics of land use and the extension of built-up areas.		
Priority level	Low	Monitoring-observation	Watch-keeping for purposes of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	<p>National Park rehabilitation Project</p> <p>Construction of stormwater management facilities in progress.</p>		
Priority level	Medium	Monitoring – Observation	Regular
Protected area	YES	Hazards	Erosion

<p>Niumi National Park (IUCN Category IV) National Park : WDPA ID : 2290</p> <p>Niumi Ramsar Site WII / Ramsar : WII ID : 1GM003 - 1840 / WDPA ID : 109037</p>	GM1-a
<p>The National Park of Niumi was designated in 1986 according to section 5.2 of the <i>Wildlife Act</i> (1977). The area was included in the list of Wetlands of International Importance/Ramsar Site on October 13, 2008. The national park management plan was finalized in May 2011.</p>	

		URBAN	
GM1-b	36 - BANJUL CENTRE		
BASELINE			
Diagnostics	In a practically insular situation, served by a road network on unstable terrain and surrounded in the South by a dyke road that acts as a dyke for the low-lying urban extension built on the mangrove embankment, lagoons and wetlands that are not yet urbanized. The urban beach is bordered by large hotels. Beaches of very fine sand or more or less silt estuary sand but relatively sheltered from ocean swell. The cemetery has been under threat for a long time and has been affected on several occasions by surges.		
Dynamics	The coastline of sandy banks of estuary deposits is very fragile and changing, with sections undergoing erosion and accretion, momentarily balanced. The risks of submersion concerning the low-lying part of the town that is protected by a dyke have been on the agenda for a long time ⁴ .		
Stakes	Dense urban site with highly unstable surroundings and coastlines, and a significant part of the town in a dyke situation and built on terrain that is not consolidated in depth. A part of the current urban extension is not protected by the dyke with small platforms scattered along the edge of the main roads.		
Actions	Continuation and completion of developments/improvements undertaken. Study of flood-submersion contingency at the level of the town of Banjul, risk prevention plan. Close monitoring of the developments carried out. The National Park Management Plan was finalized in May 2011.		
Priority level	Very high	Monitoring-observation	Intensive and regular
Remarks	The monitoring system implemented within the framework of recent developments on the Banjul Coast can make a useful contribution to the monitoring-observation of the sector.		
DEVELOPMENTS SINCE 2010			
Evolution of stakes	<p>Extension of the port of Banjul.</p> <p>Rehabilitation of the <i>Bun Road</i> pumping station.</p> <p>Construction of new buildings including the National Assembly and the Ministry of Foreign Affairs.</p> <p>New road to Gondour. Residential development projects.</p>		
Characterization of port installations	The Port of Banjul, built in 1972, is located south of the city of Banjul in the Gambia River and is managed by the Gambia Port Authority. The fishing pier located west of the Port of Banjul was enlarged between 2010 and 2012 and embankments have been carried out at the base of this jetty. (http://www.gamports.com/)		
Priority level	Very high	Monitoring – Observation	Intensive and regular
Protected area	YES	Hazards	Not reported

<p>Tanbi Wetland National Park (IUCN Category VI)</p> <p>National Park : WDPA ID : 555547524</p> <p>Tanbi Wetland complex Ramsar Site</p> <p>WII / Ramsar : WII ID : 1GM002 - 1657 / WDPA ID : 903024</p> <p>The Tanbi Wetland National Park was designated in 2003.</p> <p>The area was included on the list of Wetlands of International Importance/Ramsar Site on Monday, April 2, 2007.</p>	GM1-b
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⁴ Jallow. B. P. 1996.- *Vulnerability of the coastal zone of The Gambia to sea level rise and development of response strategies and adaptation options. Climate Research. 6:165-177p.*



2009



2015

*Change in the port of Banjul and related infrastructure between 2009 (top) and 2015 (bottom)
(Source: Google earth)*

The main changes are the development of the quay at the west of the port.



The maintenance of mangrove systems in the immediate vicinity of a capital-city is hampered by the multiple uses of mangrove trees, including firewood for domestic use and fish smoking. (Source MOLOA Country branch in the Gambia).

URBAN			
GM1-c	37 - BANJUL – KOLOLI POINT		
BASELINE			
Diagnostics	The coast facing the sea is predominantly rocky, especially in the North part. A few beaches in creeks where erosion is in progress (crescent-shapes facies), but most often a thin layer of sand on rock. The hotel area with a few homes and a fishing point at Bakau, with quay-pontoon jutting out well into the sea. For more than half of the hotels, there are limited or no beach resources. Several hotels advance towards the sea protected by walls-armouring. However, of note are wide areas with no buildings immediately bordering the coastal escarpments. In addition to the rock belt of the cape, there are several protective developments on the North-East part.		
Dynamics	Active erosion on a mainly rocky coastline with headlands and creeks with low sediment reserves.		
Stakes	Active erosion also related to the reflection on the rocky micro-cliffs and protective walls, leading to the deterioration of the potential for beach resort and tourism. Impacts of the development of the beach at Cape Point.		
Actions	Preserve unbuilt areas with location of future development of built-up area back from the shore.		
Priority level	High	Monitoring-observation	Regular
Remarks	The monitoring system implemented within the framework of recent developments on the Banjul Coast can make a useful contribution to the monitoring-observation of the sector.		
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Individual protection operations currently supported by the construction of structures reflect the threat to hotels' seaside properties.		
Coastal protection	Construction of protection structures		
Priority level	Very high	Monitoring – Observation	Intensive and regular
Protected area	NO	Hazards	Important erosion directly threatening the seaside properties of most major hotels concentrated in this sector.



Armouring at Cape Point (source: SDLAO case study)



*Developments at Cape point (armoring at the west of the Point, curved groynes filled in the East)
(Source : Google Earth 2015).*



Despite major beach re-sanding operations a few years ago, erosion is apparent and significant in front of the big hotels of Serrekunda. The Gambian authorities are closely monitoring the situation.

			TOURISM
GM1-d	38 - KOLOLI POINT – BALD CAPE		
BASELINE			
Diagnostics	A discontinuous strip of large capacity hotels saturates the coastline with golf course. The whole is clearly delimited by the coastal road, which separates this strip from the urban habitat. Certain establishments are visibly very deteriorated. Globally, the buildings are as close as possible to the foreshore, but certain hotels have their buildings and swimming pool someway back. In other cases, these leisure facilities are directly on the sea front. Overall, there is a certain amount of diversity and the zone would have deserved a case study, as its development probably dates (70s-80s). Protected forest area (Bilijo forest) constituting a first break in urbanization, followed by area still with little building in the South. Materials extraction site.		
Dynamics	Sector globally undergoing active erosion, improvements, in particular at the level of the Hotel Senegambia.		
Stakes	Viability of developments. Planning of new installations that will not fail to appear in the residual space South of the sector. Maintaining and protection of breaks in urbanization.		
Actions	Protect natural vegetation in breaks in urbanization that are still to be secured. Plan the implementation of any new hotel complexes with impact study. Closely monitor the developments carried out by Haskoning.		
Priority level	High	Monitoring-observation	Intensive and regular
Remarks	The monitoring system implemented within the framework of recent developments on the Banjul Coast can make a useful contribution to the monitoring-observation of the sector.		
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Individual protection operations currently supported by the construction of structures reflect the threat to hotels' seaside properties.		
Coastal protection	Construction of protection structures		
Priority level	High	Monitoring – Observation	Intensive and regular
Protected area	NO	Hazards	Important erosion directly threatening the seaside properties of most major hotels concentrated in this sector.

			ANTICIPATION
GM1-e	39 - BALD CAPE - SANYANG		
BASELINE			
Diagnostics	Nearshore littoral with very little human land use (two tourist establishments in Sanjang bay). Beach serves as a road at low tide. The existing hard-surfaced road constitutes a barrier to urbanization as far as the cape (Baldcap), leaving a strip devoid for human use. A small protected forest surrounds the cape. Large protected wetland and Tanji fishing port.		
Dynamics	No remarks.		
Stakes	Maintain the current situation, trend towards residential appropriation in the future to be anticipated.		
Actions	Anticipation of tourist and residential facilities and development. Protection and preservation of the vegetation on the dune rim required, in particular by maintaining the natural vegetation and possible replanting. Preservation of the urban sprawl and urbanization of all surroundings of the complex of wetlands at Tanji.		
Priority level	Low	Monitoring-observation	Watch-keeping for purposes of anticipation

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Wind farm project. Development of tourist developments and facilities		
	Establishment of temporary anti-erosion structure around the bridge of Tanji and project being identified for the construction of permanent protection structures.		
Priority level	Medium	Monitoring – Observation	Regular
Protected area	YES	Hazards	Intense erosion

Tanji Bird Reserve (IUCN Category II) Tanji Bird Reserve : WDPA ID : 62085	GM1-e
Tanji Bird Reserve was designated in 1993.	

			ANTICIPATION
GM1-f	40 - GUNJUR		
BASELINE			
Diagnostics	Coastline with a generally longitudinal profile, undulating from headlands – shallows. Beach-top rim subject to wind erosion in places. Important fishing port at Gunjur to the South of the town. Access to the coastline by branches of the hard-surfaced road which approaches the coast, a few dwellings. Globally, little human land use on the sandy terraces close to the coastline, locally in ridges and channels. Average density tourist zone in the northern part of the sector.		
Dynamics	Berms and beach top cliffs observed in places. Wind erosion of the rim sands.		
Stakes	The southern part of the Gunjur sector has potential for tourism and dwellings and will probably eventually be used in the same way as in Casamance.		
Actions	Anticipation of tourist facilities and development. Protection and preservation required for the dune rim vegetation.		
Priority level	Low	Monitoring-observation	Watch-keeping for purposes of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Limited but gradual densification of developments and construction on the seashore.		
Priority level	Medium	Monitoring – Observation	Regular
Protected area	YES	Hazards	Not reported

Gunjur Community Wildlife Reserve WDPA ID :555547522	GM1-f
Gunjur Community Wildlife Reserve was designated in 2007.	



The protected area of Gunjur Lagoon is located near the small town of Gunjur which includes a major fishing port. The western coastal zone is experiencing a growing occupancy that need to be optimized through a sector scheme to preserve planned investments.



Sénégal (South)

SN5 CASAMANCE MARITIME

		ENVIRONMENT	
SN5-a	41 - NIAFARANG		
BASELINE			
Diagnostics	<p>Coastline changing greatly, under the influence of a headland probably reinforced at the level of the sea by a layer of sandstone – hard pan with shallows. Immediate hinterland very complex: terraces in ridges and channels forming, long narrow estuary bordered by unstable sand rims, with partial vegetation cover, traces of crescent-shaped deposits from storms and/or swells, mangroves.</p> <p>Conservation of the whole probably interesting in terms of biodiversity, given the wide diversity of a mosaic of evolving natural environments. Different communities and ecosystems are effectively represented on a small surface area.</p>		
Dynamics	Dynamic coastline including highly unstable sand spit formations, southern part of the sector undergoing erosion.		
Stakes	As a prolongation of a future residential development starting at Kafountine, but no-build zone covering a wide coastal fringe. Further inland, small sites to be examined with a view to possibly installing light infrastructure for ecotourism.		
Actions	<p>Restrict installations other than light and temporary ones on the shore.</p> <p>Preserve the natural vegetation of the rim, maintain seafront vegetation on beach edge and lack of hard structures in this green strip</p> <p>Densification of residential and tourist facilities to be restricted and reserved where necessary to the zones landward of the shore in the extreme south of the sector, with an overall logic (sector scheme) to be connected to the sector of Kafountine.</p>		
Priority level	Medium	Monitoring-observation	Watch-keeping for purposes of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Construction of a hotel near Abene. Rehabilitation of the port of Diouloulou		
Priority level	Medium	Monitoring – Observation	Watch-keeping for purposes of anticipation
Protected area	YES	Hazards	Erosion-accretion cycles

The Marine Protected Area of Abene	SN5-a
MPA of Abéné : WDPA ID : 352707	SN5-b
The Marine Protected Area of Abéné was designated by Decree n° 2014-416 of November 4, 2004 establishing the Marine Protected Areas.	
The MPA of Abéné has a development and management plan covering the period 2014 to 2018.	

		TOURISM & ANTICIPATION	
SN5-b	42 - KAFOUNTINE		
BASELINE			
Diagnostics	<p>30 years ago, small village of farmers/fishermen with a tourist camp. Kafountine has expanded considerably, in particular with an important, equipped fishing center, in a very exposed situation. A basic track serves several small tourist establishments, with traces of concessions further south. The southern extension zone is a rim adjacent to a wetland/lagoon area that becomes lagoon channel and mangrove towards the south. Wide, unstable beach subject to wind, light wind erosion, accelerating towards the south of the bird peninsula (presqu'île aux oiseaux).</p> <p>The northern part is undergoing residential tourist development and land appropriation. Rims separated by a narrow lagoon channel, the concessions and traces of plots are situated on both sides of the channel.</p>		
Dynamics	Coastline by nature very unstable, numerous segments of beach undergoing erosion, in particular where buildings have been developed in proximity to the beach.		
Stakes	The south extension is typically a very fragile and exposed zone with a shoreline sensitive to storm surges. In this context, urbanization is not desirable. Nonetheless, the pictures show marks of division into plots. The central zone is a high terrace approaching the beach, with large concessions of residential cabins in palm groves, up to the edge of the beach. Precious land visibly appropriated. In the north part, the stakes are the same as for the central part, a scheme is indispensable to anticipate future building in this zone.		
Actions	<p>Restrict installations other than light and temporary ones on the shore.</p> <p>Preserve the natural vegetation of the rim, maintain seafront vegetation on beach edge and lack of hard structures in this green strip</p> <p>Densification of residential and tourist facilities to be restricted and reserved where necessary to the zones landward of the shore in the centre and north of the sector, with an overall logic (sector scheme) to prevent urban sprawl behind the coastal zone.</p>		
Priority level	Medium	Monitoring-observation	Watch-keeping for purposes of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Significant growth in the town of Kafountine. Rehabilitation of the port of Diouloulou ; Construction of houses on the sea front. Strong occupation of the coastal area. Landing spaces, fish drying and processing areas. Significant clearing activities ;		
Priority level	Medium	Monitoring – Observation	Regular
Protected area	YES	Hazards	Erosion-accretion cycles

		ENVIRONMENT & ANTICIPATION	
SN5-c	INSULAR OR PENINSULAR COASTLINES ON THE RIGHT BANK OF THE CASAMANCE		
BASELINE			
Diagnostics	Facing the sea and the banks of the Casamance, narrow sandy rims and low, narrow terraces constitute very unstable sandy coastlines. These small, insular, emerged areas are occupied in places by small fishing villages on the larger islands: Diogo, Karabane (small tourist site with wharf for cruise ships).		
Dynamics	Coastline by nature very unstable, whether banks of mangroves or partially planted sand rims that are subject to wind erosion in places (bird peninsula south of Kafountine). This bird peninsula seems to be threatened with breaching (approximately 200 m at the narrowest point), with insularisation of the southern point, as in the south of Djiffer in the Saloum.		

Stakes	Particularly fragile sector. Coastline with a vocation for ecotourism, light facilities inland of the coast. The stabilizing of the sand by the planting of trees on the areas of sharp sand could be envisaged (as on the Grande Côte) in more favorable soil and rain conditions.		
Actions	Limit installations other than light and temporary ones. The whole of the natural milieu should be preserved under a conservation unit like the neighbouring Saloum delta.		
Priority level	High	Monitoring-observation	Watch-keeping for purposes of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Construction of the Karabane quay. Development of the first port of Ziguinchor; Construction of the second port of Ziguinchor; Frequent dredging of the fluvial channel. Strong pressure due to shark fishing. Reforestation of filao on Diogue. Island Networking Project (ICZM)		
Priority level	High	Monitoring – Observation	Regular
Protected area	YES	Hazards	Strong erosion in Diogue.

Kalissaye Bird Reserve Kalissaye BR WDPA ID : 3217	SN5-c
<p>The Kalissaye bird reserve was designated by decree n° 78/809 of July 28, 1978 establishing the special bird reserve of Kalissaye and classifying it in the forest domain.</p> <p>The rules of procedure of the Kalissaye special bird reserve were determined by Order n°13.327/PM/SGG/DPN of September 26, 1978.</p> <p>The delineations of the Kalissaye bird reserve are not provided in the WDPA.</p>	

Kalissay Community Conserved Area of Mangagoulack Rural Community (Kawawana) Kawawana CCA : WDPA ID : inexistent	SN5-c
<p>The decision of the Regional Council of Ziguinchor n° 003 / CRZ of 20 March 2010 authorizing the creation of a Community Conserved Area in the public domain of Mangagoulack rural community was approved by the prefectural decree n°106/GRZ/AD of June 01, 2010.</p> <p>Order n°0098/GRZ/AD of April 17, 2012 validates the deliberation n005 / CRZ of December 13, 2011 adopting the rules of procedure for Mangagoulack CCA.</p> <p>Mangagoulack CCA is not listed in the WDPA.</p>	

Marine protected area of Niamone – Kalounayes MPA of Niamone - Kalounayes : WDPA ID : inexistent	SN5-c
<p>The Marine Protected Area of Niamone - Kalounayes was created on November 4, 2015 by decree n° 2015-1724 creating the MPA of Niamone-kalounayes.</p> <p>A development and management plan was developed in February 2015.</p> <p>The MPA of Niamone-kalounayes is not listed in the WDPA.</p>	



Erosion on Casamance islands (Diogue, March 2013)
 (Source: MOLOA country branch in Senegal)



Erosion on Casamance islands (Karabane, March 2013)
 source MOLOA country branch in Senegal.

ENVIRONMENT & ANTICIPATION			
SN5-d	44 - DJEMBERING – POINTE NIKINE		
BASELINE			
Diagnostics	A sandy terrace with ridges and channels relays the formation of the continental terminal with rice-growing in the channels. Sandy coastline with undulating longitudinal profile, a thin rocky headland jutting out into the sea. The scarcity and precariousness of drinking water resources have limited the possibility of the extension of tourist zone from Cap Skiring towards the north. In addition, the sandy rim on the edge of the beach is unstable, a complex topography of channels. To the north of Djembering, with a North West orientation, a wide strip of unconsolidated sand is subject to generalised south - south easterly wind transport. Sites that are buildable, even for ecotourism with light infrastructure, are rare in proximity to a coastline and immediate hinterland of isolated terrace (only one track inside the area).		
Dynamics	Coastline very unstable with alternate levels undergoing accretion and erosion from the sea. To this instability is added the landward loss of sand due to wind-blown erosion.		
Stakes	Particularly fragile sector. Coastline with a vocation for ecotourism, light facilities inland of the coast. The stabilizing of the sand by the planting of trees on the areas of sharp sand could be envisaged (as on the Grande Côte) in more favorable soil and rain conditions.		
Actions	Preserve vegetation coverage at the top of the beach and rim. Restrict new infrastructure on the beach. Vigilance and possible monitoring of individual protective initiatives to be placed, where necessary, in an overall improvement scheme.		
Priority level	Medium	Monitoring-observation	Watch-keeping for purposes of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Development projects for the landing of fishery products		
Priority level	Medium	Monitoring – Observation	Regular
Protected area	YES	Hazards	Strong erosion in Diembering.

National Park of Basse Casamance National Park : WDPA ID : 868	SN5-d SN5-e
<p>The National Park of Basse Casamance was designated by decree n° 70-399 of April 10, 1970 establishing the national park of Basse Casamance and classifying it in the forest domain.</p> <p>Rules of procedure were adopted by ministerial decree n° 5170 P.M of May 12, 1970 on the internal regulations of the national park of Basse Casamance.</p>	

Marine Protected Area of Kassa-Balantacounda Kassa-Balantacounda MPA : WDPA ID : inexistent	SN5-d
<p>The Community Marine Protected Area of Kassa-Balantacounda was created by Decree No. 2016-415 of 11 April 2016 following the prefectural order n°002/CMA/AN of April 30, 2015 which validated the land-use as MPA.</p> <p>The MPA of Kassa-Balantacounda is not listed in the WDPA.</p>	

		TOURISM	
SN5-e	45 - CAP SKIRRING		
BASELINE			
Diagnostics	Peninsula stretching from Cap Roxo on the border with Bissau to Nikine point, the sea outlet of the Casamance estuary. Landform of flattened hills of continental terminal formation with sandstone base and inclusions of hardpan appearing at the level of small headlands separating beautiful beaches into sandy coves (segments of type 4b then 4a). For approximately twelve kilometers, the area close to the littoral zone is practically saturated with hotels and residences, and a golf course. With an airport nearby, this tourist zone hosts an international clientele, linked to Ziguinchor then Dakar by a hard-surfaced road, and business got off to a good start, and was then hampered by social unrest in Casamance.		
Dynamics	The small scarcely consolidated headlands are very fragile and sensitive to erosion. The slightest modification could disrupt the precarious balance of the beaches, which are highly exposed to storm surges in the rainy season. The southern extremity is sandy terrace, discontinuous vegetation and is sensitive to active wind erosion. This sector also probably suffered the impacts of the reduction of sediment flows from Casamance (generalised improvements of low-lying ground and period of drought in the 1970s-1980s).		
Stakes	Maintain the headlands and the balance of the beaches, knowing that reinforcing structures may be dangerous. The necessity of maintaining plant coverage in strips along the headlands and beaches, playing an attenuating role during storm episodes. There should be no permanent developments on the edge of the beach. There are limited drinking water resources, with a high risk of the salt water wedge rising in the event of more intense exploitation of the water tables.		
Actions	Preserve vegetation coverage at the top of the beach and rim. Restrict new infrastructure on the beach. Vigilance and monitoring of individual protective initiatives to be placed, where necessary, in an overall improvement scheme. Review and update of existing master plans		
Priority level	Medium	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Offshore oil exploration		
Priority level	Medium	Monitoring – Observation	Regular
Protected area	YES	Hazards	Not reported



Guinea Bissau

GW1 GUINEA BISSAU

The physical geography of the country is typified by the following elements:

- Homogeneous of the living systems of the “Balante” population facing the sea (fishing and rice-growing in land under sea influence).
- Location of habitat on high terraces and hills out of reach of storm surges, even in the event of a rise in sea level (except very locally as in the urban zone of Bissau). Large huts surrounded by orchards and staple crops.
- Fishing and picking practiced in the mangroves (except in the Bijagos, in Bijagós the main source of animal protein is shellfish) generalized? But as a complementary activity. Few populations live on the beach.
- Importance of rice growing on dyked mangrove areas, low-lying ground with brackish waters and fresh water. This rice-growing is demanding in terms of rainfall and Guinea Bissau has seen large areas in the north abandoned during episodes of drought. Ancient rice civilisation witnessed by the Portuguese as early as the 16th century. The lowest-lying, most threatened land areas are often also the most fertile. The lowest-lying, most threatened land areas are often also the most fertile. In terms of dyking work, 20 centimetres is already a significant height...²

Tourist potential: apart from the small site of Varela, all the potential is mainly located in the Bijagos, a part of which is listed as a National Park.

The improvement of the road network replaced a situation of land isolation of a large part of Maritime Guinea when the country attained independence, communications in colonial times were by coastal shipping linking the principal small coastal agglomerations and Bissau.

Due to the difficulties related to the poor quality of the high-resolution pictures, only one zone has been considered for Guinea Bissau with a breakdown into 6 sectors.

² Given the scale, not all the concerned rice-growing area has been mapped.

		TOURISM	
GW1-a	46 - SECTOR MARITIME NORTH - CAP VARELA		
BASELINE			
Diagnostics	<p>Important rice-growing area, but which seems to have greatly decreased after 1980, the date of the initial maps. All the mobilisation systems of the milieu, land and water are represented: mangroves, hydromorphic sand, channels of terraces, wetlands, low-lying ground with fresh and/or brackish waters. The whole enjoys less favourable rainfall conditions compared to the rest of Guinea (volume and predictability).</p> <p>A seaside tourism site still relatively unexploited but which, except for Bijagos, remains the only site with potential for international tourism in Guinea Bissau. Extension, albeit restricted to around 3 km of beach adjacent to buildable land quite close to the coastline.</p> <p>Whether in terms of physical and economic geography or the coastal current system, this sector presents itself as a continuity of Maritime Casamance in Senegal.</p>		
Dynamics	<p>Shoreline changing greatly subject to both the influence of the coastal current system of the headlands (Varela and Roxo) and coastal drift currents and sediment transport in opposite directions depending on the season, and highly exposed to storm surges during the rainy season. Cap Varela, relatively unconsolidated geologically, is very sensitive to erosion. This sector also probably suffered the impacts of the reduction of sediment flows from Casamance (generalised improvements of low-lying ground and period of drought in the 1970s-1980s).</p>		
Stakes	<p>The coastline south of Cap Varela has 15 kilometres of attractive sandy beaches but adjacent to a very narrow sandy rim unsuitable for tourist facilities. In addition to the stakes relative to the different rice-growing areas, we mention the great fragility with respect to marine erosion with, facing the swell, discontinuous rock outcrops of hardpan at Cap Verga.</p>		
Actions	<p>The answers concern the precaution to be taken with the future implementation of hotel infrastructure to optimally preserve the function of the headland (imperative enforcement of ban on extraction of the rare blocks of rock in the region).</p> <p>Maintain coastal vegetation. Coastal defence structures justified within the framework of an overall sector scheme organising a global tourist facility effort.</p>		
Priority level	High	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	<p>National park currently being designated. The presence of black sands in this sector is conspicuous, which are the subject of a non-regular exploitation by mining companies (information to be checked). Zone highly affected by erosion, vulnerability of the dune belt accentuated by a (abandoned) tourist complex project then, more recently by a project for heavy sand extraction</p>		
Priority level	High	Monitoring – Observation	Regular
Protected area	YES	Hazards	Strong erosion leading to the disappearance of coastal buildings

Parque Nacional Varela (proposed) National Park : WDPA ID : 342656	GW1-a
Varela National Park is listed in the WDPA as being designated; other information indicates that no park is being designated in the area.	

Parque Natural dos Tarrafes do Rio de Cacheu Rio Cacheu NP : WDPA ID : 33046 Pelundo Wildlife Reserve Pelundo WR : WDPA ID : 342657	GW1-a
The Rio Cacheu Mangroves Natural Park was created on November 30, 2000 by the decree n°12/2000. The Park was designated as a Ramsar site in 2014.	

		MANGROVE & RICE-GROWING	
GW1-b	47 – CENTRAL MARITIME SECTOR		
BASELINE			
Diagnostics	Same as sector GW1-d, but small surface area for rice-growing under the direct influence of the sea.		
Dynamics	Very dynamic mangrove systems.		
Stakes	Same as sector GW1-d, but small surface area for rice-growing under the direct influence of the sea.		
Actions	Global reflection to be undertaken on the sustainability of mangrove rice-growing systems and relevant improvements to address the context of a rise in sea level.		
Priority level	Low	Monitoring-observation	No recommendations
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Extension of the small town of Canchungo. Rapid abandonment of mangrove rice paddies due to rising sea levels and weakening of labor forces due to the exodus of young people. Food security issues		
Priority level	Medium	Monitoring – Observation	Watch-keeping for purposes of anticipation
Protected area	NO	Hazards	Not reported

		ENVIRONMENT & URBAN	
GW1-c	48 - BISSAU – URBAN AREA		
BASELINE			
Diagnostics	<p>The town has expanded considerably since independence.</p> <p>Port problems: the historical town is located on Geba estuary, which, in the rainy season, receives the waters from the vast catchment area of the Corrubal, which seasonally clears silt from the estuary, to which is added the removal effect of the tides. There is nonetheless a tendency to siltation, with an important colonisation of mangroves. The norms for the drafts of ships have led to a readjustment of port infrastructure and the development of quays and wharfs in two principal centres. Despite the impact of the submersed groyne favouring the deepening or simply maintaining of the principal channel of the estuary, questions remain regarding the tendency to siltation between these two principal centres depending on the joint influence of the coastal current system and the fluvial swells.</p> <p>Urban growth: the topography of flattened hills (fan network) separated by shallows and mangroves has guided the growth of the town in all directions, along the axes of the main network and at a distance of 5 to 10 km from the town centre. An area equivalent to the present day urban area remains technically suitable for building. However, the attraction of the saturated centre and its proximity encourage building in former rice-growing wetlands, through the use of rock fill/embankments, block by block, or in small plots. In addition to relatively unfavourable conditions (sanitation, risk of flooding when the intra-urban wetlands for rice-growing or natural vegetation disappear), this situation is prejudicial to the urban environment (ecological services: hydrological role, collection of rainwater runoff, and uncontrolled wastewater, future rising of water table, role of green landscaped gaps, etc.). Near the historical and commercial centre, the majority of wetlands are disappearing rapidly.</p>		
Dynamics	Risks of submersion related to the drying out of low-lying, flood-prone wetlands.		
Stakes	Sustainability of the operation of port installations, dependency on other hub ports such as Dakar, given the dimensions of modern cargo ships. Control of urban growth, and respect of the wetland gaps with a view to preserving the associated ecological services. Risk of contamination of waters and accumulation of urban and domestic effluent.		
Actions	Improve the transport system towards the centre and support access to land ownership of buildable plots on the periphery on suitable soils. Global scheme absolutely essential at this stage.		
Priority level	High	Monitoring-observation	Regular

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Construction of a new fishing port in Bissau inaugurated in 2014. Strong siltation of port infrastructure due to the slowdown of currents.		
Characterization of port installations	The Port of Bissau (also known as Pidjiguiti port) is located on the Geba River, it includes two quays and a jetty.		
Priority level	High	Monitoring – Observation	Regular
Protected area	NO	Hazards	Localized erosion due to coastal infrastructure



Port of Bissau in 2015 (Source: Google earth)
 The port of Bissau has not experienced significant changes since 2010.

		MANGROVE & RICE-GROWING	
GW1-d	49 - GUINEA BISSAU SOUTH - TITE – TOMBALI		
BASELINE			
Diagnostics	Importance of the extension of the rias and few mangrove areas that can be improved with a small extension of low-lying ground that can be planted with rice.		
Dynamics	Very dynamic mangrove systems.		
Stakes	Same as sector GW1-f, but rice-growing areas under threat much more limited.		
Actions	Global reflection to be undertaken on the sustainability of mangrove rice-growing systems and relevant improvements to address the context of a rise in sea level.		
Priority level	Low	Monitoring-observation	No recommendations
DEVELOPMENTS SINCE 2010			
Evolution of stakes	General degradation of agricultural systems in mangrove areas.		
Priority level	Low	Monitoring – Observation	Watch-keeping for purposes of anticipation
Protected area	YES	Hazards	Not reported

Cantanhez National Park. WPA ID : 351088 Cantanhez NP : WDPA ID : 351088 Cantanhez Forest Hunting Reserve Cantanhez HR : WDPA ID : 33049	GW1-d
<p>Cantanhez Hunting Reserve was created in 1980.</p> <p>The Cantanhez Forest National Park was created on February 22, 2011 by Decree n° 14/2011 following the completion of an environmental impact study of the Cantanhez NP creation project.</p>	

Parque Natural das Lagoas de Cufada Cufada NP : WDPA ID : 342673 Lagoa de Cufada Ramsar site ZHII / Ramsar site : ZHII ID : 1GW001 – 469 / WDPA ID : 29806	GW1-d
<p>The Cufada Lagoon was designated as a Wetland of International Importance/Ramsar Site on May 14, 1990 (39,098 ha). The Cufada Natural Park was created on November 30, 2000 by the decree n°13/2000.</p>	

Rio grande de Buba (proposed) WDPA ID : 317051	GW1-d
<p>The designation of Rio Grande de Buba area is under discussion between the Institute of Biodiversity and Protected Areas and the Guinea Bissau Coastal Planning Office.</p>	

		ENVIRONMENT
GW1-e	50 - BIJAGOS ISLANDS	
BASELINE		
Diagnostics	Several islands have been subject to protective measures and particular status justified by the extraordinary diversity of the natural milieus in the sea, on the coast and on the land. These islands remain moderately occupied or artificialised by a population that is quite sparse, isolated and self-sufficient. The paddy fields occupy a limited surface area but are essential for the self-sufficiency of the population.	
Dynamics	Multiple situations to be assessed in each case on a level of detail (kind of shoreline, exposure to swell, tidal currents, etc.). Tidal ranges often high and essential morphogenic role of tidal removal currents.	
Stakes	In the short term, risks of pillaging of fishing resources induced from the exterior, but providing revenue, even modest, for the populations. In the future, ecotourism development of the Park, certain islands (Caravela in particular) which have beaches and particularly attractive landscape environments as a reception point for exploring the natural and cultural diversity of the archipelago. In the current situation, Bubaque island, with its landing strip and a small hotel infrastructure, could act as a platform for possible ecotourism hiking activities.	
Actions	Rigorous and concerted application of the provisions in the management plans of the conservation units. Vigilance regarding possible tourist installations on the other islands. Supervision of access to fishing resources, especially demersal.	
Priority level	High	Monitoring-observation Regular

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	High	Monitoring – Observation	Regular
Protected area	YES	Hazards	Not reported

Community Marine Protected Area des Ilas Formosa, Nago & Tchedia (Ilas Urok) Urok MPA : WDPa ID : 342655	GW1-e
The Community Marine Protected Area des Ilas Formosa, Nago & Tchedia (Urok Islands) was created by decree n°8/2005. A 2004-2008 management plan for Urok MPA was finalized in December 2003 and approved by Decree n° 9/2005.	

Marine National Park of Joeao Vieira and Poilao MNP of João Vieira & Poilão : WDPa ID : 317052	GW1-e
The Marine National Park of João Vieira and Poilão was created on August 23, 2000 by the decree n°6-A/2000.	

Orango Islands National Park Orango NP : WDPa ID : 33047	GW1-e
The Orango National Park was created on November 30, 2000 by the decree n°11/2000.	

Bolama- Bijagos Biosphere Reserve Bilama - Bijagós BR : WDPa ID : 145507 ou RB Bijagos Archipelago Biosphere reserve : WDPa ID : 11611 Bolama – Bijagós Archipelego Ramsar site ZHII / Ramsar : ZHII ID : 1GW002 - 2198 / WDPa ID : 555592547	GW1-e
<p>Bolama - Bijagós biosphere reserve joined the international network of Biosphere reserves in 1996.</p> <p>It includes following protected areas: The MPA of Formosa, Nago and Tchedia Islands, the Marine National Park of Joao Vieira and Poilao and the Orango Islands National Park</p> <p>Two records are present in the WDPa (11611 and 145507).</p> <p>Bolama-Bilajos was designated as a Wetland of International Importance/Ramsar Site on January 14, 2014 (1,046,950 ha).</p> <p>Bijagos Archipelago Biosphere reserve is included in the indicative list of UNESCO World Heritage sites since 2006, which Guinea Bissau intends to propose for registration (ref: 5081)</p>	

MANGROVE & RICE-GROWING			
GW1-f	51 - SOUTH CACINE		
BASELINE			
Diagnostics	Considered a very important rice-growing area due to the pluviometry exceeding 2,000 mm, enabling secure yields in pluvial rice-growing on mangrove land. The continental part has been extensively cleared of trees and the few maritime Guinean forest massifs that were present thirty years ago have almost all disappeared. In the post-forestry system, the very fragile soils are rapidly leached and turned into savannah (sandy soils under a heavy rain regime)		
Dynamics	Very dynamic mangrove system to be assessed in each situation.		
Stakes	Importance of risks related to the rise in sea level on the rice-growing sector (performance of the system and limits of the potential of dry staple crops as an alternative to rice). If the rise in sea level hypothesis is confirmed, it will probably be necessary to reconfigure rice-growing on the lowest-lying ground: reinforcement of dyke system which would be costly in terms of labour, abandoning of certain areas of land too difficult to manage, etc.		
Actions	Global reflection to be undertaken on the sustainability of mangrove rice-growing systems and relevant improvements to address the context of a rise in sea level.		
Priority level	Very high	Monitoring-observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Very high	Monitoring – Observation	Intensive and regular
Protected area	NO	Hazards	Not reported



Note the high sensitivity of rice development to storm surges and sea level rise.



Guinea

Guinea is characterized by its wide areas of mangrove forests, mostly used as paddy fields. They are currently very adversely affected by the sea-level rise and the unique disasters related to weather and marine conditions.

The marine protected area network remains very small and is mainly composed of Ramsar Sites, in which no significant management effort has been noted so far, except for a few of them.

The outskirts of Conakry are stretching quickly, thanks to housing projects which are (for some of them) developed on areas between the mangrove area and dry land.

The tension experienced in the last few years on the commodity market translates into a sharp increase in of port infrastructure and the setting up of many ore port projects.

GN1 NORTHERN AREA OF CAP VERGA - TRISTAO

		ENVIRONMENT	
GN1-a	52 EXTREME NORTH-WEST–MANGROVE ISLANDS AND TRISTAO		
BASELINE			
Diagnostics	System of islands or peninsulas with constantly evolving complex coastal mangrove topography. The sites are not very suitable for rice growing or fish farming. The population is sparse, thinly distributed and composed of fishermen and subsistence rice farmers. Iles Tristao is distinguishable from other areas by its extensive sandy terraces in ridges and channels, and the existence of a few small villages. The coastal hinterland remains poorly served by public transport, as the all-season road stops at Boké. Iles Tristao has a rural road network, several small villages and a relative increase in agricultural activities seems to be under way. Mangrove wood is intensively exploited.		
Dynamics	Very dynamic mangrove ecosystem		
Stakes	The site is part of the protected cross-border area of Guinea-Bissau–Guinea. Iles Tristao supports large colonies of water birds. The future of the island depends on a better road access (roads to Guinea-Bissau, and NEPAD trans-coastal road?). Concerning the tourism potential of the Guinean coastal area, the coastline is sandy over 20 km, but is too far from main roads to be relied upon as an asset in the immediate future.		
Actions	Comply with conservation measures enforced in the site of Ile Tristao and limit the collection of mangrove wood which is used for various purposes (also taking into account the vicinity of Kamsar).		
Priority level	Low	Monitoring–Observation	No recommendation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring–Observation	Watch-keeping for the purpose of anticipation
Protected area	Yes	Risks	Not reported

Strict nature reserve of Ile Alcatraz RNI Alcatraz ID. WDPA: no ID Ramsar Site of Ile Alcatraz ZHII/Ramsar Site ZHII ID: 1GN001–571/WDPA ID: 67983	GN1-a
Ile Alcatraz was designated as a wetland of international importance/Ramsar Site, on November 18, 1992 (surface area: 1 ha). The strict nature reserve of Ile Alcatraz was created by Decree D/2013/038/PRG/SGG of February 20, 2013. The strict nature reserve of Alcatraz is not listed in the WDPA.	

Managed nature reserve of Tristao RF Tristao: WDPA ID: 19980 Ramsar site of Iles Tristao ZHII/Ramsar Site: ZHII ID: 1GN002–572/WDPA ID: 67984	GN1-a
<p>The Ramsar site of Iles Tristao was designated as a wetland of international importance/Ramsar Site, on November 18, 1992 (surface area: 85,000 ha)</p> <p>The managed nature reserve of Tristao was created by Decree D/2013/037/PRG/SGG of February 20, 2013.</p>	



Iles Tristao: Typical section of terraces in ridges and channels

		URBAN
GN1-b	53 - RIO NUNEZ–KAMSAR	
BASELINE		
Diagnostics	<p>As a mere transport terminal for bauxite, with a mineral wharf, Kamsar has experienced high urban growth and has become one of the major towns of the Guinean coastline (probably ahead of Boké which is the central city of South-West Guinea).</p> <p>Apart from the potential of the plain of Kapatchez, the hinterland is dominated by extensive agro-pastoral activities; the area has a low sustainable agricultural potential (soils, reliefs, and other) and a low density of the population (and it will probably remain unchanged in the future).</p> <p>Major fishing port in the north of the mineral terminal. The backfilling of mangrove areas is noted.</p>	
Dynamics	Significant artificialization of the shoreline	
Stakes	<p>To date, despite the fact that the extent of Kamsar development is not predictable, as the upper terrace is saturated at the level of the ore port, a second small growth area, is developing with the backfilling of mangrove areas and paddy fields around the port and its wharf. Similarly, on the finger-like terrace urban site, through lack of space for a dwelling, narrows trips of new huts are being built on the more or less backfilled mangrove areas or paddy fields (these settlements are also related to the attractiveness of the site), following roughly the Guinea Bissau model.</p>	
Actions	Draw up an urban development plan that addresses the preservation of nature sites and pollution issues of any kind, in order to contain Kamsar development.	
Priority level	Medium	Monitoring—Observation Regular

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Projects aiming at extending the ore port of Kamsar are being completed, with two new piers being built for small-scale fishing; in the port of Kamsar, a housing project for Rusal workers is being developed.		
	A river port with a processing capacity of 65 million tons per year is being built upstream from Rio Nunez, by the Chinese company Winning Group to exploit bauxite.		
	An ore port is being built at the mouth of Rio Nunez by the Rusal company for the carriage of bauxite extracted from Djan Djan.		
Characterization of port installations	The port of Kamsar is the industrial hub of Compagnie des Bauxites de Guinée—CBG (51% of the company is owned by Halco and 49% by the Government of Guinea, 45% of Halco being held by Rio Tinto). The port has a terminal for export and is linked to the plateau of Sangaredi (the world's third-largest bauxite mine being currently exploited) by a train. Projects aimed at extending the ore port of Kamsar, with the building of two new piers for small-scale fishing are being completed; a housing project for Rusal workers is being developed.		
Priority level	Medium	Monitoring—Observation	Regular
Protected area	Yes	Risks	Not reported



2011



2014

Development of the ore port of Kamsar and related infrastructure between 2011 and 2014 (source: Google Earth)

The major changes are: (i) the building of a fishing wharf in the north and (ii) the backfilling for the building of a bauxite processing plant and a new ore port in the south.

		MANGROVE AND RICE GROWING	
GN1-c	54 COASTAL PLAIN of KAPATCHEZ		
BASELINE			
Diagnostics	<p>Sandy-silty coastline with discontinuous bright sandy deposits isolating well-wooded mangroves or vast and bare mudflats and tannes. Longitudinal undulating profile tending to be rectilinear.</p> <p>Impact of water engineering works aimed at diverting the course of the Kapatchez river to facilitate the draining of a rice-growing area upstream from the site which caused considerable environment disruptions.</p> <p>Wide rice-growing plains on the back side of the coastline, whose some have been drained.</p> <p>High potential for shrimp farming already identified.</p>		
Dynamics	Unstable coastline lining a vast set of lowlands under the direct or indirect influence of tides. Great evolution noted between 1954 and 1989 (accretion and erosion)		
Stakes	A classic example widely known of the complexity of the designing of water engineering projects, which have overall positive or harmful impacts in terms of economic development and equilibrium of environmental systems, base for sustainability. A considerable potential for Guinea, but hindered by a very complex hydrological, pedological and geological context.		
Actions	The design is to be reconsidered in the light of the outcomes of the projects implemented, taking account of a scenario in which the sea level rises.		
Priority level	Medium	Monitoring—Observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Bauxite processing plant; Port construction project (related to the high industrial activity); housing project (source: Guinea country branch, 2015)		
Priority level	High	Monitoring—Observation	Intensive and regular
Protected area	Yes	Risks	Severe localized erosion threatening land development for rice growing

Ramsar Site of Rio Kapatchez	GN1-b
ZHII/Ramsar Site ZHII ID: 1GN003–573/WDPA ID: 67985	GN1-c
Rio Kapatchez was designated as a wetland of international importance/Ramsar Site on November 18, 1992 (surface area: 20,000 ha)	



Rice growing in mangrove forests in Guinea (source MOLOA, 2015)

				ANTICIPATION
GN1-d	55 - CAP VERGA			
BASELINE				
Diagnostics	A body of hard rocks, approximately over 10 km, jutting out into the sea over about 7 km from the average limit of the shoreline. Complex coastline of 4b type, with creeks and coves, sandy cordons and wetlands (not mapped on a scale of 1/500,000). It is the only site endowed with a seaside tourism potential in the Guinean coastline, apart from Loose Island. Near the hinterland, the relief is composed of hills, diverse sites and sandy beaches. Currently connected to Conakry by a paved road (about 150 km away from the capital). A few infrastructure: small hostels, residential huts, but not many. Many rural roads.			
Dynamics	This site plays a key role in the local coastal currentology.			
Stakes	Thirty or so kilometers of coastline spared by tourism development, with the possibility (theoretically) to draw up a development plan in order to anticipate a possible tourism development, in particular, residential seaside tourism and to organize the rapid increase of infrastructure and equipment. Restoration of the Guinean Forest (degradation caused by burnt felled trees and clearings) around sites with a high potential for tourism.			
Actions	Anticipation of tourism development Protection of attractiveness of the site landscape			
Priority level	Medium	Monitoring—Observation	Watch-keeping for the purpose of anticipation	
DEVELOPMENTS SINCE 2010				
Evolution of stakes	Ore port project (by CPI, a Chinese company and Alufer, a South African company), aluminum refinery project, housing project for Cap Verga miners.			
Priority level	Medium	Monitoring—Observation	Watch-keeping for the purpose of anticipation	
Protected area	No	Risks	Not reported	

GN2 MANGROVE OF THE CENTRAL AREA

				MANGROVE
GN2-a	56 – BOFFA MANGROVE ISLANDS			
BASELINE				
Diagnostics	The island units are distinguishable from other areas by a highly complex mangrove waterway system. Thus, few sites are suitable for rice growing or fish farming. Low site development levels and therefore high density of human occupancy. The coastline is subject to the combination of the push-out effects of large estuaries and coastal sediment drift of redistribution on narrow offshore bars of 2a type (lining the mangrove forests facing the ocean)			
Dynamics	Very unstable			
Stakes	Maintenance of mangrove settlements, with few prospects for rice growing or fish farming development, because of its complex topography.			
Actions	No action recommended			
Priority level	Low	Monitoring—Observation	No recommendation	

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Appearance of a spit at the mouth of the Bogolon River (latitude: 10°11'56.79" North and longitude: 14°18'59.16" West); production of salt		
Coastline Protection	Construction of embankments to protect lands developed for rice growing		
Priority level	Medium	Monitoring—Observation	Regular
Protected area	Yes	Risks	The erosion effect on paddy fields is reported

Ramsar Site of Rio Pongo	GN2-a
ZHII/Ramsar Site ZHII ID: 1GN004–574/WDPA ID: 67986	
Rio Pongo was designated as a wetland of international importance/Ramsar Site, on November 18, 1992 (surface area: 30,000 ha)	

		MANGROVE AND RICE GROWING
GN2-b	57 - THE Koba PENINSULA	
BASELINE		
Diagnostics	<p>Three water engineering operations took place in the Koba Peninsula:</p> <ul style="list-style-type: none"> <input type="checkbox"/> A check dam for complementary irrigation of sugar cane fields developed on terraces. <input type="checkbox"/> Construction of embankment and water engineering in lowland areas for rice growing. <input type="checkbox"/> The embankment protecting the site from high tides is located in a section of the central part of the peninsula, in contact with the waves. It is therefore directly exposed. <p>The rest of the embankment, slightly at the back is protected for now, by a sand bar of variable width.</p> <p>The coastline of rectilinear type, slightly undulating, seems to be affected by erosion at a natural point located in its central part, and rather by accretion at its southern headland, at the end of the Konkouré estuary. This point being affected by erosion corresponds to the outlet of the main channel.</p> <p>A pilot area for fish farming, with prospects of possible expansion over Koba Peninsula was developed in the former paddy fields located in mangrove areas. If the first years of implementation proved to be promising, management issues undermined the project. However, the potential of the site is considered as one of the most attractive, as well in Guinea as in the rest of West Africa.</p>	

Dynamics	<p>Rapid erosion of the sandy bar mainly related to the drainage outlet of the developed plain.</p> <p>“Erosion of the offshore bar of Koba is concentrated in the same areas as the flood gates for the polder drainage”. Its mechanism is structured as follows: as the marsh is emptying, on the beach, sand deposits are pushed out before the flood gate by a coastline drift. This push-out effect digs a channel towards the lower side of the beach, even towards the shoreface, by shaping a delta. These deposits are then dispersed by the current created by the drift. This sand distribution causes the acceleration of the erosion process in areas located directly at the south of water engineering works. During high and low tides, the drift fills the channel with recent deposits, which are once again pushed out towards the deep sea during high and low tides. This phenomenon gets worse during spring tides and its repetition causes gradual narrowing of the beach through “sand drain”, as the sand is directed towards the deep sea.</p> <p>Finally, this sand drain ends in a drop in the topography of the beach at the area of the flood gates. This drop allows the front wave to further progress towards the coast, accelerates the burying of the upper side of the beach and the shrinking of the bar crest.</p> <p>Since 1986, the extent of the downwasting is such that swashes of high water of spring tides have been flooding the Gamblan village (Koba) located at the highest point of the offshore bar.</p> <p>With the closing of the flood gate of Mankoura for many years, a very beautiful convex beach of over 60 meters width and 3 meters depth is naturally recreated on the foreshore, burying a part of the flood gate. However, in 1988, the rainfall was so abundant in the raining season that the flood gate needed to be reopened for 8 days, at least. Following that reopening, the beach lost 1/3 of its thickness and 15 days later, not only the upper side receded to 30 meters on the offshore bar, but the erosion started to damage the underlying muddy floor, baring the roots of mangrove trees and shrubs on either side of the flood gate.</p> <p>The offshore bar is naturally protected when the transit, which is a key element of the dynamic equilibrium is not disrupted. However, it is difficult to manage the drainage of the polder with the protection of the beach against erosion. Source: Case study</p>		
Stakes	<p>The receding of the embankment which is also used as a road on its more exposed section might be necessary, with the clearing of a wooded strip, at best. However, the issue of the impact of the outflow of the central drain remains. Between the embankment and the coastline, some people settled, up to the limit and are therefore highly exposed, or between the embankment and the drain, nearby the work for the emptying of the central drain whose water outflow disrupts the offshore bar.</p>		
Actions	<p>Start overall reflection on the sustainability of rice growing systems in the mangrove area and on relevant land development, taking into consideration the context of the sea-level rise.</p>		
Priority level	High	Monitoring—Observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	<p>Intervention of the RAZC project for the embankment of lands developed for rice growing⁵. Construction of an oil refinery on the banks of the Fatal river</p>		
Coastal Protection	<p>Operations for the restoration of mangrove forests</p>		
Priority level	Very high	Monitoring—Observation	Intensive and regular
Protected area	Yes	Risks	<p>Severe erosion of lands developed for rice growing, destruction of villages and tourism sites (Kitikata, in August 2012) following a storm surge. Episodes of flooding</p>

5 Strengthening of the resilience and adaptation to the harmful impact of climate change, in vulnerable coastal areas of Guinea.



Aerial view of the developed plain of Koba (MOLOA, 2016)

		MANGROVE	
GN2-c	58 – KONKOURE DELTA ESTUARY		
BASELINE			
Diagnostics	<p>The island units are distinguishable from other areas by a highly complex mangrove waterway system. Few sites are suitable for rice growing or fish farming.</p> <p>Low site development level and therefore high density of human occupancy.</p> <p>The coastline is subject to the combination of the push-out effects of large estuaries and coastal sediment drift of redistribution on narrow offshore bars of 2a type (lining the mangrove forests facing the ocean)</p>		
Dynamics	Very unstable		
Stakes	Maintenance of mangrove settlements with few prospects for rice growing or fish farming development, because of its complex topography.		
Actions	No action recommended		
Priority level	Low	Monitoring—Observation	No recommendation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Gradual construction of dwellings (source: MOLOA Guinea Country branch) and serious deforestation of mangrove areas.		
Priority level	Medium	Monitoring—Observation	Regular
Protected area	Yes	Risks	The impact of the construction of the dam of Konkouré, as regards sedimentary deposits, should be monitored.

Ramsar Site of Konkouré	GN2-b	GN3-a
ZHII/Ramsar Site ZHII ID: 1GN005–575/WDPA ID: 67987	GN2-c	
Konkouré was designated as a wetland of international importance/Ramsar Site, on November 18, 1992 (surface area: 90,000 ha)		

GN3 THE URBAN AND PERI-URBAN AREA OF CONAKRY

		ANTICIPATION	
GN3-a	59 – MANGROVES AND PADDY FIELDS OF CONAKRY–DUBREKA		
BASELINE			
Diagnostics	Partial peri-urban area Large surface areas on mangrove areas developed in paddy fields, but their farming is uncertain.		
Dynamics	No remarks		
Stakes	Same stakes as the next area to be described (see below), i.e. Pollution, refuse and urban waste water management.		
Actions	Considering the urban transportation issues and the economic importance of the downtown of Conakry, urbanization of lowlands in the vicinity of the city will remain an increasing trend which can only be managed through structuring measures (transportation schemes, urban renovation).		
Priority level	Medium	Monitoring–Observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Gradual urban sprawl and development of the habitat along main roads. Medium extension of the Dubreka City. Major projects developed on the plain of Sonfonia seafront (625 hectares) for the construction of a new modern city, in the suburbs of the capital; the city is expected to be twice more important than Kaloum. This project would deliver a huge number of low-cost houses and buildings for government use and luxury hostels, by the end of March 2017.		
Coastal Protection	Development work for the protection of the site against storm surges and tides. Earthworks are ongoing in some parts of the site.		
Priority level	High	Monitoring–Observation	Regular
Protected area	Yes	Risks	Densification and habitat development



Aerial view of the area of Dubreka (MOLOA, 2016)

			URBAN
GN3-b	60 – MANGROVES AND PERI-URBAN EDGE—CONAKRY—COYAH		
BASELINE			
Diagnostics	Urban encroachment from the airport to Coyah, in lowlands, including mangrove areas, with more or less rough filling in. Appearance of a new internal shore at the limit of the tides, ongoing urban growth, particularly sensitive around Coyah, with occupancy of low terraces, formerly used for rice growing on hydromorphic sands. A few paddy fields remain, but many other developed on mangrove areas seem to be deserted. The dense and overpopulated urban area of Conakry, with an axial extension along the Kindia road towards the inland.		
Dynamics	No remarks		
Stakes	Maintenance of mangrove vegetation which is still illegally exploited. Curbing urbanization in lowlands; despite the fact that they are not exposed to storm waves, there are some risks related to the sea-level rise. The rocky shore of the urban peninsula is rather stable, except for some dwellings located at the limit of the shore and exposed to landslide. The wastewater lagooning facility is exposed to waves.		
Actions	The management of the coastal area of Conakry refers to more far-reaching issues related to organization of urban services, equipment and road works. In any case, the restoration or development of a landscaped seafront which enhances the physical and historical heritage will be contemplated.		
Priority level	High	Monitoring—Observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	<p>Rapid development of the north-east urban expansion of Conakry over the mangrove areas located at the east of the peninsula. Construction of a luxury complex, “Diamond Piazza” by a Chinese company, in the Kipé District (Conakry).</p> <p>The Conakry-Coyah coastal freeway should join up with the new Mafrerenyah airport.</p> <p>Extension of the port</p>		
Characterization of port installations	<p>The Conakry port (http://www.portconakry.org/) is located at the north-west of Conakry Peninsula; it is composed of a series of piers (<i>digue de la fermeture, digue nord et digue de la prudente</i>) protecting a set of mineral principal general container quays (export of bauxite extracted from Kindia mine) and oil terminal.</p> <p>The management and development of the container terminal of the port of Conakry were entrusted to Bolloré Africa Logistics, in 2011, for 25 years, as part of a public-private partnership with the port authorities, following the withdrawal of the concession granted to GETMA, a company owned by NECOTRANS Group.</p> <p>The modernization of the port is under way (tripling the length of the terminal and storage areas, developing a dry port connected to the outside by train, as well as changing to a 13 m-draft).</p> <p>The expansion and modernization of the container port were launched in 2011 and implemented by China Harbour Engineering Company Ltd.</p> <p>The earthworks and extension of the container yard at the south of the port were in phase 1, in 2011–2012.</p> <p>The extension work phase 2 (earthworks, extension of the container yard and unloading platforms) were implemented in 2013–2015.</p>		
Coastal Protection	Some private works, in particular at the south-east of the city.		
Priority level	Very high	Monitoring—Observation	Intensive and regular
Protected area	No	Risks	Localized erosion



*New housing (Diamond Piazza),
in the Kipé District, Conakry*



2010



2015

*Development of the port of Conakry and related
infrastructure between 2010 and 2015 (source:
Google Earth)*

*The main changes are (i) earthworks for the extension
of the container yard at the south of the port
(2011–2012), and (ii) extension of the container
yard and the unloading platform (2013–2015)*

		ANTICIPATION	
GN3-c	61 - LOOSE ISLAND		
BASELINE			
Diagnostics	Covered rocky coastline with some sandy creeks. A few historical and heritage sites. Seaside tourism by Conakry city dwellers, because the nearest beaches are located at 150 km away from the city.		
Dynamics	No remarks		
Stakes	Maintenance of landscape and recreational functions		
Actions	Control the development of tourism infrastructure. Curb urban sprawl on slopes and protect natural vegetation.		
Priority level	Low	Monitoring—Observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	High development of tourism infrastructure (20 or so hostels built in 2 years) without the required control and monitoring. Offshore oil exploration drilling conducted by the Tullow company		
Priority level	Medium	Monitoring—Observation	Regular
Protected area	Yes	Risks	Not reported

Wildlife sanctuary of Loose Island (Ilot Cabri, Ile Blanche and Ile Corail)	GN3-c
SF of Loose Island: ID. WDPA: no ID	
Ramsar Site of Ile Blanche	
ZHII/Ramsar Site ZHII ID: 1GN006—618/WDPA ID: 67988	
Loose Island was classified as a wildlife sanctuary by Law N°. 92/035/CTRN of 1992 on the classifying of Ilot Cabri, Ile Blanche and Ile Corail as wildlife sanctuary	
Ile Blanche was designated as a wetland of international importance/Ramsar Site, on June 23, 1993 (surface area: 10 ha).	

GN4 RICE-GROWING ISLANDS IN SOUTHERN GUINEA

Serious issues of supply of drinking water for local farmers which is caused by the sea-level rise and a significant advance of the saltwater wedge, according to some hypotheses.

		MANGROVE AND RICE GROWING	
GN4-a	62 - KAKOSSA		
BASELINE			
Diagnostics	Same as Kabak system (next area to be described), with no visible threat in land development. The percentage of surface areas for rice growing located in the mangrove area is higher, with an increasing risk related to sea level rise.		
Dynamics	Dynamic sector, constantly evolving		
Stakes	Production areas are threatened (risk of flooding and degradation of developed lands) in case of extreme events like storms and/or sea-level rise.		

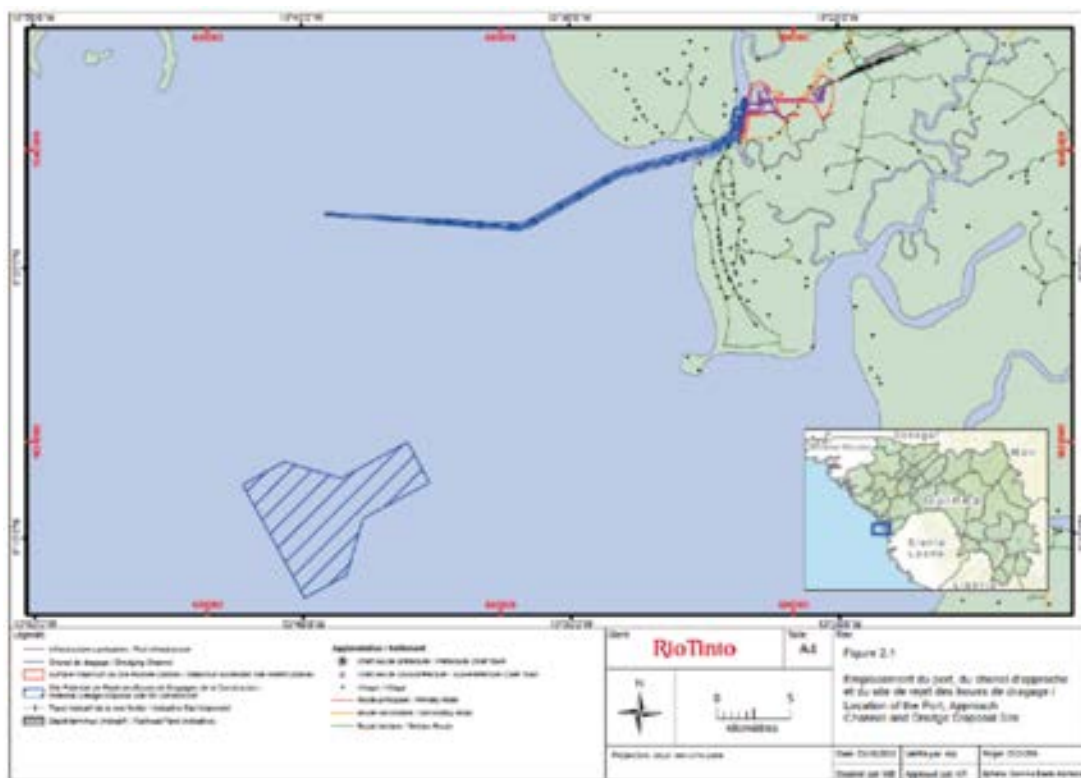
Actions	Start overall reflection on the sustainability of rice growing systems in the mangrove areas and on relevant land development, taking into consideration the context of the sea-level rise. Importance of the conservation of the largest possible mangrove coastline area.		
Priority level	Medium	Monitoring—Observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	A project for the construction of an international airport connected to Conakry by a freeway which will reportedly cross vast mangrove areas. An ore port and related infrastructure project are under way.		
Mining activities/ Ports	Large earthworks were completed on the left bank of Morebaya for the setting up of the marine offloading facility (MOC) of the Simandou iron mining project which includes the construction of the ore port (on the MOC site), a 700 km length railroad and the development of the Simandou mine by Simfer SA (Rio Tinto et IFC), The various Environmental Impact Assessment reports are available.		
Priority level	Very high	Monitoring—Observation	Intensive and regular
Protected area	No	Risks	Severe localized erosion threatening land development for rice growing Rapid receding of the mangrove shoreline, locally estimated at 30 to 50 meters/year



April 2013



March 2014



Mine Offload Facility (MOF) and future ore port site which will be operated by Rio Tinto/Simfer SA on the left bank of the Morebaya river. Earthworks conducted between 2013 and 2014 (see above—source: Google Earth) and the plan of the ore port to be constructed for the export of iron extracted from Simandou mine (Source: Environmental Impact Assessment of the Simandou Project—Rio Tinto)



Settlement of villages following a line, on fossil offshore bars, in mangrove areas (Guinea—source: JF Hellio & N Van Ingen), source: SDLAO

GN4-b
63 - KABAK PLAIN
BASELINE

Diagnostics	<p>The island is a large rice-growing area, as it is developed for rice growing and fitted with a drain and an embankment which is more or less fixed on the sandy offshore bar of 2a type. Narrow strip of mangroves before the embankment. Sandy inner offshore bar with the village in central position at the south headline of the peninsula linked to a very unstable sandy bank.</p> <p>“In 1951, a rural engineering study enables the development of 1,500 ha located between the fossil offshore bars and the area located between the dry land and the mangrove area, in the seafront. This caused not only the development of sulphated and acid lands which produce poor yields in rice-growing areas, but also the spread of sterile lands which covered a large part of croplands suitable for rice growing. Moreover the maintenance of these unsuitable water engineering works, in view of the high hydro-sedimentary mobility of the sector of Kabak needed a huge human and financial resource mobilization from local authorities, the government and development partners.</p> <p>The Kabak large scale offshore redevelopment operation took place between 1975 and 1978. This project was conducted by a Chinese company which rehabilitated the existing 1,500 ha and added 800 ha to the exploitable surface area by constructing a 10 km-length embankment on the seafront.</p> <p>Unfortunately, two years after the rehabilitation work, a sudden silt removal provoked the disappearance of the bar, causing it to retreat to more than 300 meters, at the end of the fourth year of rehabilitation. The conditions which led to the destabilization of these developed lands varied according to the scope of anthropic actions carried out.</p> <p>In Kabak, the polder extension is not followed by the considerable outflow usually directed towards the inland. In September 1982, the combination of spring tides and a renewed sea roughness, which is specific to the end of the rainy season was enough for the sea to make a first dent in the middle section of the embankment, followed shortly by a second one towards the south.</p> <p>Indeed, the extension area is located at the west of the island. It forms a 1 km-width strip located between the shoreline and a sandy dune. To protect this area against the sea flooding, a 1–2 meters-high embankment was constructed with materials originating from the dune bar which is located at 1 km away from the coastline. Currently, this former embankment is mostly destroyed by the advance of the sea.</p> <p><i>The embankment failure in Kabak have been the true revealing event of the seriousness of natural hazards caused by marine erosion, in Guinea. Indeed, Kabak island is illustrative of the effects of marine erosion, in Guinea. In spite of a history marked by land developments which dated back to 50 years, successive failures in 1996 led to the construction of a new embankment which is from a technical stand point, similar to the one swept away by the sea, in the late 1970s. This embankment is constructed following the same marking out as the previous one, but placed slightly back from the place of the previous failure. The water engineering work has been reviewed and adapted to the drainage conditions and the hydro-sedimentary situation observed at the time when the work was designed. Thus, the situation remains the same. An impressive earth-made embankment, fixed water engineering works, unsuitable to the hydro-sedimentary mobility, entailing high costs and time consuming maintenance for the government and farmers. Source: Case study of Kabak Plain</i></p>		
Dynamics	<p>Strong trend to a regressive evolution under the action of erosion. Fragile sector with largely artificialized mangrove</p>		
Stakes	<p>Production areas are threatened (risk of flooding and degradation of developed lands) in case of extreme events like storms and/or sea-level rise. Very dynamic, fragile and evolving area, directly affected by the sea-level rise.</p>		
Actions	<p>Start overall reflection on the sustainability of rice growing systems in the mangrove area and on relevant land development, taking into consideration the context of the sea-level rise. Importance of the conservation of the largest possible shoreline area.</p>		
Priority level	Very high	Monitoring—Observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	<p>Abandonment of farmland related to the destruction of developed lands</p> <p>A deep sear ore port project for the export of iron extracted from Matakan mine, developed by the mining company Bellzone is under consideration.</p>		
Coastal Protection	<p>The project for reinforcing and leveling the protective embankment of the seafront plain (4,500 ha) was to start in February 2014. The Coastal Resilience Project, funded by the Global Environment Facility (GEF) and the United Nations Development Programme (UNDP) has been supporting the riparians, with the view to re-covering recently flooded areas, but so far, results are mixed.</p>		
Priority level	Very high	Monitoring—Observation	Intensive and regular
Protected area	No	Risks	<p>High risk of erosion and flooding causing the destruction of rice-growing plots.</p>



Sequences of land development in the Kabak plain: from right to left: screen of mangrove trees, embankments and channels, production areas, habitat following a line on fossil sandy bars (source: Google Earth).



2010



2015

Part of the developed plain of Kabak in 2010 and 2015: the advanced state of degradation of developed lands is illustrative of what several rice growing plots could be in the future, in Guinea. This picture shows clearly the receding of mangrove areas and the destruction of developed lands (dykes, drains, ...) (source: Google Earth)

		MANGROVE AND RICE GROWING	
GN4-c	64 - BENTY		
BASELINE			
Diagnostics	Rather concentrated rice-growing area. Rice growing on hydromorphic sands, but also in plots located in mangrove areas. Contact rice-growing strips on upper terraces—mangrove Access to Benty is more or less difficult in rainy seasons. A few small lowland development A few plantations of oil palms Subsistence dry farming on leveled hills Fragile soils, account taken of the abundant rainfall		
Dynamics	Fragile sector with largely artificialized mangrove		
Stakes	Over 2/3 of the extension concerns rice growing on hydromorphic sands, the remaining on mangrove areas. Several potential sites for shrimp farming are identified. Fragility of the headland “false cove” on narrow cordons of 2a types The mangrove area, totally cleared at the back and farmed is fragile. On the other hand, the inner shoreline still harbors a mangrove strip and its north-west exposition protects it in some extent from storm surges. Ore port project referred to, with potential major impact to be analyzed.		
Actions	Start overall reflection on the sustainability of rice growing systems in the mangrove area and on relevant land development, taking into consideration the context of the sea-level rise.		
Priority level	Medium	Monitoring—Observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Development of the barge terminal of Konta on the Forecariah river for the export of iron ore extracted from the mine of Forecariah, by Bellzone and China International Fund (latitude: 9°9'46.7N and Longitude: 13°16'18.42w). This area experienced an unprecedented flow of migrant workers, the transformation of a fisher hamlet in a city of over 8,000 inhabitants became reality. Formerly preserved because of its inaccessibility, this area is now inhabited. The immediate consequences of this unregulated occupancy are the forest destruction. (Source: MOLOA Guinea country branch)		
Priority level	High	Monitoring—Observation	Intensive and regular
Protected area	No	Risks	Flooding, mangrove destruction



2010



2014

Development of the barge terminal of Konta, between 2010 and 2014, On the river Forecariah for the exploitation of the Forecariah iron mine.



Sierra Leone

The Sierra Leone coastline presents the following characteristics:

- ⇒ The population is small and sparsely distributed in the coastal area. The agricultural potential is not really developed. Often limited issues
- ⇒ Contrasting and diversified coastline: rectilinear/undulating shorelines, last large mangrove areas before reaching the region of Gulf of Guinea, the rocky horst of Freetown.
- ⇒ The coastline area spread over more than 10 km depth. It is mainly composed of sandy ridged terraces and channels; the soil environment, mostly changed into savannah-like soil is fragile and subject to local rainfall, trending locally to white leached out and infertile sands.
- ⇒ The issues are very limited because of the low occupancy level. However, a conservation unit including inner wetlands is likely to be set up, subject to confirmation of the importance of the sites in terms of biodiversity (wildlife). The small archipelago of Sherbro islands, with its shallows is probably an ecosystem of interest for marine biodiversity.
- ⇒ The rice-growing and even fish farming potential of the vast gutter of wetlands is difficult to estimate, but can be high.

The major issues can be summarized as follows:

- In the northern area: rice growing is directly affected by the sea
- In Freetown:
 - Curb urbanization due to the tourism sector (urban sprawl is to be avoided);
 - Prevent possible beach sand extraction;
 - Control mangrove wood exploitation;
 - Care for and preserve the natural hills.
- In the southern area: setting up of a conservation unit including Sherbro Islands.

Sierra Leone has probably a real potential in shrimp farming (physical conditions, terraces, hydrology, weather very similar with that of neighboring Guinea), but substantial impacts are to be taken into consideration, i.e. mangrove degradation or competition with rice growing.

The country has just started the drawing up of a master plan for the development of its ports, in partnership with the African Development Bank (AfDB).

SL1 NORTHERN SIERRA LEONE

		MANGROVE AND RICE GROWING	
SL1-a	65 - RIGHT BANK OF KOLENTE		
BASELINE			
Diagnostics	The situation differs from the next area (described below) by its extension, near the sea, of paddy fields developed on hydromorphic sands. The area is densely populated and composed of villages distributed following an axis, located on terrace ridges, at a little bit higher level (same as Benty, in the neighboring Guinea). The mangrove has been developed in the inland.		
Dynamics	Dynamic sector under permanent development		
Stakes	Same comments as for the next area to be described (see below). A unique area at the mouth which shows the fertility of recent alluvium deposits. The availability of drinking water and the advance of the saltwater wedge can be major issues for the dense population established in lowlands.		
Actions	Start overall reflection on the sustainability of rice growing systems in the mangrove area and on relevant land development, taking into consideration the context of the sea-level rise.		
Priority level	Medium	Monitoring—Observation	No recommendation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	The contemplated developments in the area of Benty (Guinea)—construction of the barge terminal of Konta, on the Forecariah river—will probably have a significant impact which will need to be monitored.		
Priority level	Medium	Monitoring—Observation	Regular
Protected area	Yes	Risks	Not reported

Yelibuya Island Strict Nature Reserve (proposed)	SL1-a
Strict Nature Reserve: ID. WDPA: no ID	
The classifying of the Yelibuya island has been proposed	

		MANGROVE AND RICE GROWING	
SL1-b	66 - KOLENTE ESTUARY		
BASELINE			
Diagnostics	Two major catchment areas with heavy rainfall supply a large volume of sediments. Major Freetown rice loft, vast surface areas developed on former mangrove areas, hydromorphic sand areas, and on fresh water paddy fields located in neighboring lowlands (indeed the three agro-pedological and hydraulic systems coexist). Hence, the density of the population which is distributed in strings of small villages on rural roads at the top of leveled off hills. Reportedly, in the past, a few water management projects in the lowest rice-growing lands were implemented.		

Dynamics	Dynamic sector under permanent development		
Stakes	Now the site is likely to be flooded in the case of the occurrence of extreme events like storms associated with the rise in water level of the two rivers. Maintenance of small embankments In a context of sea level rise, larger embankments are to be considered. With related impacts to be managed (fertility, loss of alluvium and acidification control)		
Actions	Start overall reflection on the sustainability of rice growing systems in the mangrove area and on relevant land development, taking into consideration the context of the sea-level rise.		
Priority level	High	Monitoring—Observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	High	Monitoring—Observation	Regular
Protected area	Yes	Risks	Not reported

Scarcies River Estuary Marine Protected Area MPA: WDPA ID: 555547921	SL1-b
The AMP Scarcies River Estuary was classified in 2012; the delimitations are not available in WDPA.	

		ANTICIPATION	
SL1-c	67 - LUNGI		
BASELINE			
Diagnostics	Terrace on the Continental Terminal composed of hard layers, translating into small headlands. Complex shoreline with narrow bars which isolate channels in a complex of thin terraces (mostly in the south) Sediment transit influenced by the estuary of Rokel. The central part of the coastline of 4a type, has large coves and beaches limited by small headlands Development and rapid growth of Lungi, related to its international airport connected to Freetown by a fast shuttle and a ferry. The habitat nears the shoreline, but this latter is isolated by thin bars and channels parallel to the bank, which make it not very favorable to construction and dwelling Growth following an axis towards the north, along a rural road on the upper terrace, linear residence villages being developed over 10 km, nearby beaches. Vast market gardening plots, in the suburbs of Lungi.		
Dynamics	Dynamic estuary area constantly evolving		
Stakes	Promising tourism sector, as the area is well served by transport which connects it to the airport; anticipation of future trends of constructions on the beaches.		
Actions	Draw up a plan for this area, take preventive measure to improve land management and control.		
Priority level	Medium	Monitoring—Observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring—Observation	Watch-keeping for the purpose of anticipation
Protected area	No	Risks	Not reported

		ANTICIPATION	
SL1-d	68 - ROKEL ESTUARY		
BASELINE			
Diagnostics	Strong tendency to siltation upstream of Pepel and its island. Important alluvial supply from the Rokel. Considerable areas of mangroves cleared (wood for fuel?). No sign of rice growing. Pepel: pier for ferry (abandoned?) with two wharfs in mudflat. The ferry crossing to Freetown is today by Kupr towards Lungi, an airport town undergoing expansion.		
Dynamics	Probable siltation of the estuary, disappearance of mangrove trees.		
Stakes	Certainly related to the cause of the disappearance of mangrove trees in certain sectors, especially upstream of Pepel. Asphyxiation of the hydrographic tuft still visible. Logging?		
Action	Actions to preserve natural vegetation and control its exploitation.		
Priority level	Medium	Monitoring/Observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Development of urban Construction of a dam on the Rokel which could modify the hydrodynamic conditions of the sector. Enlargement of the small ferry port of Tagrin is envisaged to create a mining terminal. An extension of the railway from the Marampa mine is considered, it could then replace the port of Pepel for iron export.		
Characterization of port installations	The Port of Pepel in the Sierra Leone River is used to transport iron ore in bulk and processed by the African Minerals Mining Company. This port is connected to the Marampa mine by railroad with a distance of 84 km.		
Priority level	Medium	Monitoring/Observation	Regular
Protected area	NO	risks	Not reported



2010



2015

Evolution of the Pepel mining port and related infrastructure between 2010 and 2015 (Source: Google earth)
 The main evolutions are (i) the excavation and building constructions and (ii) the improvement of the railroad connection.

SL2 URBAN AND PERIURBAN FREETOWN

It is very likely that on the SL2-b, SL2-c and probably SL2-d sectors, beaches have been put to use to supply sand for urban growth. Subject to confirmation, this is one of the major stakes in this coastline.

		ANTICIPATION	
SL2-a	69 - URBAN SECTOR IN NORTH/NORTH EAST SHORELINE		
BASELINE			
Diagnostics	Corresponds to the site of the historical town, with a rocky coast cleaned by the removal current of the Kokel estuary, which allows a harbour with no jetty for protection, slightly sheltered from the prevailing south-south-westerly ocean waves. The few creeks are marked with deposits of sand and silt. The mangrove stands (or mud cleared of trees) increase in thickness towards the east and the south, isolating the interior rocky coastline of the estuary in open water. However, the mangrove trees are still abundant and the urbanisation seems to be located on the hills which have become «post-forest», rather than in the mangroves, as is the case in Monrovia.		
Dynamics	No remarks		
Stakes	Protection of the mangrove swamp and even restoration of some sectors. Preservation of the wooded hilly area.		
Action	Establishment of a sector plan, reinforcement of land control, Actions to preserve natural milieus, hillside woods and wetlands.		
Priority level	Medium	Monitoring/Observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Extension of the port		
Characterization of port installations	The Port of Freetown's licensing has been granted to <i>Bolloré Africa Logistics</i> since 2010 and has been enforced since March 2011 for a period of 20 years as part of a public-private partnership with the Port Authority. Constructions have been undertaken to double the volumes handled in 5 years with (i) rehabilitation of the container berth, (ii) implementation of a safe and computerized management, (iii) installation of handling equipment.		
Priority level	Medium	Monitoring/Observation	Regular
Protected area	YES	risks	Collection of sand



*Port of Freetown in 2015
(Source: Google earth)
The Port of Freetown has not had major projects since 2010, except for the refurbishment of the container terminal.*

<p>Sierra Leone River Estuary Marine Protected Area MPA: WDPa ID: 555547922</p> <p>Sierra Leone River Estuary Ramsar site WII / Ramsar: WII ID: 1SL002 – 1014 / WDPa ID: 198331</p> <p>The Sierra Leone River estuary was included on the list of Wetlands of International Importance - Ramsar Site on 13 November 1999 (295 000 ha). The area was declared as a Marine Protected Area "Sierra Leone River Estuary Marine Protected Area» in 2012, delimitations are not available in WDPa.</p>	SL2-a
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		URBAN
SL2-b	70 - GODERICH URBAN SECTOR ON WEST FRONT	
BASELINE		
Diagnostics	Urban sector facing west. Rocky section and long coves with beaches of various widths. Small intra-urban wetlands in places, one of which is isolated from the sea by a narrow rim with a road and residential settlements that are potentially at risk. Vegetable growing perimeter.	
Dynamics	Situations to be analyzed in-depth in each particular situation. Limited sediment stocks.	
Stakes	Strong pressure of urbanisation on the residual unbuilt areas: banks of wetlands, wooded hills in this sector. Restructuring of the urban grid, green area to be preserved. Preservation of free access to urban beaches.	
Action	Draw up a sector scheme, reinforce land control, Actions to preserve natural milieus, hillside woods and wetlands.	
Priority level	High	Monitoring/Observation Regular
DEVELOPMENTS SINCE 2010		
Evolution of stakes	Construction of a fishing port	
Priority level	High	Monitoring/Observation Regular
Protected area	NO	Risks Sand Extraction

		URBAN
SL2-c	71 - HAMILTON – LAKKA	
BASELINE		
Diagnostics	Residential sector in which densification is accelerating. Predominantly large huts, some with swimming pool, undergoing densification with no organised urban grid. Tendency to urban sprawl on the hillsides of the wooded breakwater. Development of building towards a wetland which should probably be protected. Residential settlements in places on the edge of the beach and wetland.	
Dynamics	Situations to be analyzed in-depth in each particular situation. Limited sediment stocks.	
Stakes	Organisation of a real urban grid system. Save the last almost treeless landforms and the intra-urban wetland. Preservation of free access to urban beaches	
Action	Draw up a sector scheme, reinforce land control, Actions to preserve natural milieus, hillside woods and wetlands.	

Priority level	High	Monitoring/Observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution/ Stakes	Densification of the habitat, tourist infrastructure		
Priority level	High	Monitoring/Observation	Regular
Protected area	YES	Risks	Sand extraction

			URBAN
SL2-d	72 - WEST SHORELINE – TOKEH		
BASELINE			
Diagnostics	<p>Increasingly residential tourism coast. Complex, highly diversified coastline with all the possible cases at the level of detail (classes 5, 4a, 4b, 3c, etc.). Many sites have interesting landscape adjacent to striking hilly land-forms. Heritage of beaches interesting, with however:</p> <p>A highway, hard-surfaced in places, cut out more or less on the hillsides, with obvious collateral impacts (erosion, landslides), destruction of vegetation.</p> <p>Urban sprawl of scattered building near the road, tracks and branches for off-road vehicles towards the coastline and the few small housing schemes and villages with a varying tourism component, and lodges that were already in existence.</p>		
Dynamics	Situations to be analyzed in-depth in each particular situation. Limited sediment stocks.		
Stakes	The conditions are present for the development of a dense, busy tourism sector no more than 40 km from the town centre, with, at the beginning, villas with a panoramic view, lodges, hotels and then peri-urban densification. A detailed urban scheme is urgent, as is the protection of the wooded breakwater (catchment area for a reservoir that supplies the town with water).		
Actions	Anticipate urban sprawl and tourist development by drawing up a sector scheme.		
Priority level	High	Monitoring/Observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	High	Monitoring/Observation	Intensive and regular
Protected area	YES	Risks	Urban pollution

West Area no hunting Forest (IUCN Cat. II) NH Forest: WDPA ID: 5179		SL2-c	
West Area Peninsula Forest National Park National Park: WDPA ID: 19249		SL2-d	
West Area Peninsula Forest National Park proposed World Heritage National Park WH ID: 5741		SL2-e	
		SL2-f	
<p>The hunting reserve of the West Area Forest was classified in 1916.</p> <p>The National Park of West Area Peninsula Forest was classified in 2012.</p> <p>The National Park of West Area Peninsula Forest has been included on UNESCO's tentative list of the World Heritage Sites since 2012, which Sierra Leone intends to nominate for registration as a mixed site: cultural criterion (iii) and natural criterion (vii) and (x).</p>			
		ANTICIPATION	
SL2-e	73 - TOMBOU – CAPE SHILLING		
BASELINE			
Diagnostics	Tombou: small town expanding along an axis towards Waterloo Freetown East. Cape Shilling: rocky point with small cliffs and rocky coast. Track with panoramic view on the ocean side. Point served by track. Little building but beginnings of urban sprawl. Remaining wooded vegetation in vigorous hilly landform, but cleared enclaves appearing.		
Dynamics	No remarks. Coastline with a tendency towards sandy silt.		
Stakes	Obvious tourist potential. Development to be controlled: Landscapes, hotel establishments, etc. The point of the head land should be classified.		
Actions	Drastic limitation of buildings on both hillsides and crests, landscape insertion of possible limited tourist reception facilities. Classification as a conservation unit of the point of the headland to be studied.		
Priority level	High	Monitoring Observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	High	Monitoring/ Observation	Watch-keeping for the purpose of anticipation
Protected area	NO	Risks	Not reported

		ANTICIPATION	
SL2-f	74 - BANANA ISLAND		
BASELINE			
Diagnostics	Island consisting of rocky coast and hardpan. Beaches, creeks, vegetation of coconut trees. Some small fishing villages.		
Dynamics	No remarks		
Stakes	Obvious tourist potential. Development to be controlled: Landscapes, hotels, etc.		
Actions	Implementation of a sector scheme if tourist facilities were to be developed.		
Priority level	Medium	Monitoring/Observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Building of a hotel and resort (Source: MOLOA Sierra Leone country branch)		
Priority level	Medium	Monitoring/Observation	Watch-keeping for the purpose of anticipation
Protected area	NO	Risks	Not reported

SL3 CENTRE SIERRA LEONE SOUTH CENTER

		MANGROVE SWAMP & RICE GROWING	
SL3-a	75 - SOUTH BAY OF THE FREETOWN MOLE		
BASELINE			
Diagnostics	Extension in mudflats, coastline of mangrove trees, discontinuous, sometimes absent. Important rice-growing area with the two systems: Dyked paddy fields and rice-growing on thin layer of hydromorphic sand (dominant system). Hilly hinterland occupied by agriculture and small plantations to supply Freetown. Relatively dense habitat in villages (strings along the line of the tracks).		
Dynamics	Dynamic and unstable sector, prone to siltation.		
Stakes	Changes in the shore in mangrove trees and siltation. Rice-growing under the influence of the sea in a context of rise in sea level.		
Actions	No recommendations other than general ones regarding rice-growing.		
Priority level	Medium	Monitoring/Observation	Without recommendation.
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Building of a hotel and resort (Source: MOLOA Sierra Leone country branch)		
Priority level	Medium	Monitoring/Observation	Watch-keeping for the purpose of anticipation
Protected area	YES	Risks	Not reported

Yawri Bay Marine Protected Area	SL3-a
Yawri Bay MPA : WDPa ID : 555547923	
The Yawri Bay Marine Protected Area was classified in 2012; delimitations are not available in WDPa.	

		MANGROVE	
SL3-b	76 – SHENGE		
BASELINE			
Diagnostics	Complex coastline structured by the headland that probably plays an important hydraulic role, with low importance of the "mangrove shores" relayed by sandy spits of type 2a. More intensive land use in the neighbouring sectors in the South West. Appropriation of a few mangrove swamp rice-growing plots, but quite localised in contact with the hilly terraces. Relicts of forests still present.		
Dynamics	Very dynamic, unstable coastline. Heavy erosion transferred to the coastline of Shenge, as well as on Plantain Island.		
Stakes	Probable densification of the population connected by the network of tracks in easy topography, more or less already in place, with string of small villages more or less distant from each other. It should nonetheless be noted that the post-forest soils, under the high rainfall conditions of the region, can easily turn into savannah if they are developed with crops other than trees. Plantain Island could disappear in the next two decades (source: case study).		
Actions	Possible feasibility study of a protective system for Plantain Island if the stakes justify it?		
Priority level	High	Monitoring/Observation	Intensive and regular.
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	High	Monitoring/observation	Intensive and regular
Protected Area	NO	Risks	Not reported



On the left, former Shenge jetty destroyed by erosion,
 On the right, new infrastructure (source: SDLAO case study).

SL4 SHERBRO AREA - LIBERIA

Generally, this area is sparsely populated. The coastline is characterized by these natural conditions: estuarine and insular environments, shallow waters, complex current and relative aridity of leached sands despite high rainfall advocate for a conservation and preservation effort of this unique system in this sub-region, which is visibly still relatively well preserved. Considering the extent of the site, the populations living there, conservation solutions of the biosphere reserve or regional park type would seem to be the most appropriate. This conservation area could have a cross-border dimension, encompassing the neighboring areas of Liberia.

		ENVIRONMENT	
SL4-a	77 - SHERBRO ESTUARY		
BASELINE			
Diagnostics	From 5 to 20 km wide on the sea front. Coastline almost totally covered in mangroves. Approaching the sea, sandy spits of type 2a. Rare villages, large straw huts (farmers and probably fishermen). The hinterland is moderately inhabited with forest relics on formations of high terraces of continental terminal. Some paddy fields in places on the inside edge of the mangrove.		
Dynamics	Dynamic and unstable estuarine sector		
Stakes	Mangrove preserved (screen of Rhizophora and a few Avicennia stands). Sites and lands probably suitable for mangrove rice-growing and perhaps shrimp farming. Interesting tree vegetation in fan shaped wetlands.		
Actions	Conservation of natural milieus to be envisaged in global action to preserve the ecosystem of Sherbro island.		
Priority level	Low	Monitoring/Observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring/Observation	Watch-keeping for the purpose of anticipation
Protected Area	NO	Risks	Not reported

		ENVIRONMENT	
SL4-b	78 - TURTLE ISLANDS BANKS		
BASELINE			
Diagnostics	Unique system of sandbanks, shallows, extremely dynamic terraces, fashioned by the multiple influences of the coastal drift current, tidal currents and fluvial sediment supply in spate season.		
Dynamics	A totally dynamic and unstable sector, there are several hypotheses concerning the origin of the bank ⁶ .		
Stakes	Conservation of natural ecosystems. Area to be included in a conservation unit that also incorporates the Sherbro islands and possibly the preceding sector.		
Actions	Instigate a study of a large conservation unit with an original status such as de Biosphere Reserve or Regional Natural Park, also reconciling the possibilities of developing tourism, ecotourism, residential settlement and fishing. The Turtle bank should legitimately be assigned a rigorous conservation status.		
Priority level	High	Monitoring/Observation	Regular

6 Anthony. E. J. 2004.-The Turtle Bank, Sherbro bay, west Africa: estuarine-modified inner shelf shoal. Marine Sandwave and River Dune Dynamics – 1 & 2 April 2004 - Enschede, the Netherlands.8p.

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	High	Monitoring/Observation	Regular
Protected Area	YES	Risks	Not reported

Turtle & Sherbro Island MPA (proposed)	SL4-b
MPA : WDPA ID : nil	
The proposed «Turtle & Sherbro Island» MPA is not registered in WDPA	

Sherbro River Estuary MPA	SL4-b
MPA : WDPA ID : 555547924	SL4-c
The Sherbro River estuary MPA was classified in 2012; its delimitations are not available in WDPA.	

		ENVIRONMENT
SL4-c	79 - SHERBRO –MAIN ISLAND	

BASELINE			
Diagnostics	Remarkable estuary. Practically uninhabited. Small strategic village and historical port of Bonthe, formerly a relatively important town. Sector not very visible on the high-resolution images. Another village to the south with a few huts. Micro-lagoons in the south. Attempts by private investors to promote the unique setting of this insular system.		
Dynamics	Extremely complex current system, importance of fluvial sediment supply, east-westerly coastal drift. Erosion observed on the Bonthe site		
Stakes	Area to be included in a conservation unit incorporating all the sectors in the area.		
Actions	Consider a study of a large conservation unit with an original status such as Biosphere Reserve or Regional Natural Park, also reconciling the possibilities of developing tourism, ecotourism, residential settlement and fishing.		
Priority level	Medium	Monitoring/Observation	Regular

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring/Observation	Regular
Protected Area	YES	Risks	Not reported

Bonthe Mangrove Swap Strict Nature Reserve (proposed)	SL4-c
SNR : WDPA ID : 19268	
The delimitations of the Bonthe mangrove natural reserve are not available in WDPA.	

		ENVIRONMENT	
SL4-d	80 - SHERBRO –MOA MOUTH		
BASELINE			
Diagnostics	<p>Great homogeneity of the straight coastline along a hundred kilometers varying according to the proximity of the shoreline and the depth of multiple terraces channels. Wrinkled terraces and channels composed of recent sands with discontinuous bushy tree vegetation.</p> <p>The terraces and channels complex corresponding to successive genesis phases is bordered (between 500 m and 5 km) by a continuous interconnected wetlands»gutter«, receiving waters from several rivers with large water-sheds, with a final mangrove outlet near the Sherbro.</p> <p>Subject to inventory, this area has a rich floristic and wildlife setting along with poor and «arid» vegetation characteristics in climatic areas with high rainfall (> 3,000 mm) on leached sandy soils.</p>		
Dynamics	<p>No remarks, but the coastline morphology confirms the presence of an East-Western result of coastal drift. Highly homogenous coastline along a straight stretch of around a hundred kilometres, becomes diversified depending on the proximity of the shore and the depth of multiple channels on terraces. Terraces in ridges and channels composed of recent sands with discontinuous shrubs and tree vegetation.</p> <p>The complex of terraces and channels corresponding to successive phases of genesis is bordered (between 500m and 5 km) by a continuous “gutter” of interconnected wetlands, receiving the waters of several streams with vast catchment areas, with a final outlet in mangroves approaching the Sherbro islands.</p> <p>Subject to an inventory, this area presents a rich system of flora and fauna associated with characteristics of poor, “arid” vegetation in a weather area with high rainfall (> 3,000 mm) on leached sandy soils.</p>		
Stakes	<p>For 10 to 20km landward from the coastline, practically uninhabited area, without any sustainable agricultural future on sandy terrace and undetermined potential agricultural use in the wetlands. Little potential for coconut plantations (as in Côte d’Ivoire). Possibly plantations of eucalyptus... More certainly, pertinent area to be included in a conservation approach as mentioned above.</p>		
Actions	<p>Consider a study of a large conservation unit with an original status such as Biosphere Reserve or Regional Natural Park, also reconciling the possibilities of developing tourism, ecotourism, residential settlement and fishing.</p>		
Priority level	Low	Monitoring/Observation	No recommendation.
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring/Observation	No recommendation.
Protected Area	YES	Risks	A grounded vessel on the beach in southern Sierra Leone in 2013 at Lake Mape resulted in an accretion in the south and an erosion of the beach in the north.

Lake Mape / Mabesi National Park National Park : WDPA ID : 19266	SL4-d
A 75.11 km ² area has been proposed around the coastal lakes of Mape and Mabesi for classification as a national park. The delimitations are not available in WDPA.	

Sewa-Waanje game reserve (proposed) WDPAID : 28367	SL4-d
A100 km ² area has been proposed around the coastal rivers of Sewa - Waanje for classification as a reserve. delimitations are not available in WDPA.	

		ENVIRONMENT	
SL4-e	81 – MOA MOUTH - SULIMA		
BASELINE			
Diagnostics	Sulima, a small village situated on the coast just before Liberia, some agriculture on alluvial deposits. Configuration of the estuary involves a strong, westward coastal sediment drift. This drift blocks the outlet of a vast lateral wetland.		
Dynamics	Unstable estuarine area		
Stakes	Area to be included in a conservation unit unless, for different reasons relating to the border, Sierra Leone wished to see a densification of human land use in places.		
Actions	Consider a study of a large conservation unit with an original status such as Biosphere Reserve or Regional Natural Park, also reconciling the possibilities of developing tourism, ecotourism, residential settlement and fishing.		
Priority level	Low	Monitoring/Observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring/Observation	Regular
Protected Area	YES	Risks	Sector with active erosion at Sulima.
Sulima Mangrove Swap Strict Nature Reserve (proposed)			SL4-e
Strict Nature Reserve : WDPA ID : 19265			
The delimitations of the Sulima mangrove natural reserve are not available in WDPA.			



Liberia

Liberia's coast is largely composed of rocky littoral zones. Its shores are thin and very sensitive to erosion, especially because of the low sediment stocks which are gradually reduced with sand extraction for construction purposes.

LR1 SIERRA LEONE – ROBERTSPORT - MONROVIA

		ENVIRONMENT	
LR1-a	82 - SIERRA LEONE - ROBERTSPORT		
BASELINE			
Diagnostics	Vast sector of wetlands behind the coastline. Practically uninhabited, but some agricultural clearing on sandy terraces. Straight coastline, narrow rims-lidos separating channels parallel to the shore.		
Dynamics	Highly localised situations related to the presence of rocky outcrops and exposure to ocean waves at the level of the Robertsport breakwater. North part very unstable with sandy spits in the lagoon mouth and long rim-lido separating a lagoon channel from the shore towards the north.		
Stakes	Area not suitable for agriculture, in wetlands or very fragile sands (white sands leached by the high rainfall as soon as the vegetation coverage has disappeared). Would be suitable rather to be included in a vast binational protected area stretching as far as Sherbro island.		
Actions	Consider a study of transboundary conservation unit with Sierra Leone (see above).		
Priority level	Low	Monitoring/Observation	No recommendation
DEVELOPMENTS SINCE 2010			
Evolution oof stakes	Not reported		
Priority level	Low	Monitoring/Observation	No recommendation
Protected Area	YES	Risks	Sector in accretion

		ENVIRONMENT	
LR1-b	83 - ROBERTSPORT		
BASELINE			
Diagnostics	The intrusion of basic rocks from the Robertsport breakwater plays an important role in the structuring of the coastal current system. Marine protected area of Cape Mount. Robertsport is a small village at the foot of the rocky breakwater connected by a track towards Monrovia. The coast north of Robertsport is straight and fragile.		
Dynamics	Highly localised situations related to the presence of rocky outcrops and exposure to ocean waves at the level of the breakwater. Sandy spits very unstable at the level of the mouth of the lagoon.		
Stakes	Preservation of the biological diversity of a system of more or less well-preserved landscape and forestry sites.		
Actions	Consider a study of transboundary conservation unit with Sierra Leone (see above).		
Priority level	Low	Monitoring/Observation	Watch-keeping for the purpose of anticipation

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Hotel and Tourism developments		
Priority level	Low	Monitoring/Observation	Watch-keeping for the purpose of anticipation
Protected Area	YES	Risks	Sector in accretion



Free arrows system at Robersport

		ENVIRONMENT	
LR1-c	84 - LAKE PISO		
BASELINE			
Diagnostics	Vast lagoon of around 100,000 hectares, subject to the tide with adjoining wetlands. Tendency to siltation, and to filling in of outlets.		
Dynamics	No remarks.		
Stakes	Preservation of the biological diversity of a system of sites and wetlands.		
Action	Consider a study of transboundary conservation unit with Sierra Leone (see above).		
Priority level	Low	Monitoring/Observation	Without recommendation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring/Observation	Without recommendation
Protected area	YES	Risks	Not reported

Lake Piso National Park (proposed) National Park : WDPA ID : 555542457 Lake Piso Ramsar site WII / Ramsar : WII ID : 1LR001 – 1306 / WDPA ID : 901219	LR1-a LR1-b LR1-c
The Piso Lake area was designated as a Wetland of International Importance - Ramsar site on July 2, 2003 (76,091 ha), the area was nominated for national park status.	

		ENVIRONMENT	
LR1-d	85 - EST ROBERTSPORT - MONROVIA		
BASELINE			
Diagnostics	Slightly undulating, straight littoral to Lofa estuary, then straight. Almost continuous presence of channels and wetlands parallel to the shore. Very narrow littoral rims. Practically uninhabited coastline. Wetlands around the Lofa estuary, the whole area seems to offer great diversity.		
Dynamics	No remarks.		
Stakes	Conservation of the biological diversity of a system of sites and wetlands.		
Action	Consider a study of transboundary conservation unit with Sierra Leone (see above).		
Priority level	Low	Monitoring/Observation	Without recommendation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring/Observation	Regular
Protected area	NO	Risks	Not reported

LR2 AREA UNDER THE INFLUENCE OF MONROVIA

The entire Monrovia area has been subject to large influxes of populations during the periods of instability in Liberia. The rehabilitation of precarious settlements appears to be a priority for urban development, which should be associated with the structuring of a sea front and secured urban beaches. The establishment of suitable infrastructure for landing fishing catches on a site which remains to be determined.

Monrovia has accumulated a number of problems with a high level of settlements concerned, that generate real risks:

- Risk of flooding.
- Risks related to sea level rise.
- Coastal erosion, including rocky coasts.
- Instability of the coast which is extremely sensitive to any coastal developments.

In terms of local geodynamics, Monrovia breakwater plays a structural role in all Liberia's coastal current system.

				URBAN
LR2-a	86 - NORTH OF SAINT-PAUL RIVER – RIGHT BANK			
BASELINE				
Diagnostics	Very narrow fluviomarine terrace with the AFRICA hotel complex/village of OUA in an almost insular position. Coastline in a thin rim bordered with wetlands.			
Dynamics	Area undergoing erosion still subject to impacts of the development of Monrovia harbour.			
Stakes	While the terraces situated in depth can bear urban development as an alternative to the saturation of the Monrovia site, the characteristics of this coastal fringe make it unsuitable for the safe, sustainable development of periurban residential districts on the sea front.			
Action	Anticipate the development of residential districts and possibly planning of such districts in a global sea front scheme that respects the constraints of the site.			
Priority level	High	Monitoring/Observation		Intensive and regular
DEVELOPMENTS SINCE 2010				
Evolution of stakes	Border of the urban extension North-West of Monrovia			
Priority level	High	Monitoring Observation		Intensive and regular
Protected area	NO	Risks	Not reported	
				PERIURBAN & URBAN
LR2-b	87 – INTERIOR LAGOON			
BASELINE				
Diagnostics	Sector with significant amount of precarious human settlement on flood-prone former mangrove swamp, surrounding more or less planned urbanisation on low fan-shaped hills opening onto wetlands.			
Dynamics	High risk of flooding / submersion.			
Stakes	Large area of dense habitation in a area with a high risk of flooding in the event of surges associated with continental spates and/or a future rise in sea level.			
Action	Early warning system. Flood risk prevention plan. In the long term, relocation of the population.			
Priority level	Very high	Monitoring/Observation		Intensive and regular
DEVELOPMENTS SINCE 2010				
Evolution of stakes	Not reported			
Priority level	Very high	Monitoring/Observation		Intensive and regular
Protected area	NO	Risks	Not reported	



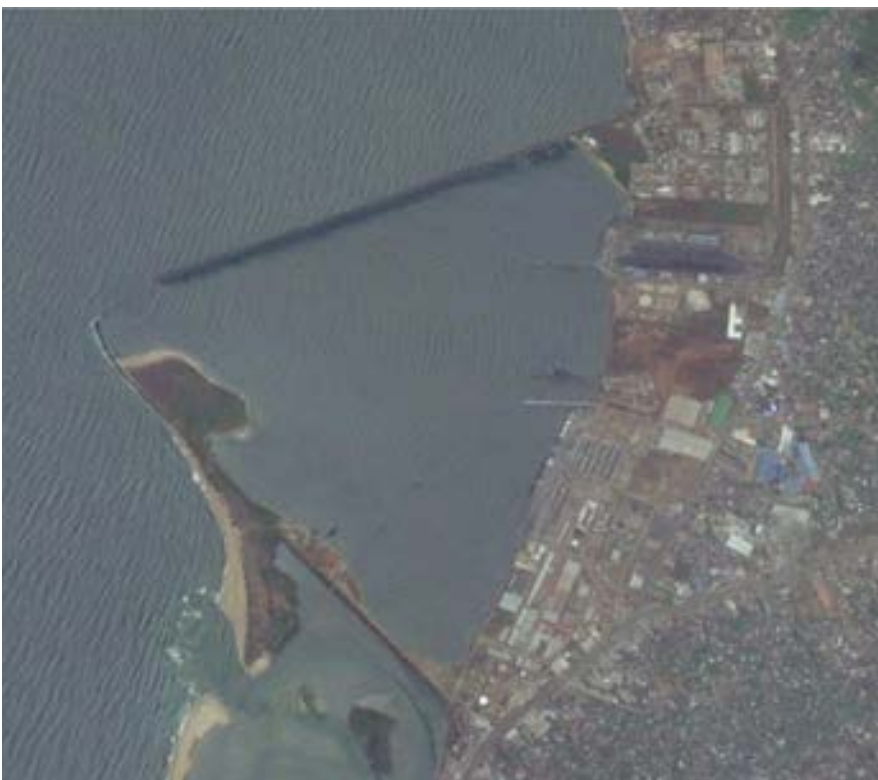
Under-integrated districts of Monrovia at risk

			URBAN
LR2-c	88 - WEST POINT – MESURADO MOUTH AND PORT AREA		
BASELINE			
Diagnostics	This sector and the previous one (former interior lagoon, former mangrove) concentrate almost all of the most serious risks in Liberia. Coastline in a complex, highly artificialised situation. Harbour sheltered by the sediment systems of the interior lagoon and the St Paul river by two dykes.		
Dynamics	Sediment drift current oriented somewhat westward. Tendency to accretion blocked by the South pier and to erosion guided by the North pier on the urban beach North of the harbour, also of fishing landing point. The sandy spit of West point seems to be in a state of dynamic equilibrium in the medium term, with, however, phases of erosion and accretion and serious risks of submersion in the event of ocean overhang.		
Stakes	Very low area topographically with large sectors of unplanned, very dense, at risk habitation at the level of West Point and North of the port.		
Action	Control of sea front urbanisation. Draw up sector scheme allowing for requalification (withdrawal? Relocation?) of the at risk fishermen's districts.		
Priority level	Very high	Monitoring/Observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Characterization of port installations	Monrovia's free port is composed of two piers / breakwater in the bay of Monrovia. It is a port which has licensing partners with APM Terminals, Firestone, China and the Western Cluster. It is the largest port in Liberia; it was originally built by the US military for strategic purposes during the Second World War. 3 piers belong to Liberia Mining Company (LMC), National Iron Ore Company (NIOC) and the Bong Mines Company (BMC) Piers (http://npaliberia.com/operations/monrovia/)		
Priority level	Very high	Monitoring/Observation	Intensive and regular
Protected area	NO	Risks	Extraction of sand for construction purposes



Precarious settlements of fishermen at West Point (source: SDLAO national diagnostics Liberia)

Mesurado Wetlands Ramsar Site	LR2-c / LR2-d
WII / Ramsar : WII ID : 1LR004 – 1631 / WDPA ID : 902909	LR2-e / LR2-f
The Mesurado wetland was included in the list of Wetlands of International Importance - Ramsar Site on August 24, 2006 (6,760 ha), the Ramsar site boundaries are not available in WDPA.	



*Port of Monrovia in 2015 (Source: Google Earth)
Since 2010, the Port of Monrovia has not undergone any major work.*

				URBAN
LR2 - d	89 - MAMBA POINT – SINKOR			
BASELINE				
Diagnostics	Historical town with planned grid on the peninsular site, with precarious islets of habitation. Coastline with headlands, undulating, very exposed to ocean waves, with residential settlements on the sea shore. Vast urban beach, divided by rocky headland but subject to erosion.			
Dynamics	Straight coastline undergoing erosion in places.			
Stakes	Main urban beach in Monrovia, sector scheme and sea front development desirable.			
Actions	Control urbanisation along sea front. Sector scheme to be drawn up allowing for the implementation of a sea front and a secured urban beach, possible improvements to be planned.			
Priority level	High	Monitoring/Observation		Intensive and regular
DEVELOPMENTS SINCE 2010				
Evolution of stakes	Not reported			
Priority level	High	Monitoring/Observation	Intensive and regular	
Protected area	YES	Risks	Sand extraction for construction purposes	

				URBAN
LR2-e	90 - SINKOR - PAYNESVILLE			
BASELINE				
Diagnostics	Straight coastline sector adjacent to wetlands. urbanised, mixed residential, islets of precarious settlements			
Dynamics	Straight coastline undergoing littoral with local erosion			
Stakes	Low-lying landform, flood risks			
Actions	Control urbanization along sea front			
Priority level	High	Monitoring/Observation		Regular
DEVELOPMENTS SINCE 2010				
Evolution of stakes	Not reported			
Priority level	High	Monitoring/Observation	Regular	
Protected area	YES	Risks	Sand extraction for construction purposes	

		URBAN	
LR2 - f	91 - PAYNESVILLE - MAMGBALI		
BASELINE			
Diagnostics	Predominantly residential housing, concessions on the edge of the seafront.		
Dynamics	Littoral with headlands and coves subject to erosion.		
Stakes	Mastery of buildings in gradual densification on the seaside.		
Actions	Mastery of seafront urbanisation.		
Priority level	Medium	Monitoring/Observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Development of some tourist infrastructure.		
Priority level	High	Monitoring/Observation	Regular
Protected area	YES	Risks	Sand extraction for construction purposes

		ENVIRONMENT & TOURISM	
LR2 - g	92 - MAMGBALI – SOPWE TOWN		
BASELINE			
Diagnostics	Urbanisation growing towards the coast, residential huts and some hotels, all on the edge of the beach or North of the lagoon (Schefflin lagoon – approximately 3.5 km ²) on terrain with often very low, complex topography (fan-shaped wetlands). Extraction of materials.		
Dynamics	Highly unstable straight coastline undergoing erosion. Reflective beaches on the rim. Marked erosion in the west of the sector (Barnes and Thinker beach).		
Stakes	Schefflin lagoon is managed by the armed forces. It can therefore theoretically be considered protected. However, the opening of new sand extraction sites in the east may further deteriorate an already highly unstable rim.		
Actions	Reinforce protection of Schefflin lagoon. Sector scheme to organise urban and residential development.		
Priority level	High	Monitoring/Observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	High	Monitoring/Observation	Regular
Protected area	NO	Risks	Sand extraction for construction purposes



Monrovia's eastern coastal neighborhoods organized on terraces and fossil cords of low elevation at the immediate edge of an extensive network of flooded depressions

		TOURISM	
LR2 - h	93 - SOPWE TOWN - DOLOTA		
BASELINE			
Diagnostics	Discontinuous urbanisation extends along a narrow site in a peninsular situation surrounded by a system of wetlands and lagoons landward and isolated from the coastline by a series of lagoons and channels closed by a narrow, more or less straight coastal rim-lido.		
Dynamics	Site of estuarine mouth, very unstable. Highly unstable estuary outlet site.		
Stakes	Installation on the sandy spit seems to present high risks and should be reserved for temporary, light tourist facilities.		
Actions	Total ban on building on the sandy spit. Withdrawal and relocation of at risk habitations		
Priority level	Medium	Monitoring/Observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring/Observation	Regular
Protected area	YES	Risks	Not reported

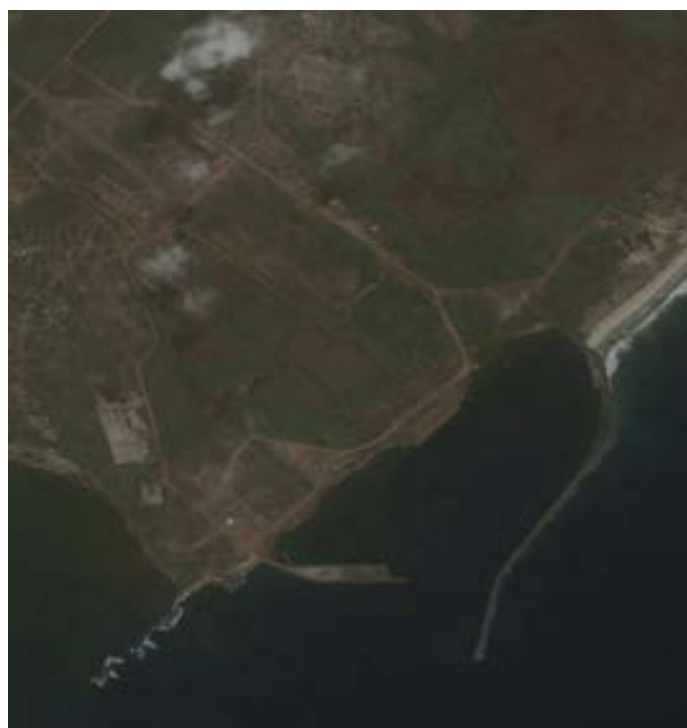
Margibi Mangrove National Park (proposed) National Park : WDPA ID : 555542456	LR2 - h	LR3 - has
Marshall Wetlands Ramsar site WII / Ramsar : WII ID : 1LR004 – 1630 / WDPA ID : 902909		
A proposal to classify the Margibi Mangrove area as a national park was made in 2003.		
The Wetland of Marshall was included in the list of Wetlands of International Importance - Ramsar Site on 24 August 2006 (12 168 ha), the delineation of the Ramsar site is not available in the WDPA.		

LR3 DOLOTA - BUCHANAN

		ENVIRONMENT	
LR3 - has	94 - DOLOTA		
BASELINE			
Diagnostics	Very sparsely occupied area, with numerous wetlands close to the coastline. Track close to the coast from Buchanan stretching for around thirty kilometres. Long, very narrow rim – lido effective as the shore of a lagoon parallel to the coast.		
Dynamics	No remarks		
Stakes	The opportunity and the possibility of preserving areas of interest in terms of biodiversity: Wetlands, terraced forests, in particular around Buchanan. The one around the small village of Dolota is connected to an almost intra-urban wetland in the eastern extension of Monrovia.		
Actions	Validate and define options to protect biodiversity		
Priority level	Medium	Monitoring/Observation	Survey to anticipate
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring/Observation	Watch-keeping for the purpose of anticipation
Protected area	YES	Risks	Sand extraction for construction purposes

		URBAN	
LR3 - b	95 - BUCHANAN		
BASELINE			
Diagnostics	Complex site, artificial, submerged groynes, erosion generalised despite a few sites undergoing accretion in places. Urban habitations sometimes planned near the shore.		
Dynamics	Very dynamic site, alternating erosion and accretion areas. Very dynamic site, alternate areas undergoing erosion and accretion.		
Stakes	A site undergoing erosion to be controlled, extractions of materials prohibited today and relocated to Upper Buchanan on the St John River estuary in the North. Erosion seems to be largely related to harbour developments and material extraction.		

Actions	Total ban on building between the urban coastal roads and the shore. Withdrawal and relocation of at risk habitations; sector scheme able to incorporate some improvements if cost compatible with the stakes.		
Priority level	High	Monitoring/Observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Port upgrade/railway connection.		
Characterization of port installations	<p>The port of Buchanan is the second port of Liberia, it is located in the south of the city of Buchanan, at 270 km southeast of Monrovia. It consists of two jetties / breakwater, the one located to the northwest includes a wooden pier. The port includes an iron ore terminal owned by Arcelor Mittal. (http://npaliberia.com/operations/buchanan/)</p> <p>The modernization projects of the port are undertaken by UMARCO (subsidiary of Bolloré Africa Logistics). The development of the port of Buchanan is of interest to several companies that could use it in the long term (Chevron, Equatorial Palm Oil, African Petroleum).</p>		
Coastal protection	Construction of the "first structured breakwater coating" of the coastal protection structure over a distance of six hundred (600) meters. This work was carried out between 2010 and 2014.		
Priority level	Very high	Monitoring/Observation	Intensive and regular
Protected area	NO	Risks	Very active erosion, mean retreat of the coastline since 1969: 6.6 m / year, more than 250 m of decline observed in total.



2010



2015

*Evolution of the Buchanan port and associated infrastructure between 2010 and 2015 (Source: Google Earth)
The main developments are the upgrading of the port with the construction of buildings and the railroad connection.*



Coastal site in Buchanan before and after the construction work with the dyke



Implementation of the first matte GeoTextile section (white color in the image) below the construction to protect the concrete structure in Buchana

LR4 BUCHANAN – RIVERCESS – GREENVILLE - GRANCESS

- Practically uninhabited sectors on the edge of the coastline, apart from a few villages always located in proximity to a headland and a small estuary.
- Sectors that are very isolated regarding the road network.
- Dense network of coastal rivers and five large rivers flowing into the coast in more or less extensive estuarine wetland complexes.
- Only one significant agglomeration apart from Greenville.
- Relatively uninhabited, post forest type coastal strip 50 km long. Islets of forestry under exploitation.

In the long term, the stakes concern the colonisation and intensification of clearing (as in Côte d'Ivoire) more in an inland direction. In general, the first two kilometres from the shore are relatively unsuitable for agriculture: wetlands, small terraces of fragile white sands.

The implementation of a programme to preserve the small estuaries (inventory of biological resources, organise and inform population and local authorities, sector schemes for areas under development) would be pertinent, with a view to early promotion of sustainable management methods for these rich, fragile milieus, in a context where human land use is still limited in an isolated environment. For all of these sectors, the Priority level is low, and no particular recommendations are made in terms of monitoring-observation

		ENVIRONMENT	
LR4-a	96 - BUCHANAN – RIVERCESS		
BASELINE			
Diagnostics	Coastal area of headlands and coves. 50 kilometre strip served by a secondary road. Plantations and significant density of agricultural use		
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring - Observation	No recommendation
Protected Area	NO	Hazards	

		ENVIRONMENT	
LR4-b	97 - RIVERCESS		
BASELINE			
Diagnostics	Small town with landing strip. Complex estuarine site difficult to turn into a port because of nearby reefs.		
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring - Observation	No recommendation
Protected Area	NO	Hazards	

		ENVIRONMENT	
LR4-c	98 - RIVERCESS - GREENVILLE		
BASELINE			
Diagnostics	Relatively uninhabited. Coastal landscape sites of headlands and coves (Sasstown and King William) but tourist developments practically non-existent.		
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	low	Monitoring - Observation	No recommendation
Protected Area	YES	Hazards	Not reported
Senkwehn National Park (proposed)		LR4-c	
National Park : WDPA ID 36026			
A proposal was made in 2003 to classify the Senkhwehn area as a national park.			

		ENVIRONMENT	
LR4-d	99 - GREENVILLE		
BASELINE			
Diagnostics	Agglomeration with planned grid, town structured in several natural islets separated by wetlands and port on the estuary. Headland with port and pier. Town relatively isolated from the road network.		
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Rapid, though still moderate development of Greenville, following the planned scheme.		
Characterization of port installations	The port of Greenville is located in the South-Eastern region of the country, about 673 kilometres away from the Port of Monrovia in the Sino Bay. The port is protected by a 400m-pier that includes two wharfs on its internal face. The port is currently closed and it should reopen in 2012, to handle timber, iron, and palm oil exports. (http://npaliberia.com/operations/greenville/)		
Priority level	Medium	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	NO	Hazards	Not reported

		ENVIRONMENT	
LR4-e	100 - GREENVILLE - GRANCESS		
BASELINE			
Diagnostics	Almost deserted coastline very marked headlands with rocky banks jutting out into the sea and reefs. Numerous segments of straight coastline with narrow rims-lidos, wetlands and channels parallel to the shore.		
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	low	Monitoring - Observation	No recommendation
Protected Area	YES	Hazards	Local accretion situations in the mouths of small estuaries

Grand Kru-River Gee National Park (proposed) National Park : WDPa ID 555512169	LR4-e
A proposal was made in 2003 to classify the «Grend Kru» river area as a national park.	



Planned structure of the small town of Greenville

LR5 GRANCESS – CAP PALMAS

		ENVIRONMENT	
LR5-a	101 - GRANCESS		
BASELINE			
Diagnostics	Vast system of more or less wooded wetlands, coastal white sands and estuarine lagoons. Sector uninhabited in the eastern part. Granceess is a small town with a planned grid, including an attempted housing scheme. Road connection to the north on hills turned into savannah towards Niebo and rubber plantations. Track on a small terrace in the east; oil palm plantations.		
Dynamics	No information.		
Stakes	Conservation unit to be envisaged, development of ecotourism.		
Actions	Encourage low impact tourist development in organised circuits.		
Priority level	Low	Monitoring-observation	No recommendation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	low	Monitoring - Observation	No recommendation
Protected Area	NO	Hazards	Localised erosion

		ENVIRONMENT	
LR5-b	102 - GRANCESS - HARPER		
BASELINE			
Diagnostics	Coastline uninhabited except for two small villages. Two rocky headlands of probable landscape value. Several complexes of estuarine wetlands and lidos.		
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	low	Monitoring - Observation	No recommendation
Protected Area	NO	Hazards	Not reported

		ANTICIPATION	
LR5-c	103 - HARPER		
BASELINE			
Diagnostics	Estuarine site, town on rocky, hilly peninsula. Former administrative centre. Wetlands at the back of the estuary to the north. The surroundings of the town have been largely cleared. Future harbour town if the area undergoes significant development.		
Dynamics	No information.		
Stakes	Future centre of border area development?		
Actions	No recommendations.		
Priority level	Low	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	<p>The port of Harper is located in the South-eastern region of Liberia, close to the border with Côte-d'Ivoire, about 761 kilometres away from the port of Monrovia. It is built on the Russwurn Rocky Island, connecting the latter to the mainland via a causeway-bridge, protected by a 150-metre levee. Its activities are mainly related to the export of log and sawn timbers from the country's South-eastern hinterland.</p> <p>The port of Harper should be expanded to handle the traffic that will likely follow the palm oil sector's revival and other associated economic activities in the region. (http://npaliberia.com/operations/harper/)</p>		
Priority level	low	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	NO	Hazards	There are some sites faced with localized erosion



Port Harper in 2014 (Source: Google Earth) Port harper has not experienced any major works since 2010.

		ANTICIPATION	
LR5-d	104 - CAP PALMAS		
BASELINE			
Diagnostics	Small rocky area extending as far as Harper by a lagoon close to the coastline (lake Sheperd). Long fragile lido east of Harper. Border area which will possibly be subject to densification in the future.		
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	low	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	NO	Hazards	Not reported



The Cap Palmas area (mouth of the Cavally river) marking the border with Côte d'Ivoire remains relatively inhabited, probably due to its isolation.



Côte d'Ivoire

CI1 LIBERIA BORDER – SAN PEDRO

Echeloned coast with alternate small rocky headlands and creeks or long sandy coves. Change dynamics relate to very localised conditions on each site, surrounded by accentuated hilly landforms.

High density of micro estuarine lagoons, outlets of small coastal rivers.

Human land use density has long remained low towards the coastline and limited around the four agglomerations: Tabou, Grand Bereby, San Pedro and Sassandra. The completion of a full road link, located most often less than 10 km from the coastline, has already induced a post-forest agricultural situation that will be almost generalised in the medium term.

Generally, the habitations and villages remain some distance inland from the beaches.

The potential of attractive landscape sites locally sheltered from the ocean waves is important, but use is limited to local populations with motor vehicles. Tourist development projects have been envisaged (1970s and 80s),

but were restricted by lack of international investment.

A high densification of agriculture on the accentuated hilly landform highly unlikely and, in this context, maintaining satellite tracks from the coastal road will always remain costly.

Little tradition of fishing among migrants, more centred on the cash crops of coffee, cacao and staples, therefore not much interest for settlements on the sea front or beach.

In the long term, human land use of the coastline is only to be expected on sites subject to tourist development, with a national and international clientele.

When the time comes, accompaniment will be indispensable for investments to preserve attractive landscape and environmental resources, as well as caution regarding developments on the edge of the beach.

Côte d'Ivoire experienced several surge episodes that caused the destruction of building of infrastructure (2007, 201 and 2014).

		ENVIRONMENT	
CI1-a	105 - CAVALLY ESTUARY - LIBERIA BORDER		
BASELINE			
Diagnostics	Particular morphology of the estuary: sandy spits extending inwards. Two small villages on each side of the border. Complex of wetlands, woodland and various formations of vegetation. Sector largely cleared on the Côte d'Ivoire side to the edge of the coastline. Very sparsely populated.		
Dynamics	Highly unstable estuary outlet site.		
Stakes	No particular stakes, possible future densification in the event of a growth in activity on the Liberian side and possible development of a harbour town at Harper.		
Actions	Possible set up of transboundary protected area of approximately 10,000 hectares on Cavally estuary.		
Priority level	low	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	low	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	NO	Hazards	Not reported

		RURAL	
CI1-b	106 - TABOU WEST		
BASELINE			
Diagnostics	Sparsely populated sector. Large clearings.		
Dynamics	No remarks.		
Priority level	low	Monitoring-observation	No recommendation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	low	Monitoring - Observation	No recommendation
Protected Area	NO	Hazards	Not reported

		RURAL	
CI1-c	107 - WEST		
BASELINE			
Diagnostics	Town planned within the framework of the development of oil palms, with attempt at plot division of a satellite town in the east. Fluvial channel parallel to the sea shore, but separated from it by a wide terrace. Rocky spurs stabilising the river mouth. Today there is a good road connection with Abidjan.		
Dynamics	No remarks.		
Stakes	Few stakes in the future, low population density in nearby Liberia, San Pedro, 100 km away, looks more attractive as a centre for services and infrastructure connected towards the exterior.		
Actions	No action identified		
Priority level	low	Monitoring-observation	No recommendation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Possible impacts of the development of the San Pedro centre on the town of Tabou.		
Priority level	Low	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	NO	Hazards	Not reported

		ANTICIPATION	
CI1-d	108 - TABOU EAST		
BASELINE			
Diagnostics	Sector of sandy terraces, sparsely populated, straight coastline. Oil palm plantations on terraces and flattened hills towards the interior.		
Dynamics	Micro-outlets of estuaries and lagoons, typically filled in, but meanders of the river are breaching the narrow lido. Full reconfiguration of the river mouth in the long term if the lido is breached.		
Stakes	Future tourist development?		
Actions	No action identified		
Priority level	Low	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	NO	Hazards	Not reported

			ANTICIPATION
CI1-e	109 - GRAND BEREBY		
BASELINE			
Diagnostics	Area largely cleared with small villages on the edge of the coastline, but largely removed from the beach (no danger). Grand Bereby, small town with an attractive, slightly sheltered cove. South of Grand Bereby, seven east-facing, handsome coves with tourist potential		
Dynamics	Unstable beaches (erosion/accretion)		
Stakes	Future tourist development		
Actions	Anticipate development of building a hospitality infrastructure along the line of the beaches.		
Priority level	Low	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	NO	Hazards	Not reported

			ENVIRONMENT
CI1-f	110 - SAN PEDRO WEST		
BASELINE			
Diagnostics	Numerous coastal lagoons, isolated, sparsely populated area despite proximity of San Pedro.		
Dynamics	No remarks.		
Priority level	Low	Monitoring-observation	No recommendation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring - Observation	No recommendation
Protected Area	NO	Hazards	Not reported

			URBAN AND PORT
CI1-g	111 - SAN PEDRO URBAN AREA AND WEST PERIPHERY		
BASELINE			
Diagnostics	New town fully planned in the 1970s during the boom in forestry then in coffee and cacao that are more or less processed locally. Coastal-seafront road. Random, unplanned development of dwellings on the edge of wetlands north of the town, on flood-prone land, as the extension of the lower course of the river does not facilitate drainage and evacuation of spates.		

Dynamics	This sector is part of a system of mixed, echeloned coastlines typical of the west of Côte d'Ivoire. The entry channel to the port is protected against siltation by two piers preceded upstream of the drift by structures transversal to the coast (experimental groyne and rock-fill serving as dykes to stop the sand). This infrastructure has disrupted sediment transport, causing instability of the beaches between the port and the mouth of the San Pedro (reflective profile, scalloped bars). The general trend in the sector is towards erosion (between 0.3 and 1 m per year) with however, episodes of accretion west of the Port.		
Stakes	Role and place of San Pedro harbour in the country's economy. Airport area in the event of future tourist development. Feasibility and sustainability of intended works to extend the harbour area (a container park in particular) depending on the coastal dynamics observed.		
Actions	Improve drainage and management of rainwater. Relocate precarious settlements located in flood-prone area. Sector scheme for the entire urban coastline. In-depth studies prior to the extension of the port.		
Priority level	High	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	San Pedro is experiencing a relatively important growth thanks mainly to increased boat and goods traffic favoured by transshipment. San Pedro's port extension project: the port area should be extended from 5 to 23 ha. Offshore oil exploration. Establishment of new hotels.		
Characterization of port infrastructures	The Port of San Pedro is located in the South-western part of the country in a natural bay protected by two piers. It is run by Port Autonome de San Pedro, a State-owned company. It is the world first cocoa bean-exporting port. It is the country's second ports in terms of tonnage (3.5 million tonnes in 2012). It also includes a fishing facility covering a total area of 18 727 m ² (http://www.sanpedro-portci.com/site/)		
Priority level	Very high	Monitoring - Observation	Intense and regular
Protected Area	NO	Hazards	The shoreline's length has considerably diminished. This reduction was estimated at between 1 and 1.5 m/year during the 2008-2012 period. On the beach of the Balmer Rock, the shoreline diminished by 0.5 to 1.5m. This reduction is partly man-caused (port developments, sand extraction on the beach of the Digboué lagoon west of the port's channel).



San Pedro's port area



2009



2015

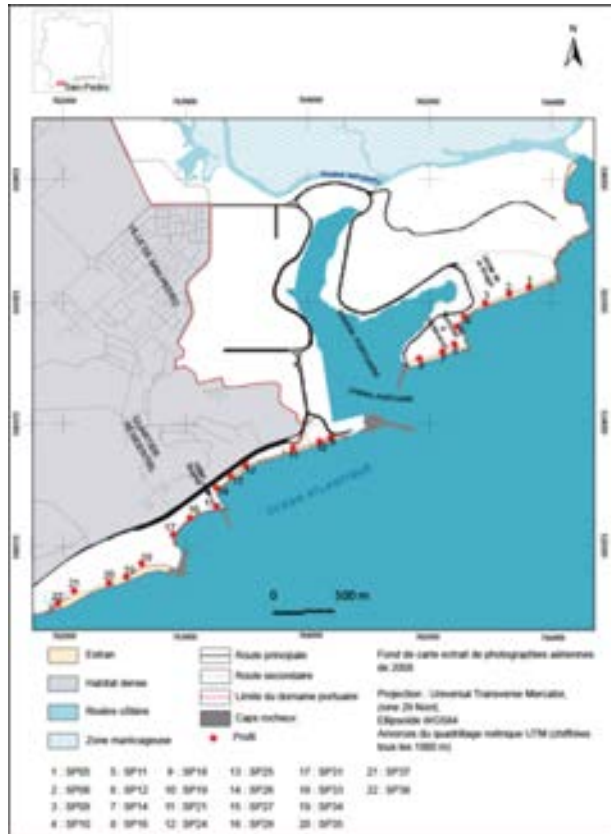
*Evolution of the San Pedro's port and related infrastructure between 2009 (above) and 2015 (below) Google Earth
The San Pedro's port has not known major works since SDLAO but ever-increasing earthmovings/clearings
are a sign of the port's dynamism.*



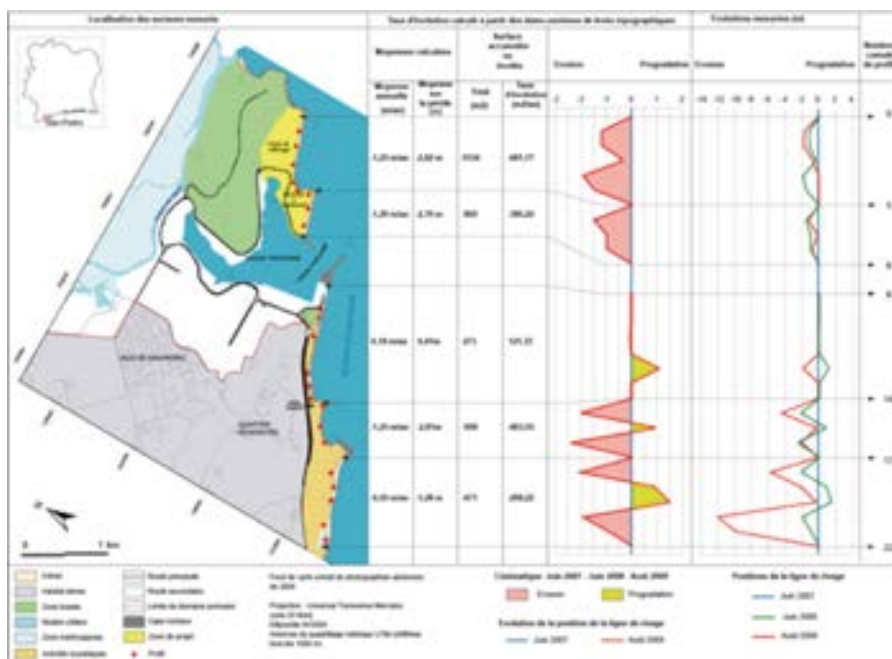
Road break east of San Pedro's sand quarry on the Digboué lagoon's beach (2009).



Intensive sand extraction on the Digboué lagoon's beach (2008)



Site of the San Pedro's port coastal perimeter
(Source: SDLAO, case study report on Côte d'Ivoire)



Evolution rate of the shoreline of the San Pedro's port coastal perimeter between June 2007 and August 2009 (Source: SDLAO, case study report on Côte d'Ivoire).

CI2 EAST SAN PEDRO - SASSANDRA - FRESCO

		ENVIRONMENT	
CI2-a	112 - EAST SAN PEDRO		
BASELINE			
Diagnostics	The west boundary is the San Pedro, the bed of which was shifted to develop the estuary into a harbour. Isolated, uninhabited coastline not accessible by road.		
Dynamics	To be analysed in each local situation.		
Priority level	Low	Monitoring-observation	No recommendation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring - Observation	No recommendation
Protected Area	YES	Hazards	Not reported

Monogaga's reserved forest	CI2-a
Monogaga's reserved forest: WDPA ID 29640	
The Monogaga's coastal area has a «reserved forest» status.	

		ENVIRONMENT & TOURISM	
CI2-b	113 - RIGHT BANK OF SASSANDRA		
BASELINE			
Diagnostics	<p>Forest reserve severely deteriorated and cleared in proximity to the coastal road and almost completely on the eastern third towards Sassandra. Uncleared patches remain, however, in particular, in the western part of the forest reserve and on the edge of the coastline. A few sites with tourist potential already slightly developed (Monogaga cove). Two small lagoons closed off by a micro barrier are of interest. In the absence of a drastic reduction in the clearing of the forest reserve, which is quite unrealistic given the current context, certain forms of protection could be considered at the level of the littoral strip (a band 1 km wide) with a status to be examined.</p> <p>Sassandra is a historical town, tourist centre in the same category as Grand Bassam. Hilly landscaped site, sheltered in places towards the eastern part. Pier, small harbour shelter with possible impact on the urban beach. Fishing centre. Interior estuarine site, potential for facilities for yachting if there is a passage into the estuary. Sassandra West hills close to the coastline, with a road serving all the plantations. On the coastline, numerous sites of beaches, coves and creeks with tourist potential. Sassandra and the vicinity have been the subject of tourist development studies.</p>		
Dynamics	Each local situation to be analysed. High rate of erosion nonetheless noted on the Monogaga site, threatening residential and tourist buildings (often substandard).		
Stakes	Preservation of the forestry environment and of the landscape and seaside resort appeal of beach sites with a view to developing high value added tourism.		

Actions	Sector scheme and anticipation of the development of hotel facilities on the most sought after sites (Monogaga for example).		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	NO	Hazards	Not reported

			ENVIRONMENT
CI2-c	114 - SASSANDRA LEFT BANK - DAGBEBO		
BASELINE			
Diagnostics	Site with tourist and landscape potential at the level of Dagbego. Headland oriented eastward and permanent lagoon. Wetland complex on the right bank and island. Site of potential value for biodiversity.		
Dynamics	Numerous fragile and unstable sites at the mouths of small estuaries (spits and lidos). To be analysed in each local situation.		
Stakes	Conservation of a system of wetlands and a potential for tourism and landscape exploration.		
Actions	No action recommended		
Priority level	Low	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	YES	Hazards	Not reported

Sassandra Complex - Dagbego Ramsar Site WII / Ramsar site: WII ID: 1CI002 – 1581 / WDPA ID : 902796	CI2-c
The Sassandra Complex - Dagbego Ramsar site was designated as a Wetland of International Importance/ Ramsar site on 18 November 2005 (10 551 ha), its delimitations are not available in the WDPA.	

		ENVIRONMENT
CI2-d	115 - DAGBEBO - FRESCO	
BASELINE		
Diagnostics	Coastline with little agricultural activity, but a land clearing face is advancing towards the coastline. Numerous small lagoons at outlets of small coastal rivers closed off by narrow sand barriers.	

Dynamics	Numerous fragile and unstable sites at the mouths of small estuaries (spits and lidos). To be analysed in each local situation.		
Stakes	Conservation of a system of wetlands and a potential for tourism and landscape exploration.		
Actions	No action recommended apart from efforts to conserve sites and natural ecosystems.		
Priority level	Low	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	YES	Hazards	Not reported

Dassieko's reserved forest Dassieko RF: WDPA ID 300966	CI2-d
The Dassieko's coastal area has a «reserved forest» status.	

CI3 FRESCO - ASSAGNY

Area of land completely cleared to plant coconut groves, scattered relicts of natural vegetation more or less interspersed. Of botanical value and for the biodiversity of the forest vegetation on sandy terraces to be confirmed.

		ENVIRONMENT
CI3-a	116 - FRESCO	
BASELINE		
Diagnostics	Lagoon complex of the South of Fresco. Very narrow littoral rim approximately 20 km long adjacent to lagoon complex, littoral channels, interconnected wetlands as far as the large Tadio lagoon. Ramsar site on the Fresco wetland. The Fresco lagoon is the only one in Côte d'Ivoire to shelter the two types of mangroves found in the country (lagoon and estuarine). The Fresco site is the articulation between the rocky, echeloned coasts in the west and the straight sandy coasts in the east.	
Dynamics	Numerous fragile and unstable sites at the mouths of small estuaries (spits and lidos). To be analysed in each local situation. At the level of the Fresco site, the barrier is undergoing erosion, announcing the situation of most of the sandy coastal areas towards the east. Episodic closures of the passes isolating the lagoons with risks of organic pollution.	
Stakes	Rich and diverse in terms of biodiversity related to wetlands complex, lagoons (varied milieus related to the hydrological system, flora and fauna of interest). Low human land used including on the coastline.	
Actions	No action recommended apart from efforts to conserve sites and natural ecosystems.	
Priority level	Low	Monitoring-observation Watch-keeping for the purpose of anticipation

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	YES	Hazards	Not reported

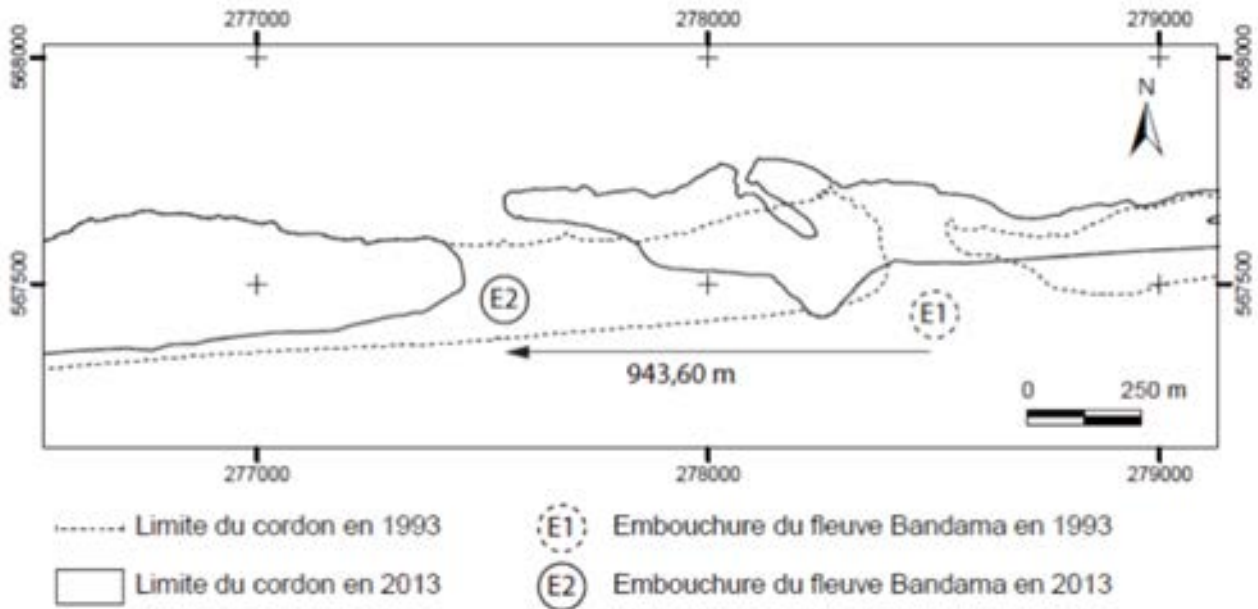
Fresco Ramsar Site WII / Ramsar site: WII ID: 1CI003 – 1582 / WDPA ID : 902797	CI3-a
The Fresco Ramsar site was designed as a wetland of international importance / Ramsir site on 18 October 2005 (15 507 ha).	

Port-Gautier's Reserved Forest Port Gautier's RF : WDPA ID 300965	CI3-a
The Port-Gautier's coastal area has a «reserved forest» status.	

			ENVIRONMENT
CI3-b	117 - WEST GRAND LAHOU		
BASELINE			
Diagnostics	Complex and dynamic estuarine area, reconfiguration of littoral rims in progress in relation to the deficit in sediment supply caused by the dam over the Bandama.		
Dynamics	Straight, apparently stable coastline.		
Stakes	Conservation of coastal forest relicts.		
Actions	Flora reconnaissance of the coastal forest relicts to be associated with Assagny conservation unit.		
Priority level	Low	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	NO	Hazards	Cloness of the Grand Lahou's area and impacts of the Bandama dam, though the sector is located upstream of the longshore drift.

			URBAN & TOURISM
CI3-c	118 - GRAND LAHOU, RIGHT BANK AND BANDAMA ESTUARY		
BASELINE			
Diagnostics	Initially situated on the rim near the mouth of the Bandama, the town was relocated 18 km inland. The reason given to justify this relocation is erosion of building land. Tourist vocation weakened by the generalised instability observed at Lahou Beach. Some evidence of forest vegetation covering twenty or thirty hectares must absolutely be preserved.		
Dynamics	<p>Dynamic area (average recession rate at the level of the Lighthouse: 1.7m per year). The sandy rim of Grand-Lahou is divided into two parts: To the west, the village of Kpanda and to the east, the town centre. The sandy rim is 365 m wide at the level of the village of Kpanda and 210 m wide in proximity to the river mouth. Impact of the sediment deficit related to Kossou dam built in the 1970s on the Bandama to be confirmed. The morphological variations of Grand-Lahou beach are cyclical, marked by the seasons, with periods of erosion and accretion corresponding to periods of high and low energy ocean waves.</p> <p>The erosion of the littoral rim destroyed the town's lighthouse. Over the period 1985-1990 erosion of approximately 2.5 m per year was observed. The lighthouse in the background was destroyed by erosion and was moved in 1989. The large quantity of sand transported from the west by the coastal drift current and the reduction in the flow of the Bandama contribute to the seasonal siltation of the lagoon passes.⁷</p>		
Stakes	<p>Value of the biodiversity of the Bandama delta wetlands complex.</p> <p>Threatened stability of all urban and tourist installations situated on the sand spit of the river mouth. Deterioration and deforestation of mangroves, increasing the instability of the lagoon shores. Tendency towards episodic closure of the river mouth affecting fishing activities.</p>		
Actions	Inform occupants of the sandy spit in the estuary. Possible development programme to be examined in a highly dynamic context where impacts must be anticipated and properly assessed.		
Priority level	Very high	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Project on creation of an oceanographic centre north of the lagoons. Oil exploration, project on creation of a fishing port and a school.		
Coastal protection	Project on stabilization of the Bandama river's mouth		
Priority level	Very high	Monitoring - Observation	Intense and regular
Protected Area	NO	Hazards	Retreat of the shoreline by 19 to 23 m between 2008 and 2015, representing a 2 to 3 m/year recess rate. Migration towards the Tagba lagoon's channel, causing a lateral erosion of the Lahou-kpanda offshore bar on about 600 m between 2011 and 2012; The cumulative distance since 1993 is 1.5 km.

⁷ Koffi.P. 2001.- *Quelques aspects de l'érosion actuelle de l'unité littorale de Côte d'Ivoire (Golfe de Guinée)*. 8p.



Migration towards the western part of the Tagba lagoon between 1993 and 2013 (source HAUHOUOT C., 2014)

The coastline forms a narrow shoestring sand isolating the Tagba lagoon from the Atlantic Ocean. The Lagoon and the ocean are connected by a narrow channel that also serves as a marine outlet for the Bandama river. This confluency has for a long time made the site attractive during the country's recent history. It was a privileged place for trade exchanges between Europeans and local populations, under the French colonial domination. Serving as the river's mouth, the shoestring sands are exposed to marine and river forces, the contrasts of which make the site erosion-prone.



The Tagba lagoon's channel in Grand Lahou (MINESUDD, 2011)



Destruction of the shoestring sands and the Lahou-kpanda habitat (Source: Hauhouot and Pourinet 2015)

			ENVIRONMENT
CI3-d	119 - LEFT BANK OF BANDAMA		
BASELINE			
Diagnostics	Very narrow, sparsely populated rim bordered by channels and wetlands, complex terraces with gouged channels. Coconut groves bordered in the north by Assagny canal, south border of National Park.		
Dynamics	Erosion. Impact of the sediment deficit related to the Bandama dam to be confirmed.		
Stakes	Value of the biodiversity of the Bandama delta wetlands complex.		
Actions	Apply provisions for management and development of Assagny National Park.		
Priority level	Medium	Monitoring-observation	No recommendation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Oil exploration, project on creation of a fishing port and a school. Project on creation of an oceanographic centre north of the lagoons.		
Coastal protection	Studies have been initiated to identify solutions for the sustainable management of the shoreline.		
Priority level	Medium	Monitoring - Observation	Watch-keeping for the purpose of anticipation
Protected Area	YES	Hazards	Retreat of the shoreline by 13 m between 2008 and 2014, representing a 2.5 m/year recess rate. West-ward migration of the Bandama river's mouth, causing much damage, especially in buildings.

Azagny National Park (IUCN Category II) National Park WDPA ID 7522 Azagny Ramsar Site WII / Ramsar site: WII ID: 1CI001 – 790 / WDPA ID : non-existent	CI3-d
The Azagny national Park was created by decree n°81/218 of 2 April 1981 on the creation of the Azagny National Park as well as a protective peripheral area.	
The Azagny National Park Ramsar site was designed as a wetland of international importance / Ramsar site on 27 February 1996 (19 400 ha).	

CI4 RURAL SECTOR ASSAGNY – JACQUEVILLE - ABIDJAN WEST

Straight, rather homogenous coastline, with generalised extension of large coconut groves on sandy terrace. Planned villages served by road or track on sand parallel to the coast. Positioned inland and not at risk from the sea.

Despite the proximity of Abidjan and the ferry connection that crosses the lagoon, very little evidence of seaside homes other than the huts associated with the plantations. The attractive coastline is rather the Ebrié lagoon, which has numerous residences along the edge of the lagoon, and boating facilities.

		RURAL	
CI4-a	120 - ASSAGNY - JACQUEVILLE		
BASELINE			
Diagnostics	End of the hard-surfaced road, but improved track on sand some way back from the beach. Same scheme as for the following sectors: villages with planned grids amidst the plantations. Assagny canal, very narrow lagoonal channels on the edge of the beach.		
Dynamics	Straight shoreline, very slight, practically imperceptible undulations (period: approximately 10 to 15 km).		
Stakes	No particular stakes, rural coconut groves, except for a few exceptions, localised some distance from the beach		
Actions	No recommendations.		
Priority level	Medium	Monitoring-observation	No recommendation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring - Observation	No recommendation
Protected Area	NO	Hazards	Not reported

		ANTICIPATION	
CI4-b	121 - JACQUEVILLE		
BASELINE			
Diagnostics	Small centre town surrounding an improved lagoon. Like all the planned villages in the sector, the initial grid allows for a natural strip of coconut trees on the edge of the beach. Locally, the buildings are nonetheless beginning to move closer to the beach. Hard-surfaced road connection to Abidjan.		
Dynamics	Straight shoreline, very slight, practically imperceptible undulations (period: approximately 10 to 15 km).		
Stakes	Stakes essentially related to human land use on the edge of the lagoon, but also to vigilance regarding the advancement of building between the coastal track and the beach.		
Actions	No action recommended		
Priority level	Low	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Development of 4 offshore oil fields (Foxtrot), Marlin and Manta platform. Construction of a dry support bridge.		
Priority level	Medium	Monitoring - Observation	Regular
Protected Area	NO	Hazards	Accretion of the beach. The extension of the shoreline between 2012 and 2015 is estimated at 0.8m.

		ANTICIPATION	
CI4-c	122 - JACQUEVILLE - WEST ABIDJAN		
BASELINE			
Diagnostics	This sector runs along the Vridi canal, an area adjacent to the lagoon, where urbanisation is in progress. The littoral part is scarcely used, and comprises sandy terraces that are not very fertile where only a few coconut palms are planted. Practically empty sector (land reserve?)		
Dynamics	Straight shoreline, very slight, practically imperceptible undulations (period: approximately 10 to 15 km). Slight tendency to accretion west of Vridi pier. Green front of coconut trees on the edge of the beach.		
Stakes	Stakes essentially related to land use on the edge of the lagoon.		
Actions	Anticipation of the development of land use and sector scheme if it becomes denser.		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Progressive expansion of the habitat on former coconut plantations.		
Priority level	Medium	Monitoring - Observation	Regular
Protected Area	NO	Hazards	The sector is experiencing an accretion in its Eastern part at the Vridi canal

Banco National Park (IUCN Category II) National Park WDPA ID 7525	CI4-c
The Banco area was classified as forest reserve in 1926 then as a reserved forest in 1929.	
The Banco national park was created in 1953 by the decree of 31/1053 (3474 ha).	

CI5 RURAL ABIDJAN – PORT BOUET

Continuous urban area, with breaks on each side of the airport, situated directly opposite the Trou sans Fond (deep underwater canyon gouged out of the continental shelf directly below Abidjan).

Growth towards the north and east (unplanned habitation east of the airport).

Sandy terrace site, easy to equip.

		URBAN AND PORT	
CI5-a	123 - PORT BOUET		
BASELINE			
Diagnostics	Structured urban district including habitation and activities related to the port. Added to this are tourist installations (beach edge restaurants) and substandard habitations the most often in proximity to the beach. A protection plan based on a battery of eight 100-metre buoyant breakwaters at 400 to 450-meter intervals was drawn up but never implemented (mainly due to the cost). Works to widen Vridi pass are being considered. Exceptional ocean waves (due to a seismic event) in 2007, then in 2008 seriously affected this sector, with losses of dwellings and a beach recession of more than 15 m (source: national diagnostic study).		
Dynamics	Sector undergoing very active erosion. Impact of Vridi pier and sediment trap of the Trou sans Fond located perpendicular to the sector. Beach still in existence, with highly reflective profile, partly constituted of materials from the initial eroded terrace, large grain size of sand. The drop in removal currents due to the shifting of the water course towards the Vridi canal encouraged this process (case study).		
Stakes	Numerous dwellings and tourism infrastructure seriously threatened and exposed. Local impact of beach walls and "spontaneous" protective structures built by the locals. Stability of the infrastructure of the mouth of the channel giving access to the port.		
Actions	Risk prevention plan and preparation of the population. Ideally, dwellings should be requalified and relocated further from the beach. Control of the proliferation of individual installations for defence and protection. Planning and re-qualification of the seafront (sector scheme).		
Priority level	Very high	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	(i) Many building destructions, displacement of populations, (ii) Extension and development of the Abidjan's port, (iii) Implementation of a master plan for the town of Abidjan (iii) Private-owned facilities for building-strengthening and anti-erosion purposes.		
Characterization of port installations	<p>The port of Abidjan comprises the Vridi canal that gives access to lagoon waters hosting the different breakwaters and wharves. (http://www.portabidjan.ci/)</p> <p>The operation of the Port of Abidjan and its containers terminal was entrusted to Bolloré Africa Logistics in 2015 for a 15-year period.</p> <p>A refurbishment operation is under way (commission of 8 new RTG container crane on wharf 21).</p> <p>Bolloré Africa Logistics manages the Satirail rail concession (1 260 km network connecting Abidjan, Ouagadougou and Kayes).</p>		
Priority level	Very high	Monitoring - Observation	Intense and regular
Protected Area	NO	Hazards	Major erosion in all the Easter part of the Vridi canal, retreat of the shoreline by 0.5 to 3 m/year. Important retreat during storm tides, especially in August 2011 and May 2014. Potential landslides in the western part of the Trou Sans Fond heads (submarine canyon).

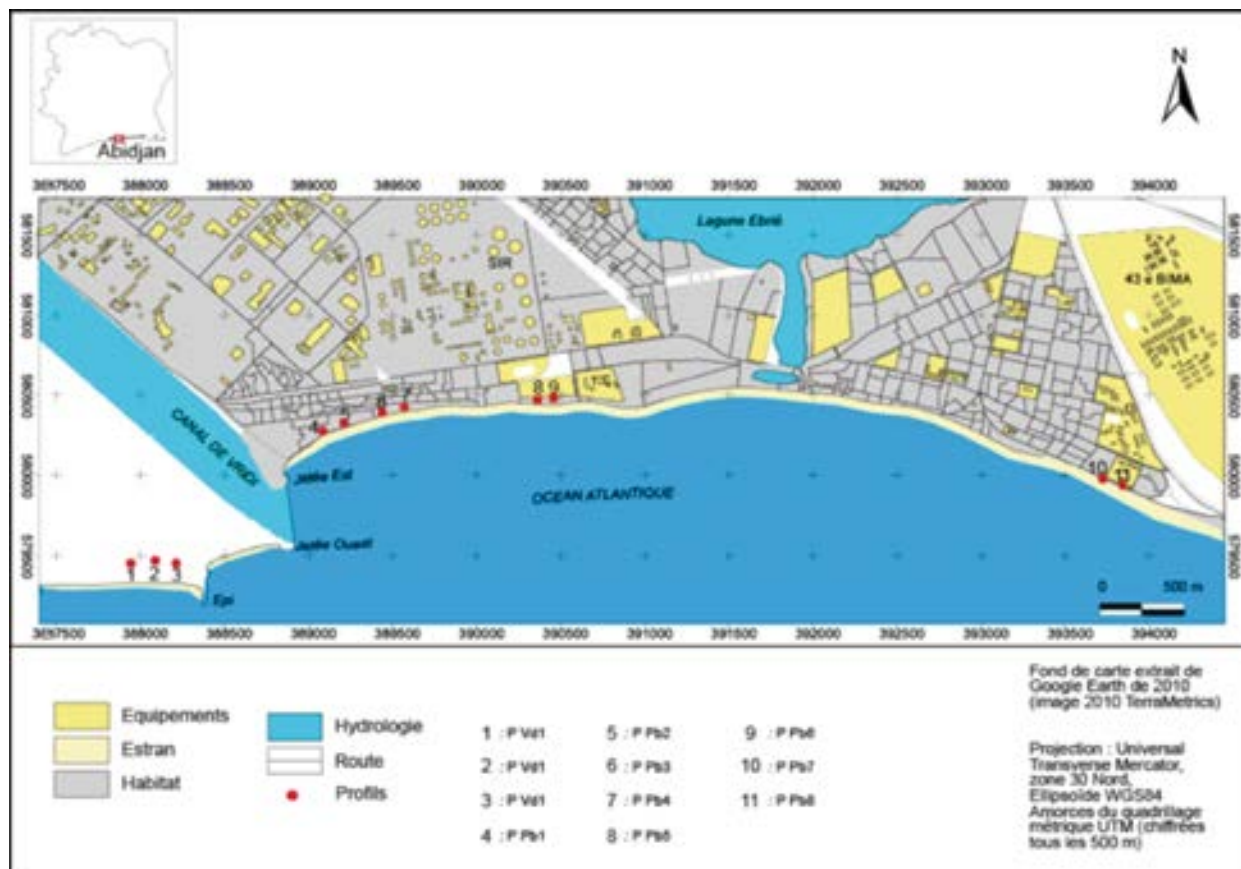


2010



2015

Evolution of the port of Abidjan and related infrastructures between 2010 and 2015 (Source: Google Earth)
 The Port of Abidjan has been subject to many expansion works through earthmoving on the lagoon's area since 2010.



Site of the Vridi-Port Bouet Abidjan-Côte d'Ivoire coastal perimeter (Source: SDLAO, case study report on Côte d'Ivoire)



Mouth of the Vridi canal (source MINESUDD, 2011)



Breakwater lines facing a protective wall in front of Coco Beach. Port-Bouet, Abidjan (October 2003). Source: SDLAO's detailed case study report, Côte d'Ivoire).



Destruction of upper-beach installations East of these installations of the mouth of the port's channel access (MOLOA)

			URBAN
CI5-b	124 - PORT BOUET EAST		
BASELINE			
Diagnostics	Dense habitation on a narrow coastal strip bounded by the main road (dual carriageway from the airport). Density increases from the airport. Only green footprint is the break in urbanisation constituted by the airport. Totally privatised area little organised access to the beach. The progression of the sea contributes to the weakness of the constructions in the immediate vicinity of the beach. Sand extractions in several points.		
Dynamics	Sector undergoing progradation or stable in places. The oscillations due to the effects of the storm in 2007 and the consecutive reconstitution of the beach in the years that followed should not conceal the very unstable nature the sector.		
Stakes	Progressive privatisation of the beach. Continued densification of urbanisation north of the coastal road, as the plots to the south on the edge of the beach are already used. Future densification by division into concessions should be considered. Urban sprawl with the corresponding costs of equipment, roads, etc. Management of urban effluent.		
Actions	Risk prevention plan and preparation of the population in the event of surges. On the whole eastern part of the sector, requalification and relocation of habitations further back from the road. Planning and requalification of the seafront (sector scheme).		
Priority level	Very high	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Many cases of building destruction, displacement of populations. Potential threats on one portion of the airport's strip and on the coastal road, Construction of the Abidjan-Grand Bassam highway (2013-2014)		
Priority level	Very high	Monitoring - Observation	Intense and regular
Protected Area	NO	Hazards	Retreat of the shoreline by 0.5 to 3 m/year; This retreat with exacerbates (by 6 to 8 m) by the storm tides of August 2011 and late May 2014.





Future cut scene of the shoreline along the Airport-Anani highway (source Koffi et al., 2014)

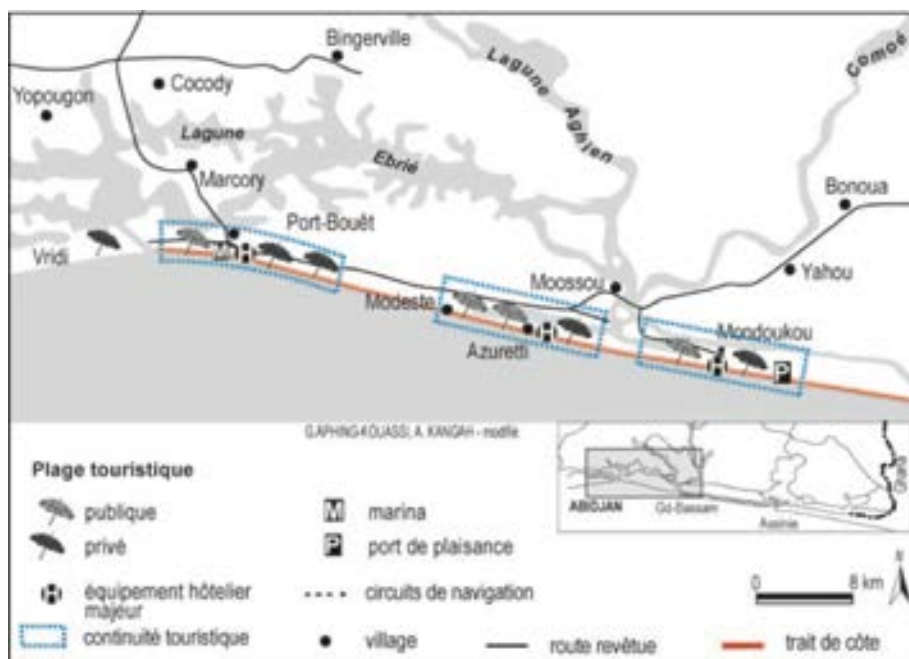
CI6 PERIURBAN AREA EAST ABIDJAN – GRAND BASSAM

		URBAN	
CI6-a	125 - ABIDJAN EAST PERIURBAN AREA		
BASELINE			
Diagnostics	Vast terrace with no channels or lagoons. Coastal road inland (300m). "Rurban" residential strip along the beach, surveyed and continuous with coconut plantations. Vast "projects" to create plots for building inland from the beach. Progressive densification of habitation approaching Abidjan.		
Dynamics	Sector undergoing active erosion.		
Stakes	Progressive privatisation of the beach. Continued densification of urbanisation north of the coastal road, as the plots to the south on the edge of the beach are already used. Future densification by division into concessions should be considered. Urban sprawl with the corresponding costs of equipment, roads, etc. Management of urban effluent.		
Actions	Urban organisation and structuring of the districts divided into building plots (centre district?), equipment. Inform the populations and residents on the edge of the beach.		
Priority level	High	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Construction of the Abidjan-Grand Bassam international highway (2013-2014), a section of the Abidjan-Lagos corridor. Renovation and enlargement of the former Abidjan-Grand Bassam road		
Priority level	High	Monitoring - Observation	Intense and regular
Protected Area	NO	Hazards	Moderate sensitivity of the shoreline with retreating, stable of expanding sectors (km 26 beach). Significant impacts of the storm tides of August 2011 and May 2014, Marine submersion of lidos

URBAN & TOURISM			
CI6-b	126 - GRAND BASSAM WEST COAST		
BASELINE			
Diagnostics	Habitation on very narrow rim-lido. Strong tendency to build, including in at risk areas. In the western party, widening of the terrace. Coastal road near the beach (60 to 200 m).		
Dynamics	Sector undergoing active erosion. Sector was subject to damage and flooding during storm surges associated with ocean swell.		
Stakes	Strong tendency to build on the edge of the beach (linear sprawl of coconut groves), development of residential buildings close to urban Abidjan. Progressive privatisation of the beach.		
Actions	Reconquer land ownership control, supervision and limitation of the development of building. Inform the populations and residents on the edge of the beach. Reconquer land ownership control, supervision and limitation of the development of building.		
Priority level	Very high	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Construction of the Abidjan-Grand Bassam international highway (2013-2014), a section of the Abidjan-Lagos corridor. Renovation and enlargement of the former Abidjan-Grand Bassam road		
Priority level	Very high	Monitoring - Observation	Intense and regular
Protected Area	YES	Hazards	Moderate sensitivity of the shoreline with retreating, stable of expanding sectors (km 26 beach). Significant impacts of the storm tides of August 2011 and May 2014. Marine submersion of lidos



Erosion on the beach of Mondoukou in Grand Bassam (source: MOLOA country branch of Côte d'Ivoire)

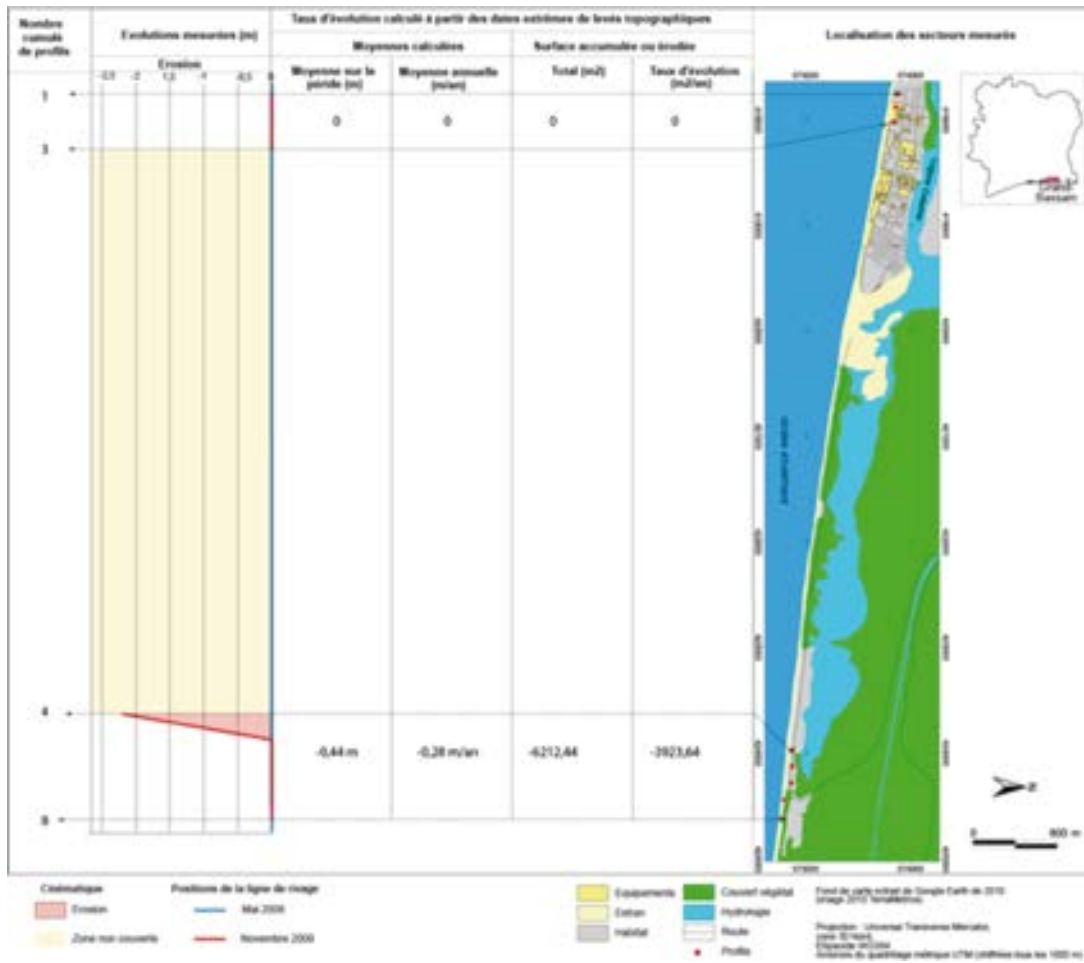


Tourist facilities on the Abidjan-Grand-Bassam road (source: Apling-Kouassi, 2008)

			URBAN
CI6-c	127 - GRAND BASSAM		
BASELINE			
Diagnostics	Historical town on a narrow terrace adjacent to a lagoon, almost insular position, area suitable for urbanisation on the site is practically saturated, hence growth spreading north and east. Road link to Abidjan.		
Dynamics	Precarious stability. Risk of a combination of continental flooding and storm surge.		
Stakes	High risks for all the dwellings on the edge of the beach (residential, tourism, old habitations and precarious dwellings spreading east along the very narrow rim-lido and on the low-lying land on the shore of the lagoon).		
Actions	Detailed flood-submersion risk prevention plan. Inform the population and residents on the edge of the beach. Resorption and relocation of precarious dwellings on the edge of the beach.		
Priority level	High	Monitoring-observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Project to reopen the mouth of the Comoe River ; Project to rehabilitate the historic town of Grand Bassam. The historic city of Grand Bassam was designated in 2012 as a UNESCO World Heritage for cultural criteria (iii) and (iv).		
Priority level	High	Monitoring – Observation	Intensive and regular
Protected area	YES	Hazards	Sedimentary filling of the mouth of the Comoe, organic pollution of the lagoon of the mouth; Moderate retreat of the coastline and frequent marine submersion. Regression of the coastline of 8m i.e. 1m/year between 2008 and 2015. Exacerbation of the retreat by storm surges (2011 and 2014).

Grand Bassam Ramsar Site ZHII / Ramsar site : ZHII ID : 1CI004 – 1583 / WDPA ID : 902798	CI6-b CI6-c CI6-d
Grand Bassam Ramsar Site was designated as a Wetland of International Importance/Ramsar Site on Tuesday, October 18, 2005 (40,210 ha).	

		TOURISM	
CI6-d	128 - BASSAM ESTUARY LEFT BANK		
BASELINE			
Diagnostics	Narrow terrace with coconut groves adjacent to a lagoon served by a permanent road, connected to the Bonoua, Grand Bassam, Abidjan main road. Materials extraction sites. Off-road vehicles drive on the sand of the estuary which is blocked most of the time.		
Dynamics	Erosion observed (Mondoukou). Dynamics of siltation and temporary openings of the estuary. Fragility of the rim – lido at very low elevation. Sensitivity to surges and flooding of the lagoon system.		
Stakes	Tendency towards residential development in coconut groves for wealthy urban population. Annex of Grand Bassam, but coastal habitations at risk.		
Actions	Detailed flood-submersion risk prevention plan. Inform the population and residents on the edge of the beach. Resorption and relocation of precarious dwellings on the edge of the beach.		
Priority level	High	Monitoring-observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	High	Monitoring – Observation	Intensive and regular
Protected area	YES	Hazards	Moderate retreat of the shoreline and frequent marine submersion. Retreat of the shoreline of 2.3m i.e. 0.76m/year between 2011 and 2014. Strong Impacts of August 2011 and May 2014 storm surges.



Rates of shoreline change on the littoral perimeter of Grand-Bassam. Source: case study.



Filling of the mouth of the Comoé in Grand Bassam (source Google Earth)

CI7 SANDY TERRACE AND COCONUT GROVES IN EASTERN COTE D'IVOIRE

			ANTICIPATION
CI7-a	129 - GRAND BASSAM – ASSINIE		
BASELINE			
Diagnostics	Wide terrace bordered by the Assinie canal in the north. Vast coconut palm plantations, scattered dwellings (plantation huts), practically no villages. "Sand" track used by traffic including off-road vehicles on the edge of the beach. Connected to the road system by a north branch towards Bonova. The Assinie canal is not very functional today.		
Dynamics	Straight shoreline with a tendency to wide undulations (period approximately 10 km) rather unstable.		
Stakes	Residences conquering the coconut groves, with no strong densification of habitation or population.		
Actions	Implementation of a sector scheme if land use were to become significantly denser.		
Priority level	Low	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring – Observation	Watch-keeping for the purpose of anticipation
Protected area	NO	Hazards	Moderate retreat of the shoreline and frequent marine submersion. Strong Impacts of August 2011 and May 2014 storm surges.

			ENVIRONMENT & TOURISM
CI7-b	130 - ASSINIE AND MOUTH OF THE ABI LAGOON		
BASELINE			
Diagnostics	Long lido of Assinie isolating a longitudinal lagoon from the shore. Estuary of the lagoon system Abi + river Bia (nearby dam) and river Tano originating in Ghana. Estuarine islands and lagoon-ocean contact. Protected site, biologically valuable. Ehotile islands national park. Centre of tourist activity with installations essentially located on or in proximity to the lido.		
Dynamics	Estuary mouth clearly open and symmetrical, however, naturally fragile and unstable site. Straight shoreline with a tendency to wide undulations (period approximately 15 km) rather unstable. High rate of erosion observed towards Assinie. "Assouindé and Assinie beaches are tourist resort sectors par excellence. Given the narrow rim (sea-lagoon) and its very low coast, the tourist infrastructure is frequently and periodically submerged in this area. Erosion and especially submersions during exceptional storm or equinox tides in this part of the littoral area, have become a cause for concern to the extent that some of the economic operators installed in the area move their facilities and others totally abandon them (VALTUR holiday club and Club Med). This state of affairs has a considerable effect on the principal economic activity (tourism)". Source: case study		
Stakes	Maintain a secure tourism potential. Main mangroves stands on the coast of Côte d'Ivoire. Conservation of protected milieus in the context of the National Park.		
Actions	Detailed flood-submersion risk prevention plan. Inform the population and residents on the edge of the beach. Seek suitable architecture solutions to maintain reception capacities in an at-risk situation. Relocation of the most threatened facilities. Developments are certainly not recommended on this site.		
Priority level	Very high	Monitoring-observation	Intensive and regular

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Very high	Monitoring Observation –	Intensive and regular
Protected area	YES	Hazards	Moderate retreat of the shoreline and frequent marine submersion. 11m retreat from the shoreline between 2008 and 2012 in Assouindé related to the storm surge of August 2011. Progradation of the foreshore at the west of the mouth of the Aby lagoon.

<p>Reserved forest of Nganda Nganda RF of Nganda Nganda : WDPA ID : 300964</p> <p>Nganda Nganda Ramsar Site WII / Ramsar site : WII ID : 1CI006 – 1585 / WDPA ID : 902800</p>	<p>CI7-b CI7-c</p>
<p>Nganda Nganda Ramsar Site was designated as a Wetland of International Importance/Ramsar Site on October 18, 2005 (27 274 ha) (the Ramsar site map is not included in the WDPA)</p>	

<p>NATIONAL PARK OF EHOTILE ISLANDS (IUCN Cat II) National Park : WDPA ID : 20174</p> <p>Ramsar Site of Ehotile Islands ZHII / Ramsar site : ZHII ID : 1CI004 – 1584 / WDPA ID : 902799</p> <p>Proposed World Heritage Site of Ehotile Islands UNESCO WH ID : 2099</p>	<p>CI7-b CI7-c</p>
<p>The National Park of Ehotile Islands was created by Decree 74/179 of April 25,1974 designating the National Park of Ehotile Islands.</p> <p>The Ramsar Site of Ehotile Islands - Essouman was designated as a Wetland of International Importance/Ramsar Site on October 18, 2005 (27,274 ha) (the Ramsar site map is not included in the WDPA)</p> <p>The national park of Ehotile Islands is included in the indicative list of UNESCO World Heritage sites since 2006, which Côte d'Ivoire intends to propose for classification.</p>	



Assouindé beach (Hauhouot C, 2011)

		ANTICIPATION	
CI7-c	131 – EAST ABI LAGOON		
BASELINE			
Diagnostics	Terraces partially planted with coconut palms. Sparsely populated area (compared to the adjacent part in Ghana). Isolated sector, except for small track towards Ghana.		
Dynamics	No remarks.		
Stakes	Area included in the Ehotile islands National Park, compatibility of this status with farming activities on terraces and in the National Park.		
Actions	No recommendations		
Priority level	Low	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Low	Monitoring – Observation	Watch-keeping for the purpose of anticipation
Protected area	YES	Hazards	Strong Impacts of August 2011 and May 2014 storm surges. Shore erosion in Assinie France (Immediate East) between 2011 and 2015 due to the dynamics of the mouth of the Aby lagoon



Ghana

GH1 SANDY TERRACE AND COCONUT GROVES WEST GHANA – COTE D'IVOIRE

The main characteristics of the area are summarised as follows:

Sandy rims – lidos frequently isolated by long lagoonal channels very close to the littoral area (around forty segments not all drawn at 1:500,000).

Habitations in numerous large villages, served by roads and tracks on terraces stretching along the littoral area. Indirect connection to the main road. Little communication with Côte d'Ivoire.

Some villages installed right to the edge of the beach, some adjacent to the nearby lagoon. Risks related to storm surges, alternating accretion/erosion of beaches related to the sediment wave. Straight – undulating littoral area (sediment “trains”).

It was not possible to detail the characteristics of the three sectors due to a lack of pictures of usable quality.

				ANTICIPATION
GH1-a	132 - COTE D'IVOIRE – BONYERE BORDER			
BASELINE				
Diagnostics	Wide sandy terrace and dense habitation behind vast complex of diversified wetlands. Probable biological value, but strong human pressure on the periphery. Numerous villages located on the edge of the shore.			
Dynamics	Apparently stable littoral area apart from outlets and small estuaries.			
Stakes	No information.			
Actions	No recommendations			
Priority level	Medium	Monitoring-observation		Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010				
Evolution of stakes	Not reported			
Priority level	Medium	Monitoring – Observation		Watch-keeping for the purpose of anticipation
Protected area	NO	Hazards	Not reported	

				ANTICIPATION
GH1-b	133 - BONYERE – EKWE			
BASELINE				
Diagnostics	Narrow rims and lagoonal channels more or less parallel to the shore of type 3C. Numerous villages located on the edge of the shore.			
Dynamics	Apparently stable littoral area. Straight, slightly undulating littoral area. Lagoonal channels behind.			
Stakes	Numerous villages situated on the terrace between littoral area and channels, especially in the western part of the area.			

Actions	Anticipate tourist development as a prolongation of Axim.		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Atuabo gas plant, road projects, port construction project		
Priority level	Medium	Monitoring – Observation	Regular
Protected area	NO	Hazards	Beach sand extraction for construction
			ANTICIPATION
GH1-c	134 - EKWE - KIKAM		
BASELINE			
Diagnostics	Wide terrace. Start of rocky Ghana coast on the east end of the sector.		
Dynamics	Apparently stable littoral area. Straight, slightly undulating littoral area.		
Stakes	No information.		
Actions	Anticipate tourist development as a prolongation of Axim.		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Protected bird habitat in Essiama to be confirmed		
Priority level	Medium	Monitoring – Observation	Watch-keeping for the purpose of anticipation
Protected area	NO	Hazards	Not reported

GH2 CAPE THREE POINTS

Area which has considerable potential in sites with a tourist vocation:

- Landscape of interest: landform and vegetation surrounding the sites with creeks and coves.
- Position sheltered from the prevailing ocean waves on numerous sites.
- For a large part, road connection by tracks connected in branches to the main road (with, however, maintenance constraints due to the nature of the soils and landform). The road network on hillsides could generate the start of erosion, to be controlled.

		TOURISM	
GH2-a	135 - THREE POINTS WEST		
BASELINE			
Diagnostics	Numerous sites with tourist potential, some with a lagoon behind the rim. Connected by more or less permanent tracks, close to the littoral area for certain sections. Start of a «panoramic track» leading to accommodation or lodges offering view points. Main centre, the small town of Axim, landscape site with rocky islet. Fishing point connected to the major coastal road, lagoon and estuarine system.		
Dynamics	Sandy beaches, fragile creeks and coves, in particular the rims and lidos on the edge of the lagoon which are attractive for tourist facilities. Prevailing exposure to ocean swell.		
Stakes	Same as East sector for controlled tourist development, roads, tracks and facilities on the edge of the beach respecting the natural areas and the surrounding landscape.		
Actions	Anticipate tourist development as a prolongation of Axim. Organise tourist operators with a view to harmonising facilities with the landscape and the environment. Anticipation of tourist development.		
Priority level	High	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Miami new port construction project		
Coastal protection	Anti-erosion facilities in Axim, Princess town, Dixcove		
Priority level	High	Monitoring – Observation	Regular
Protected area	NO	Hazards	Strong erosion reported in Axim



Impacts of the erosion in the Axim sector (MOLOA country branch of Ghana)

		ENVIRONMENT & TOURISM	
GH2-b	136 - THREE POINTS CENTRE		
BASELINE			
Diagnostics	Main rocky coast site of the whole littoral area studied; Still isolated; Very hilly, wooded agricultural vegetation and slash-and-burn staple crops.		
Dynamics	High energy ocean waves on the rocky headlands. Narrow, fragile coves and sandy creeks with low sediment reserves.		
Stakes	Status of protected area desirable, natural area of value in terms of landscape, aesthetics and leisure activities. Restrict access of vehicles and equipment on rambling paths		
Actions	Organise tourist operators with a view to harmonising facilities with the landscape and the environment. Regulatory initiatives to be taken to strengthen the preservation of the area.		
Priority level	High	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	High	Monitoring – Observation	Regular
Protected area	NO	Hazards	Not reported

		TOURISM	
GH2-c	137 - THREE POINTS EAST		
BASELINE			
Diagnostics	Numerous sites exposed east - south-east and therefore quite sheltered. Small villages on each sheltered cape. Tourist lodges already present.		
Dynamics	Beaches adjacent to narrow terraces, with low sediment reserves but systematically anchored on small headlands and points.		
Stakes	Tourist facilities will be developed in the future. Local impact to be assessed for installations on the sea edge and for the connecting road network. Control of future installations in terms of both landscape and ecology, with the maintaining of green spaces to be protected.		
Actions	Organise tourist operators with a view to harmonising facilities with the landscape and the environment. Anticipation of tourist development.		
Priority level	High	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Headland/observatory(oil spill detection) source MOLOA country branch of Ghana		
Coastal protection	Armouring/200m dyke at Dixcove		
Priority level	High	Monitoring – Observation	Regular
Protected area	NO	Hazards	Some sites affected by erosion

GH3 URBAN SECTOR AND PERIURBAN EXTENSION OF SEKONDI - TAKORADI

Urban site with complex topography, numerous small breaks of wetlands. Predominantly rocky coast, two main ports and annexes with piers intended to improve the natural position of sheltered cape. Beaches of coves and creeks with low sand reserves, very sensitive to port developments.

				ANTICIPATION
GH3-a	138 - APOWA – TAKORADI			
BASELINE				
Diagnostics	Clear green break in urbanisation by estuarine wetlands. Three traditional villages with dwellings on the edge of the beach. Agriculture encroaching, residences in large huts. Possibility of building on the area often limited by small wetlands. Handsome cove beach.			
Dynamics	No remarks.			
Stakes	Risks for habitations in villages on the edge of the beach.			
Actions	Land ownership control, to avoid urban sprawl on the break in urbanisation. Anticipate tourist development on Apowa–Takoradi Beach.			
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation	
DEVELOPMENTS SINCE 2010				
Evolution of stakes	Not reported			
Priority level	Medium	Monitoring – Observation	Watch-keeping for the purpose of anticipation	
Protected area	NO	Hazards	Not reported	

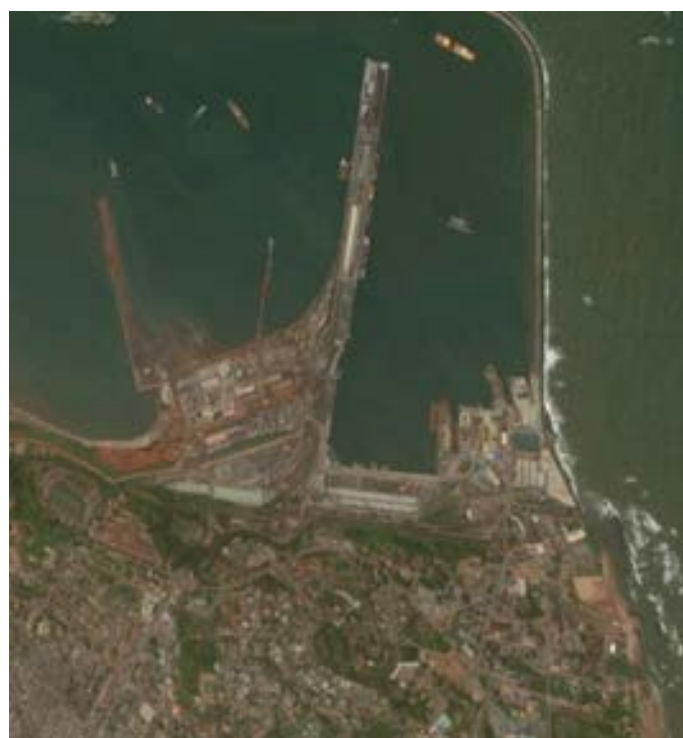
				URBAN & PORT
GH3-b	139 - TAKORADI			
BASELINE				
Diagnostics	Seaside road in the north of the sector on rock fill. Residential districts at risk north of the port installations.			
Dynamics	The beach will very probably disappear, in a context of a littoral area with poor sediment reserves.			
Stakes	Possible restoration of an urban beach. The North Port road is flood-prone and unstable, fully exposed to ocean waves. Deterioration of port installations (including underwater pipeline) following erosion and extraction of materials.			
Actions	Stop the extraction of materials in the littoral area. Monitor the shoreline and the stability of port developments. Anticipate the development of a tourist sea front south of the port.			
Priority level	Medium	Monitoring-observation	Regular	

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Oil infrastructure, arrival of the West African gas pipeline Extension of the port of Takoradi, Construction of roads Tourist infrastructure development		
Characterization of port infrastructure	The Port of Takoradi is the country's first commercial port, opened in 1928 to facilitate the country's international trade. It is strategically located between Accra (225 km) at the west and Abidjan (300 km) (http://ghanaports.gov.gh) An extension of the protection breakwater over 2 km eastward of the port was carried out between 2013 and 2015. A new dyke is being built north of the port since 2014. (US\$ 28 million). In 2012, the port processed 31% of Ghana's maritime traffic, 66% of national exports and 19% of national imports. It is a mining and a container port. Major exports include manganese, bauxite, wood and cocoa beans. The port is strategically located to accompany exploration and exploitation operations of the oil discovered in the Cape Three Points area in 2007.		
Coastal protection	Construction of protective structures for Takoradi, proposition of works for Ngyiresia.		
Priority level	High	Monitoring – Observation	Regular
Protected area	NO	Hazards	Strong localized erosion related to port and urban infrastructure

2010

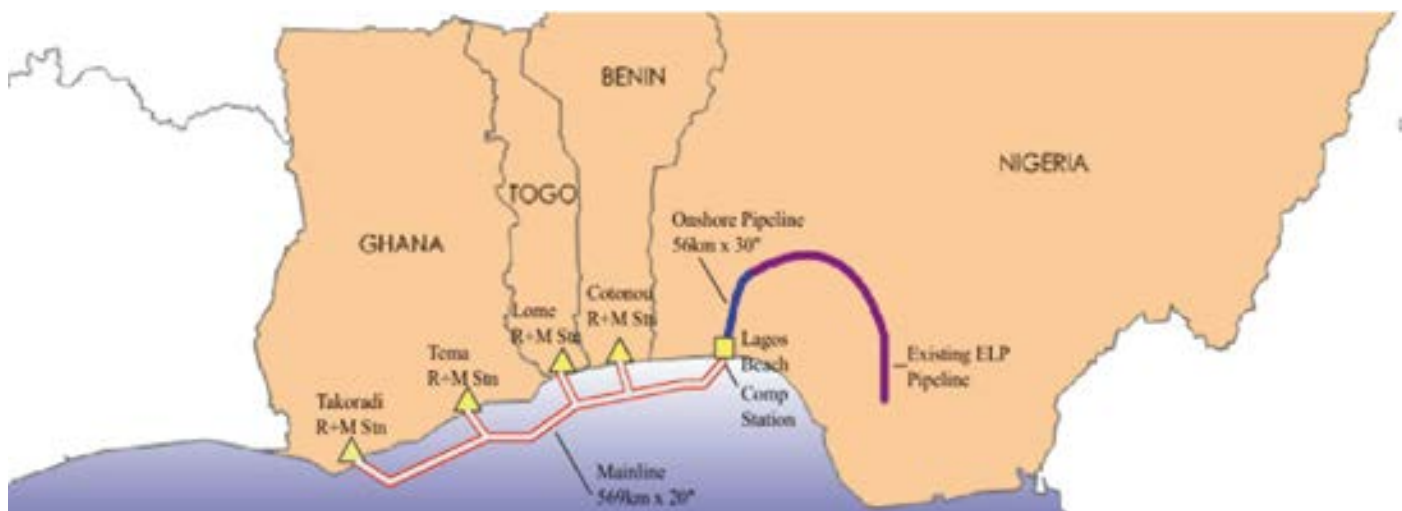


2010

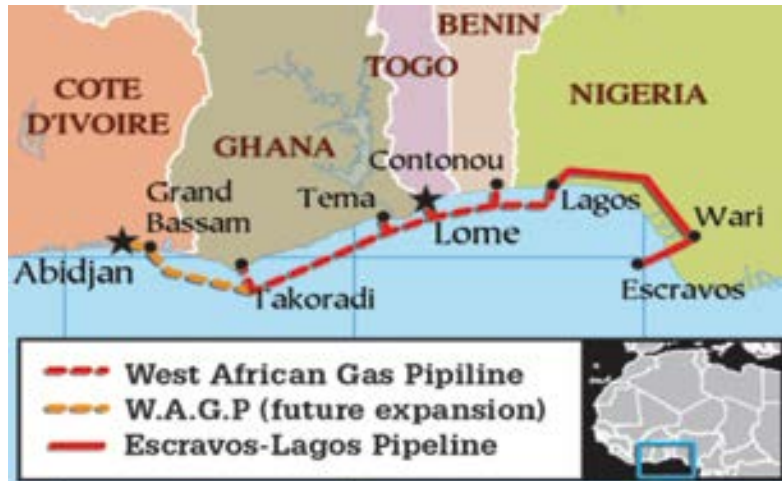


2015

Change in the port of Takoradi and related infrastructure between 2010 (top) and 2015 (bottom) Google earth
The port of Takoradi has undergone extensive developments since 2010, including (i) the extension of the breakwater and (ii) the construction of a new quay.



The West Africa gas Pipeline route leads to Takoradi, and supplies the thermal power station near Abohadze. A maritime exclusion area is planned all around the pipeline.



The pipeline route could be extended to Cote d'Ivoire and beyond.

The West African Gas Pipeline

The 678 kilometer West African Gas Pipeline (WAGP) links into the existing Escravos-Lagos pipeline at the Nigeria Gas Company's Itoki Natural Gas Export Terminal in Nigeria and proceeds to a beachhead in Lagos. From there it moves offshore to Takoradi, in Ghana, with gas delivery laterals from the main line extending to Cotonou (Benin), Lome (Togo) and Tema (Ghana). The Escravos-Lagos pipeline system has a capacity of 800 MMscfd, and the WAPCo system will initially carry a volume of 200MMscfd and peak over time at a capacity of 460MMscfd.

The main offshore pipeline runs East to West at an average water depth of 35 metres though some sections such as the south east of Ghana, south of Lome and the Benin – Nigerian frontier ranges between 50 to 70 meters. Its range from the coast is as varied as the depth. South of Cape St. Paul in Ghana, it is as close as 3.5 nautical miles (6.5 kilometres) while at its widest section south of Winneba also in Ghana, it is 17.5 nautical miles (32.5 kilometres). The ranges of the Tees from the coast are approximately as follows: Cotonou - 7 nautical miles (13 Km), Lome - 10.3 nautical miles (19 Km), Tema -7.8. nautical miles (14 Km).

The main pipeline is 20 inches in diameter. Cotonou and Lome laterals are 8 inches respectively while the Tema lateral is 18 inches. The termination point at Takoradi (Aboadzi) forms part of the main pipeline.

WAGP transports purified natural gas free of heavy hydrocarbons, liquids and water, ideally suited as fuel for power plants and industrial applications. 85% of the gas is for power generation and the remaining for industrial applications. The Volta River Authority's Takoradi Thermal Power Plant in Ghana, CEB of Benin and Togo are WAPCo's foundation customers. »

Source : WAPCO



Detailed route of the West African Gas Pipeline

		URBAN & PORT	
GH3-c	140 - SEKONDI		
BASELINE			
Diagnostics	Port and important fishing centre. Complex site, improvements to natural headlands for shelter effect. Impact on the beach probable, but extent difficult to assess.		
Dynamics	The port developments have consequences for the stability of the beaches; the extraction of building materials also seems to play a decisive role.		
Stakes	Segment of coastal road north of the harbour very close to the shore. Development of an urban beach in the northern part of the sector.		
Actions	Restriction of extraction of materials. Close monitoring of the stability of infrastructure.		
Priority level	Medium	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Characterization of port infrastructure	The port of Sekondi includes a small fishing port and a larger associated port. No recent changes have been made to the port.		
Coastal protection	Construction of protection works in Aboadze (US \$ 28.5 million)		
Priority level	Medium	Monitoring – Observation	Regular
Protected area	NO	Hazards	Strong localized erosion related to port and urban infrastructure



Port of Sekondi in 2013
 (Source: Google earth)
 The port of Sekondi has not experienced significant changes since 2010.

			ANTICIPATION
GH3-d	141 - SEKONDI – SHAMA		
BASELINE			
Diagnostics	"Rurban" prolongation of Sekondi with dense development of buildings at Aboadi, including on the edge of the shore. One part is a long cove, the remainder is short coves and creeks. 16th-century Portuguese Fort at Shama.		
Dynamics	Fragile littoral area, but free of impact of port developments.		
Stakes	Periurban development, sites suitable for tourism.		
Actions	Sector scheme should be considered if the tendency to building development is confirmed. Anticipate, with a view to preserving the green breaks in urbanisation to avoid the development of a continuous conurbation which has already begun between Takodari and Selondi. Industrial activity areas should be located inland of the littoral area.		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Coastal protection	Damaged coastal protection facilities in Shama; Settlement of armour rock between 2013 and 2015; Protection road at the north of Ngyiresia; Construction of a protective dyke and settlement of armour rock for Aboadze thermal power station.		
Priority level	Medium	Monitoring – Observation	Regular
Protected area	NO	Hazards	Strong localized erosion related to port and urban infrastructure



2010



2015

Protection works made at Aboadze power plant since 2010

GH4 SHAMA – ELMINA HINTERLAND

		ENVIRONMENT	
GH4-a	142 - SHAMA - ANKWANDA		
BASELINE			
Diagnostics	Littoral area away from the coastal road. Some large villages. Several wetlands sites, one of which is significant. Some tourist facilities.		
Dynamics	Apparently stable littoral area.		
Stakes	Apparently stable littoral area. Possibilities of protecting the sector's complex of wetlands, mangrove lagoons and estuaries (5 to 10,000 hectares). Important relay of the network of fluviomarine protected areas between the Volta delta and the systems of wetlands and lagoons of western Ghana and West and Côte d'Ivoire.		
Actions	Identify potential fluviomarine sites that could be subject to protective measures.		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Important gold mining site in Elmina; The port of Elmina is the main artisanal fishing port of Ghana located in a small river whose mouth is equipped with two groynes/protection dykes		
Priority level	Medium	Monitoring – Observation	Watch-keeping for the purpose of anticipation
Protected area	NO	Hazards	Not reported



Gold mining in Elmina (MOLOA country branch of Ghana)

GH5 URBAN AREAS AND EXTENSIONS ELMINA - CAPE COAST - SALTPOND

			ANTICIPATION
GH5-a	143 - ELMINA		
BASELINE			
Diagnostics	Fort and fishing centre, estuary and sheltered cove with north-easterly exposure. Historical site largely disconnected from the coastal road. Growth of luxury flats in the direction of Cape Coast. Western wetlands equipped with ponds.		
Dynamics	Discontinuous beaches, with frequent segments of type 4b rocky coast. Very attractive cove beach in the town of Elmina, supplied by river sediment, anchored at the cape, but equilibrium seems precarious towards the east (erosion?). Beyond this, discontinuous, very fragile beaches.		
Stakes	Control current residential urbanisation towards the beach.		
Actions	Control and planning of residential habitation on the peripheries. Planned withdrawal of at risk buildings from the edge of the beach.		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Relatively loose urban patterns. Important gold mining site in Elmina.		
Characterization of port installations	The port of Elmina is the main artisanal fishing port of Ghana located in a small river whose mouth has been equipped with two groynes/protection dykes		
Priority level	Medium	Monitoring – Observation	Watch-keeping for the purpose of anticipation
Protected area	NO	Hazards	Moderate erosion



Port of Elmina in 2013 (Source : Google earth)
The port of Elmina has not experienced significant changes since 2010.



Erosion impacts in the Elmina sector (MOLOA country branch of Ghana)

			ANTICIPATION
GH5-b	144 - WEST CAPE COAST		
BASELINE			
Diagnostics	Narrow fluvial marine terrace, rim-lido isolating wetlands and several lagoons, one of which touches the town. Main coastal road very close to the beach (50 m).		
Dynamics	Straight littoral area/slightly undulated types 3b/3c therefore at risk.		
Stakes	Respect the natural break in urbanisation, but a point very close to the beach for the coastal road at risk. Installations between the lagoon and the road seem to be on very low land, with risks of flooding by the lagoon and storm surges.		
Actions	Preserve the green break of the wetlands between the peripheries of Elmina and Cape Coast. Restrict urban development. Monitor the shoreline and the stability of the road in places close to the shore.		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring – Observation	Watch-keeping for the purpose of anticipation
Protected area	NO	Hazards	Not reported



Natural urbanisation division between Elimina on the left and Cape Coast on the right

			PERI-URBAN
GH5-c	145 - CAPE COAST		
BASELINE			
Diagnostics	Bipolar urban area, older part to the east, more recent part to the west, but also historical centre and fort. Partially urbanised coastal area, narrow, discontinuous beaches, rocky headland.		
Dynamics	Beaches and rocky coasts more or less strongly exposed to the ocean waves, exposure varies greatly from one site to another. Necessity for an approach at a level of local detail.		
Stakes	Fishermen's districts at risk to the east of the rocky breakwater. Preservation of breaks in urbanisation to the east and west, to avoid the development of a continuous conurbation all the way to Saltpond.		
Actions	Preserve the green breaks to the west and east of the town. In the long term, withdraw at risk settlements east of the cape.		
Priority level	Medium	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring-Observation	Regular
Protected Area	No.	Hazards	Not reported

			ENVIRONMENT
GH5-d	146 - CAPE EAST COAST		
BASELINE			
Diagnostics	Hilly area still only sparsely built on the eastern edge of the town, break in urbanisation protected?		
Dynamics	No remarks		

Stakes	Break in urbanisation to be preserved and strengthened.		
Actions	Land control, to prevent urban sprawl across these natural areas.		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority	Medium	Monitoring-Observation	Watch-keeping for purpose of anticipation
Protected Area	NO	Hazards	Not reported



Corridorization of urban spread on Cape Coast landward and in conurbation along the coastal area (Ghana). (source : SDLAO 2011)

			ANTICIPATION
GH5-e	147 - PERI-URBAN SECTOR OF CAPE COAST – SALTPOND		
BASELINE			
Diagnostics	Sector very well connected by the main coastal road which approaches the coastal area. Small towns undergoing growth, like Saltpond, separated by an agriculture hinterland already colonised in places by residential settlements. Sites of small beaches oriented east/south-east. Human land use globally increasing.		
Dynamics	Mixed coastal area of type 4a and 4b, some segments of type 3. Sites highly individualised in places, often fragile, many beaches undergoing erosion.		
Stakes	Control of residential and leisure urbanisation developing towards the beach.		
Actions	Anticipate development of buildings on the edge of the shore in agreed, equipped development zones. Select sites suitable for limited protective measures in order to secure sites of high value in terms of landscape and leisure activities. Sector scheme could be useful		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Infrastructure related to oil exploration.		
Priority	Medium	Monitoring-Observation	Regular
Protected Area	NO	Hazards	Not reported

GH6 RURAL HINTERLAND OF URBAN AREAS OF CAPE COAST AND ACCRA

			RURAL
GH6-a	148 - SALTPOND – MFANTSIMAN		
BASELINE			
Diagnostics	Villages located on the edge of the sea at high risk (5 important sites + huts in coconut groves) on estuarine sites. Series of small agglomerations some distance back from the lagoon and channels. Inland, vast system of wetlands.		
Dynamics	Rims-lidos of type 3c, very fragile and unstable, outlets from wetlands system in places.		
Stakes	Situation of villages on the edge of the beach, very exposed and no possibility of withdrawal to the lido. Value of the wetland connected to the estuary with two water courses.		
Actions	Planned withdrawal of the most exposed installations. Sites to be preserved for biological value of the estuarine systems.		
Priority	High	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	No observed significant evolution, reduced priority because of lack of important developments		
Priority	Medium	Monitoring-Observation	Regular
Protected Area	NO	Hazards	Not reported



Location of habitations in sector GH6-a within the estuarine system, including on the lido (source: Google Earth).

				ANTICIPATION
GH6-b	149 - WINNEBA			
BASELINE				
Diagnostics	Succession of large towns-villages on headland sites and fishing ports (Winneba, Apam, etc.). Possible sites with tourist potential, perhaps already partially occupied. Road connection by north and south satellites 10-15 km from the main coastal road. Portion of the coastal area isolated. Large, successive breaks in urbanisation to be preserved.			
Dynamics	Mixed coastline with alternating type 4b coast and 3 segments. No remarks.			
Stakes	Sector intended for residential tourism in the more or less near future depending on road connections. Anticipation of an overall land planning scheme.			
Actions	Sector scheme anticipating probable residential developments. Anticipate development of buildings on the edge of the shore in agreed, equipped development zones. Select sites suitable for limited protective measures in order to secure sites of high value in terms of landscape and leisure activities.			
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation	
DEVELOPMENTS SINCE 2010				
Evolution of stakes	Not reported			
Priority level	Medium	Monitoring-Observation	Watch-keeping for the purpose of anticipation	
Protected Area	YES	Hazards	Not reported	

Muni Lagoon Ramsar site	Gh-6B
WII / Ramsar : WII ID : 1GH002 – 563 / WDPA ID : 67966	
Muni Lagoon was inscribed on the list of wetlands of international importance -Ramsar site on August 14,1992 (8670 square)	

GH7 ACCRA WEST URBAN AREA

Urbanisation division near the shoreline clear enough between the two sectors of that area.
 Shoreline alternating coast type of 4b, 4a, 3 a, 3b, with small segments not all identifiable at 500 000th.
 All these small towns are associated with capes sheltering the swell, small estuaries and traditional fishing.

				ANTICIPATION
GH7-a	150 - SENYA - NYANYANO			
BASELINE				
Diagnostics	Tendency to urban sprawl over rural areas from small agglomerations. Relative isolation of the near shore zone connected by North-South satellites.			
Dynamics	Alternating rocky coast 4b with creeks oriented South-east, segments not all marked off at 500,000.			
Stakes	In the long term, rurbanisation will continue, under the impulse of improved road access towards Accra and its current extension.			

Actions	Land control and global scheme for the zone to prevent urban sprawl. Enforce a littoral strip of at least 100 m in the developing of a sea front for tourism and residential purposes promoting the small, sheltered resort sites.		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Medium	Monitoring-Observation	Watch-keeping for the purpose of anticipation
Protected Area	NO	Hazards	Not reported
			ANTICIPATION
GH7-b	151 - NYANYANO - ACCRA WEST AREA PERI-URBAN		
BASELINE			
Diagnostics	Despite the proximity of Accra, loose urbanisation predominantly luxury flats, some hotels. Intra urban isolated areas of agriculture still present.		
Dynamics	Fragile area, tendency to erosion – smoothing of beaches in coves by dyke effect of headlands. Numerous, somewhat reflective beaches.		
Stakes	. Future of the agricultural plain facing urbanisation, as a green enclave undergoing urban sprawl.		
Actions	Land control and global sector scheme, preserving the large break in urbanisation. Enforce a littoral strip of at least 100m m in the developing of a sea front for tourism and residential purposes.		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	High and fast expansion of built areas.		
Priority level	Medium	Monitoring-Observation	Regular
Protected Area	NO	Hazards	Not reported

GH8 ACCRA EAST URBAN AND OUTSKIRTS AREA

			PERI-URBAN & TOURISM
GH8-a	152 - ACCRA WETLAND DENSU DELTA		
BASELINE			
Diagnostics	Complex of wetlands locally reached by rising tide, the contours of which mark the current limits of urbanisation. Vast development of salt production fields. Littoral rim in extremely narrow lido with no vegetation (sharp sand?), with precarious settlements and tourist camps in places. Densu delta is a RAMSAR site		
Dynamics	Extreme fragility of the very narrow rim-lido, hydrologic system stabilised by the Weija dam built in 1978.		

Stakes	Strong tendency to diffuse urbanisation in wetland especially on right bank. Urban pollution from various sources to be managed. Over-exploitation of fishing resources and mangroves. Very low elevation and impact in the event of storm surge on the lido.		
Actions	Imperative to maintain the break in urbanisation with blockage of urban sprawl on the periphery of the wetland. Restrict installations on the lido to temporary fishing and leisure facilities. Possible restriction of tourist traffic on Bojo Beach, and in any case, of permanent installations. Reinforce collective sanitation measures and restrict urban effluent. Reinforce and apply the management provisions of the RAMSAR site.		
Priority level	High	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority	High	Monitoring-Observation	Regular
Protected Area	YES	Hazards	Not reported

Densu Delta Ramsar site	GH8-a
WII / Ramsar : WII ID : 1GH003 – 564 / WDPA ID : 67967	
Densu delta was inscribed on the list of wetlands of international importance-Ramsar site on August 14,1992 (4620 square), the delimitations of the area are not available in WDPA.	

			URBAN
GH8-b	153 -ACCRA CENTRE WEST		
BASELINE			
Diagnostics	Coastline predominantly straight type 4a undulating. Very dense habitation right to the beach and precarious fishermen's settlements. Narrow urban road, inland and at a distance from the coastline.		
Dynamics	Coastline undulating in short periods, with sectors undergoing erosion probably related to the dam and the wetland. Small zone undergoing accretion on the eastern part of the zone upstream of Jamestown (nearby the fishing port).		
Stakes	Very dense habitation at high risk in the event of surges.		
Actions	Requalification and withdrawal of dense settlements on the edge of the coastline to be examined strategically. Implement preventive measures and prepare the population.		
Priority level	Very high	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Coastal protection	Works proposal for protection in Jamestown Existence of some rockfills for private protection.		
Priority level	Very high	Monitoring-Observation	Intense and regular
Protected Area	NO	Hazards	Not reported

				URBAN
GH8-c	154 -ACCRA CENTRE			
BASELINE				
Diagnostics	Undulating type 4b coastline fully urbanised to the limit of (small) coastal cliffs or beaches, connected by an urban motorway which approaches the shore locally when passing the wetland (same as Tema West). Eastern part occupied by public beaches and important residential and hotel area. Narrow, compartmented beaches, given the high frequentation.			
Dynamics	Tendency to erosion, beaches thinning at the foot of the cliffs, the small headland that is the boundary of the sector acting as a natural groyne, reinforced by a pier in rock fill (fishing port). Tendency to erosion less marked to the east of the area.			
Stakes	The start of organised development of a sea front should be considered from Labadi Beach eastward. Fragile sector where it crosses the wetland. Complex restructuring, given the diversity of types of settlement. Evolution of the fishing port in an increasingly restricted space.			
Actions	Secure the heritage of very busy urban public beaches. Monitor the quality of the waters. Secure road segments a small distance from the coastline. Preserve wetlands and breaks in urbanisation and areas to the east of the zone.			
Priority level	Very high	Monitoring-observation		Intense and regular
DEVELOPMENTS SINCE 2010				
Evolution of stakes	Building of high standing residential complexes			
Coastal protection	Stage 2 of shoreline protection projects in Sakumono (40 million US dollars), a big jetty (industrial installation) in the South of Sakumono			
Priority level	Very high	Monitoring-Observation	Intense and regular	
Protected Area	NO	Hazards	Not reported	

				PERI-URBAN & ENVIRONMENT
GH8-d	155 - WETLAND BREAK TEMA WEST SAKUMO			
BASELINE				
Diagnostics	Wetland and artificialised lagoon. System marked in the south by the passage of a main coastal road (dyke road). Linear rock fill for stabilisation. Tendency to reclamation of the wetland and development of building on reclaimed sites. Sakumo is a RAMSAR site			
Dynamics	Risks concerning the stability of the dyke road if undercutting occurs at the foot of the protections. Risks of marine intrusion in the event of surge. Risks related to drainage capacity in periods of			
Stakes	Preservation of a break in urbanisation in an area with an industrial vocation: different ecological services and hydraulic regulation.			
Actions	Preserve the area. Monitor status of developments. Restrict building on the banks of the lagoon. Reinforce and apply the management provisions of the RAMSAR site.			
Priority level	High	Monitoring-observation		Regular
DEVELOPMENTS SINCE 2010				
Evolution of stakes	Not reported			
Coastal protection	Stage 2 of shoreline protection projects in Sakumono			
Priority level	High	Monitoring-Observation	Regular	
Protected Area	YES	Hazards	Not reported	

Sakumo Lagoon Ramsar site WII / Ramsar : WII ID : 1GH004 – 565 / WDPA ID : 67968	GH8-d
Sakumo lagoon was inscribed on the list of wetlands of international importance -Ramsar site on August 14,1992 (1340 square), the delimitations of the area are not available in WDPA.	

		URBAN & PORT	
GH8-e	156 - TEMA		
BASELINE			
Diagnostics	Eastern limit marked by a wetland partly equipped with ponds. Fully urbanised site, complex urban fabric, average and substandard classes, industrial sites, developments and installations of the port. Area of dense substandard habitation east of the port. Tema is a commercial and fishing port.		
Dynamics	Rocky coastline, very thin beaches (units 4b, limit 5). Impact of the harbour pier accretion to the west and erosion to the east controlled by structural work and the characteristics of the shoreline structured on small cliffs.		
Stakes	Future evolution of the port, sufficient depth. Erosion in the eastern part and habitation east of the port possibly threatened. Absence of sea front development.		
Actions	Close monitoring of the shoreline east of the port. Planned withdrawal (relocation) of habitations in immediate proximity to the east of the port.		
Priority level	Very high	Monitoring-observation	Intense and Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Extension of Tema Port. Upon arrival of West African gas pipeline and corresponding onshore infrastructure, thermal plant, master plan under way. High urban growth.		
Characterisation of port installations	Tema port is the biggest in Ghana, located on the eastern coast of the country at 30 km from the capital, Accra. It is made up of two main jetties/ breakwater which constitute the berry of the main port, three smaller jetties connected to the main jetty in the north constitute the fishing port. It comprises one port with container, one oil terminal and one fishing port. The concession of terminal containers of Tema port was granted to Bolloré Africa Logistics in 2007 for a 20-year term.		
Priority level	Very high	Monitoring-Observation	Intense and Regular
Protected Area	NO	Hazards	Not reported



Tema port in 2015 (Source: Google earth).
 Tema port was not subjected to major works over the period 2010-2015.

		PERI-URBAN	
GH8-f	157 - PRAMPAM		
BASELINE			
Diagnostics	Tema cut-off by estuarine zone, no road passage. Served by a secondary road close to the coastline and connected to Accra by a satellite of the main inland road. Large, growing town (Prampam, Old and New Ningo connected by a bridge). Ponds in the wetland, material extraction area; In interurban spaces, residential type growth in agricultural milieu (large huts) with private tracks. Human land use of the coastal strip still moderate, but growing.		
Dynamics	Continuous, very narrow beaches. Undulating shore subject to erosion, particularly in the east. Lagoons isolated by extremely narrow rim lidos adjacent to harder formations of the sandstone type.		
Stakes	Area intended for accelerated urbanisation if a road across the estuary is built enabling direct access to Prampam and Tema.		
Actions	The stakes do not really justify coastal defence structures given the relatively low rate of land use outside the urban centre. Close monitoring of the effectiveness of the developments carried out, particularly in the east.		
Priority level	High	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority	High	Monitoring-Observation	Regular
Protected Area	NO	Hazards	Not reported

GH9 VOLTA DELTA RIGHT BANK NINGO-ADAFOAH

Fluviomarine rim-terrace adjacent to a vast system of wetlands (Songaw Lagoon-Ramsar site) formerly subject, before the Akossoumbo dam was built, to Volta floods. Current watershed flowing into this system with limited surface area (unlike Keta Lagoon on the left bank). The control of floods of the Volta has led to profound alterations:

- Contraction of lagoon areas.
- Drying out and encroachment by agriculture or salt flats.
- Development of villages close to the coastline on the highest points (which remain at a relatively low elevation).

- Development of a track network and service road: North-South satellites connected to the coastal road. Secondary tracks more or less usable in the rainy season.

- Many points of fishing catch landing.

The eastward coastal drift is scarcely supplied upstream (Accra area). A coastal rim very narrow in places isolates lagoon channels and the distributaries of the delta system. The sediment supplies of the delta system are completely cut-off, the system is maintained by the sediment stocks of sediments of the terrace rims of the delta.

The coast is of very flat topography and at very low elevation. Habitation and road connections probably at risk, but with very variable degrees of risk in places; the situations should be analysed on a case-by-case basis.

			RURAL
GH9-a	158 - NEW NINGO – LEKPOGUNO		
BASELINE			
Diagnosics	Atypical coastline, undulating but with very narrow rim-lido isolating lagoons and fields. Villages on high terraces set back from the channels-lagoon system/littoral lido. Situation practically peri urban at Accra.		
Dynamics	Thin and fragile lido.		
Stakes	. Sector with potential for densification in a context of a fragile coastline (nearby lagoons and narrow lido), including production infrastructure that also contributes to the fragility of the system.		
Actions	Absolutely avoid any installation on the lido or in the areas in immediate proximity to the sea. Monitor the shoreline and the status of the lido. Maintain the break in urbanisation east of New Ningo.		
Priority	Very high	Monitoring-observation	Intense and Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Very high	Monitoring-Observation	Intense and Regular
Protected Area	NO	Hazards	Not reported

		RURAL	
GH9-b	159 - LEKPOGUNO - AKPLABNYA		
BASELINE			
Diagnostics	Succession of large villages connected by a coastal road with North-South satellites. Width of the lido (rim terrace) very variable, but always adjacent to the wetland. Sensitivity very variable depending on the proximity of the coastline and elevation of the zones in use. Certain installations are extremely close to the shore. Wetlands typically developed.		
Dynamics	Straight to undulating coastline. Lido of variable width. Unstable zone subject to risk of surge and flooding by continental waters;		
Stakes	To be analysed on a case-by-case basis depending on the elevation of the sites and the distance from foreshore and from the channels and lagoons.		
Actions	Maintain the break in land use and urbanisation. Monitor the status of the lido in particular in the rainy season and/or during storm surges.		
Priority level	High	Monitoring-observation	Intense and Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority	High	Monitoring-Observation	Intense and Regular
Protected Area	NO	Hazards	Not reported



Lekpoguno - Akplabnya Sector (source : Google Earth).

		ENVIRONMENT	
GH9-c	160 - AKPLABNYA – TOTOPE		
BASELINE			
Diagnostics	Extremely narrow littoral rim – lido (under 50 metres in places), no human land use. Interruption of the coastal road, track on the top of the beach. Songaw Lagoon is a RAMSAR site		
Dynamics	Extremely unstable and fragile sector.		
Stakes	Sector not used and not suitable to be equipped		
Actions	Maintain the break in land use and urbanisation.		
Priority level	Low	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	High	Monitoring-Observation	Intense and Regular
Protected Area	YES	Hazards	Serious possibilities of submersion and erosion of the lido, requirement to underline any new occupation.

Songor Lagoon Ramsar site WII / Ramsar : WII ID : 1GH005 – 566 / WDPA ID : 67969	GH9-c GH9-d
Reserve Biosphere of Songor WDPA ID : 555547583	
The lagoon of Songor was inscribed on the list of wetlands of international importance -Ramsar site on August 14,1992 (28 740 square), the delimitations of Ramsar site are not available in WDPA.	
The lagoon of Songor joined the World network of biosphere reserve in 2011; the delimitations of the biosphere reserve are not available in WDPA.	

		RURAL	
GH9-d	161 - ADAFOAH		
BASELINE			
Diagnostics	Large agglomeration extending north (saturation of buildable land close to the coastline). Situation very like Keta, with however the possibility of continuing the extension of urbanisation landward (North direction), already exploited. Hard surfaced road to the north, urban development corridor to the edge of the Volta, on alluviums of raised bank, but flooding excluded today. Even though the densest urbanisation is away from the coastline, the tendency is for it to move closer at the level of the estuary mouth. Islets of at risk habitations.		
Dynamics	Slightly undulated coastline (erosion/accretion). Certain sites present a quite marked reduction in the beach in places.		
Stakes	Colonisation of the beach by random land use, leading to high risks for the installations (some located 30m from the foreshore).		
Actions	Natural strip to be implemented. Withdrawal of random installations on the beach desirable.		
Priority level	High	Monitoring-observation	Intense and regular
DEVELOPMENTS SINCE 2010			

Evolution of stakes	Demolition of shoreline infrastructure		
Coastal protection	7 important groynes have been built in the west of Volta mouthpiece in front of ADA village (183 million Euros)		
Priority	Very high	Monitoring-Observation	Intense and Regular
Protected Area	YES	Hazards	High erosion



The effect of erosion in the Ada sector (Source: MOLOA Ghana country branch)



Shoreline protection project of Ada, stage 1 (source: MOLOA Ghana country branch)



Ada shoreline protection project-Right bank of Volta mouthpiece, building of 7 groynes finalised in 2013 (Google Earth 2015)

GH10 VOLTA DELTA LEFT BANK

		RURAL	
GH10-a	162 - DZEITA – LEFT BANK OF VOLTA		
BASELINE			
Diagnostics	Very narrow fluvio-marine rim (sandy spit), with lagoonal channels adjacent to a zone flood-prone in places, islets of alluvial terraces with habitations.		
Dynamics	Very unstable, “thinned” mouth rim, partially composed of sharp sands, further inland than its opposite on the right bank.		
Stakes	Small villages in a situation of high exposure to very high risks in the event of storm surges or episodes of high rainfall. No alternative for relocation or withdrawal.		
Actions	Radical restriction of the development of dwellings or infrastructure on the site. Inform the population.		
Priority	Very high	Monitoring-observation	Intense and Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Aquaculture growing of prawns		
Coastal protection	Protection building proposal		
Priority	Very high	Monitoring-Observation	Intense and Regular
Protected Area	YES	Hazards	High erosion

Anlo-Keta Lagoon Complex Ramsar site WII / Ramsar : WII ID : 1GH006– 567 / WDP A ID : 67970	GH10-a GH10-b GH10-c
The Anlo-Keta lagoon complex was inscribed on the list of wetlands of international importance-Ramsar site on August14, 1992 (127 780 square), the delimitations of Ramsar site are not available in WDP A.	

		RURAL	
GH10-b	163 - KETA		
BASELINE			
Diagnostics	Slightly undulated terrace. Numerous micro-channels flowing into the lagoon in the north. Average density of dwellings, but building land saturated. Main road route outside the coastline, on the edge of the lagoon, connected to satellites. Practically insular situation. Important market-gardening zone on the edge of the lagoon. The lagoon and its surroundings form a RAMSAR site covering 53,000 hectares.		
Dynamics	Shoreline with curved profile “atypical” for the region, of deltaic origin. Historical deposits by successive accretions isolating the channels. Limited accretion still noted. Current dynamic equilibrium fragile.		
Stakes	Dwellings saturate the area to the edge of buildable land that is not flood-prone (channels, lagoon edge). High risk of flooding on the bank of the lido on the lagoon side. The major risk in the current configuration is related to the extremely variable level of the Keta lagoon and to a conjugation of continental spate/storm surge. There is also a possibility of flooding due to the water table rising. Preservation of the RAMSAR site of Keta Lagoon.		

Actions	Restrict the development of dwellings on the site. Adaptive management of installations with planned resettlements. Monitor the impact of developments and of changes in the lagoon shore.		
	Preserve the natural shore vegetation on the lagoon side. Implement preventive measures to face the risk of submersion (warning systems and prepare the population.)		
	Opportunity to assess the feasibility of architecture adapted to the risks of submersion (embankments, stilts?).		
Priority	Very high	Monitoring-observation	Intense and Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Oil exploration		
Coastal protection	Building of 6 groynes and a dyke to protect the road between Salo and Angola (2010-2013) on the left bank of the Volta.		
Priority	Very high	Monitoring-Observation	Intense and Regular
Protected Area	YES	Hazards	Episodes of submersion -flooding, located accretion following the works implementation

2010



2013



Protection works building of the coastal road between Salo and Angola (2010-2013) on the left bank of the Volta

Keta Sea Defense Project

The entire area has been subject to considerable developments at regional level, which started in 2000 for a US \$ 84 million budget. These developments have been carried out within the framework of *Keta Sea Defence Project*. It includes:

- Six rockfill groynes (61, 000 tonnes each) 220 m in length.
- An armouring of rockfill (153 000 tonnes)
- A pass to control flooding 80 metres long with road passage
- 14 km of paved road network equipped with 14 drainage systems
- 225 square of embankments suitable for equipment
- More than 5,000 m of protective banks planted with local tree species

These works have made it possible to stop shoreline recession which was particularly characterised at the level of the lagoon outlet and to restore the sandy spit. However, erosion has resumed between the groynes, as evidenced by the formation of a berm at the top of the beach. These developments are not radical, and enable to maintain a sediment flow towards neighbouring Togo. An important monitoring system has been implemented as part of developments.

The risks of submersion are mainly linked to the low elevation of the lido on the lagoon side⁸, or to flooding - submersion of continental origin.



The effect of erosion in the Keta sector (Source: MOLOA Ghana country branch)



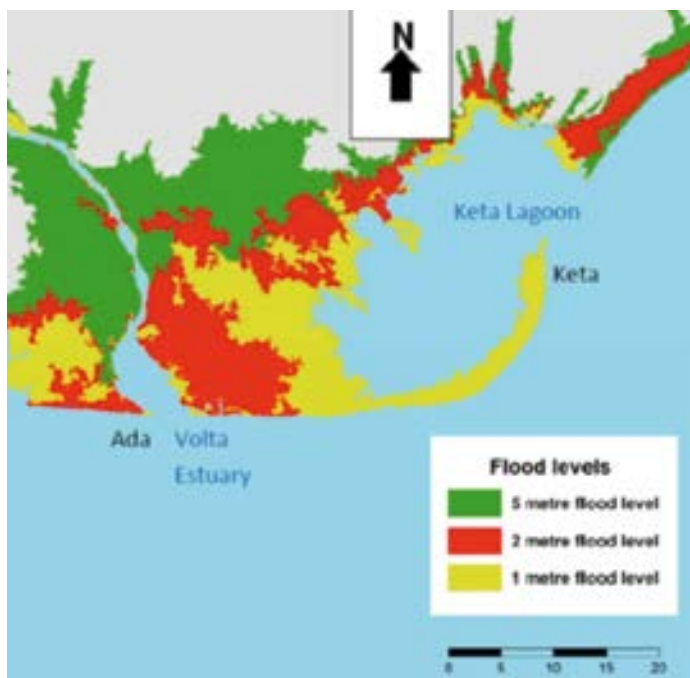
Extensive overview of Keta defence project planning



Gardening area on the lagoon shores of Keta (MOLOA)



Resumption of erosion between the groyne of Keta planning (Formation of a berm at the top of the beach)



Cartography of submersion hazard (scenarios 1m, 2m, 5m) concerning Keta zone before development (source I. Boateng)



The very low elevation makes it difficult to limit the flooding risk from the rising water table.



Keta armouring (source: MOLOA Ghana country branch)

		RURAL
GH10-c	164 - KETA DYKE	
BASELINE		
Diagnostics	Small sector of the dyke road	
Dynamics	Extremely fragile sector in connected to the artificial outlet of the lagoon.	
Stakes	Dyke road improves access to Keta. Very high risk for nearby dwellings. Plant coverage of bare sand. Installations at very high risk on the sandy spit separating the lagoon from the foreshore and on the extremity of the lido towards the east (habitations less than 20 m from the foreshore). Effectiveness of the drainage connection of the lagoon?	
Actions	Plant coverage of bare sand. Close monitoring of the status of the mechanism and of infrastructure. Relocate installations from the sandy spit.	
Priority level	Very high	Monitoring-observation Intense and Regular

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority level	Very high	Monitoring-Observation	Intense and Regular
Protected Area	YES	Hazards	Not reported

			RURAL
GH10-d	165 - ADINA		
BASELINE			
Diagnosics	Same as for the next sector, but rim and terraces extremely narrow. Variable density of habitation in large huts and concessions of coconut palms. Numerous canoes on the beaches.		
Dynamics	Formation in a narrow lido in the west (less than 150 m between the wetlands on the lagoon shore and the foreshore in places).		
Stakes	Area at risk in the event of surge. Not possible to relocate the installations in places.		
Actions	Total control of the densification of dwellings and installations. Withdrawal of installations too close to the beach. Monitor the shoreline and impacts of the anti-erosion mechanism at Keta.		
Priority level	High	Monitoring-observation	Intense and Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority	High	Monitoring-Observation	Intense and Regular
Protected Area	NO	Hazards	High erosion

			PERI-URBAN
GH10-e	166 - EAST GHANA - TOGO BORDER		
BASELINE			
Diagnosics	Rurban sector in continuity with Lomé. Homogeneous terrace adjacent to a lagoon and channel. Agricultural land with small and medium-sized concessions of coconut palms. Main road far inland from the shore, area undergoing densification on both sides of the road corridor. Discontinuous beach edge track. Encroachment through installations on the edge of the beach.		
Dynamics	No remarks		
Stakes	Colonisation of the beach by random land use, leading to high risks for the installations (some located in immediate proximity to the foreshore).		
Actions	Total control of the densification of dwellings and installations. Withdrawal of installations too close to the beach. Monitor the shoreline and impacts of the anti-erosion mechanism at Keta.		
Priority level	High	Monitoring-observation	Regular

DEVELOPMENTS SINCE 2010			
Evolution of stakes	Not reported		
Priority	High	Monitoring-Observation	Intense and Regular
Protected Area	NO	Hazards	Not reported



Togo

The sectors situated east of Lomé present high risks of submersion related to conjugations of high rainfall and continental spates and storm surges.

A large part of the Togolese Coast is undergoing a pronounced erosion east of the port of Lomé. The causes are on the one hand old: the Akossombo dam on the Volta and the disrupted supply of sediments as well as the establishment of Lomé of port infrastructure disrupting sediment movements according to the West -East coastal drift. At the west of the port the coast is undergoing accretion for the same reasons.

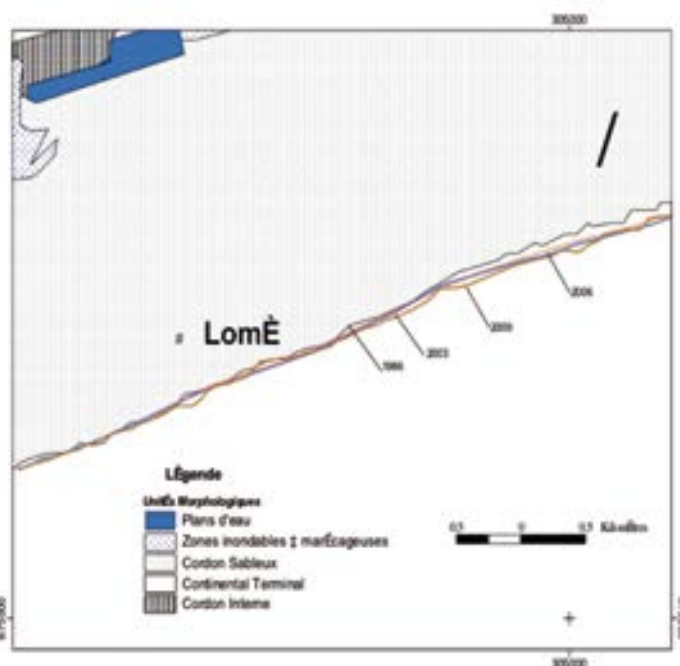
			URBAN
TG1-a	167 - GHANA BORDER - LOME WEST		
BASELINE			
Diagnostics	Vast, homogeneous sandy terrace. Dense, diversified urban habitation (eastern part residential) separated by a coastal road very close to the beach (approximately 100 m or less). The road-beach strip has been subject to the beginnings of seafront development, but this strip is undergoing urban encroachment near the border. Numerous signs of wastewater outlets on the beach. Probable eastward transfer of pollution via the coastal drift current. This concerns the sectors Lomé centre and east.		
Dynamics	Developments on the backshore in the vicinity of the border post influence-compensate for the accretion this sector should normally experience. Stable in places, erosion noted towards the west in the zones developed on the beach.		
Stakes	Control of urbanisation on the beach beyond the coastal road. Numerous installations and habitations at risk in the event of storm surge.		
Actions	Control development on the beach beyond the coastal road.		
Priority level	Moderate	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	New buildings near the border of Ghana: Togolese Customs, Bank of Africa. Beginning of the circular boulevard and the two-lane seaside boulevard. Discharge of wastewater on the beach (19 points on the littoral of Lomé). Two-lane seaside boulevard. Gas pipeline		
Priority level	Moderate	Monitoring – Observation	Regular
Protected area	YES	Hazards	Accretion of the sector, west of the port

Togo Coastal Wetlands Ramsar Site	TG1-a / b / c / d / e
WII / Ramsar site : WII ID : 1TG004 – 1722 / WDPA ID : 903069	
The Togo Wetlands Ramsar site was designated as a Wetland of International Importance/Ramsar Site on April 2, 2008 (591,000 ha) (no map in WDPA), it covers the entire coastline of Togo.	

Transboundary Pipeline Gas Area (proposed)	TG1	BJ1
WDPA ID : inexistent		BJ2
Rules for the management of a buffer zone around the pipeline, in particular with regard to navigation and fishing, are currently in force in Togo and Benin, and a reflection on the creation of an MPA in this zone is initiated.		



Wall materializing the border with Ghana
(Source MOLOA country branch of Togo)



Change in the shoreline over 1.2 km from the border of Ghana
(Source MOLOA country branch of Togo)

		URBAN	
TG1-b	168 - LOME CENTRE		
BASELINE			
Diagnostics	Zone of recent sandy sediment supply isolating a wetland from the former coastline. Dense urban habitation, urban effluent outlets on the beach (outlets on the beach to be related to the accretion of the sector and the burying of the sewage outlet). Vast vegetable growing area between the road and the beach; large housing scheme being built at the top of the beach.		
Dynamics	Sector undergoing accretion following the installations of the Lomé port. Width of beach 100 to 300 m.		
Stakes	Future of the urban facilities on the sea front. Sanitation and impact of the housing being built on the beach. Examine possibilities for extracting materials in the zone undergoing accretion.		
Actions	Shoreline monitoring. Urban waste and rainwater runoff management plan.		
Priority level	Moderate	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Two-lane seaside boulevard. Discharge of wastewater on the beach (19 points on the littoral of Lomé). Construction of Hotel Onomo, Coconut Residence, maritime car park, road parking. Port development/extension work (dock, third quay and dredging, extension of the south jetty), sand control dyke. Closure of a sand quarry. Two-lane seaside boulevard. Gas pipeline		
Characterization of port installations	The concession for the Port of Lomé was granted to Togo Terminal, a subsidiary of Bolloré Africa Logistics. Construction work for a third quay (450m long, 15m deep and 38ha of storage) was initiated in March 2011 and finalized in October 2014.		
Priority level	Moderate	Monitoring – Observation	Regular
Protected area	YES	Hazards	Accretion of the sector, west of the port



Lome : Housing development on the beach area undergoing accretion (West of the port)



Discharge of wastewater on the beach



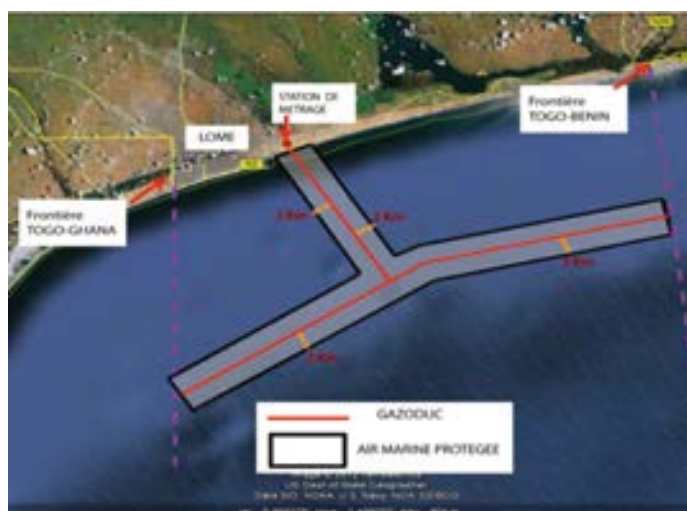
2009



2015

Change in the port of Lome and related infrastructure between 2009 (top) and 2015 (bottom) Google earth
The port of Lome has undergone extensive developments since 2010, including (i) the construction of a groyne perpendicular to the main breakwater of the port and (ii) the construction of a third quay and a container storage depot.
A distinction is made between the area undergoing accretion in the west of the infrastructure and the area undergoing erosion at the east

		URBAN & PORT	
TG1-c	169 - LOME URBAN - EAST PORT		
BASELINE			
Diagnostics	Average quality housing quite dense right to the beach. Diversified urban fabric, warehouses, dwellings. Main road route lies outside the coastline.		
Dynamics	High rate of erosion, to be weighed up against the beachrock freed by the erosion.		
Stakes	Control of future new installations in the area between the road and the shore, from the point of view of the probable future densification of residential habitations.		
Actions	Monitor the shoreline and the status of the beachrock. Anticipate installations possibly subject to withdrawal measures. Actions to preserve the beachrock and seek alternatives to the extraction of materials. Sector scheme recommended		
Priority level	Very high	Monitoring-observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Port development/extension work (dock, third quay and dredging, extension of the south jetty), sand control dyke. The port of Lomé has existed since 1967. Small-scale fishing station. Port-Baguida-Avepozo 2-lane boulevard. National 2 Avepozo-Aneho. New site of sports and leisure beach (pure beach and Moevi residence) in Avépozo. Novela Star Hotel. Gas pipeline Closure of a sand quarry. Two-lane seaside boulevard.		
Priority level	Very high	Monitoring – Observation	Intensive and regular
Protected area	YES	Hazards	Sector erosion, East of the port, sand and gravel extraction (alteration of the beach rock); Erosion: 35-meter retreat between February 2014 and March 2015; Breaking of the beach-rock line; erosion of Hotel beaches ; Coastal erosion (deposition of rubble from buildings and road on the beach top in Gbétsogbé)



The West African Gas Pipeline, stretching from Nigeria to Takoradi port in Ghana, spans throughout the Togolese Coast. A marine protected area is being considered in the maritime exclusion zone of the infrastructure.



Coastal erosion in the east of the port of Lomé

		PERIURBAN	
TG1-d	170 - LOME EAST		
BASELINE			
Diagnostics	Homogeneous terrace, variable densities of habitation, of very unequal quality, seaside flats, hotels, relicts of agricultural concessions on standby. Road route outside the coastline.		
Dynamics	Straight coastline, tendency to «undulate», very unstable, subject to high erosion in places (cell east of Lomé port). The clearing of the beachrock by erosion has made the beach relatively stable.		
Stakes	In the long term: Urban consistency of the green sea front type avoiding coastal roads too close to the shore. High risk of flooding from continental waters.		
Actions	Avoid the building of dwellings and hotels too close to the beaches. Conserve green agricultural breaks in urbanisation that are still present. Monitor the shoreline and the status of the beachrock. Measures to preserve the beachrock and seek alternatives to the extraction of materials. Implement a sector scheme to frame periurban residential and tourist development.		
Priority level	High	Monitoring-observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Gas pipeline		
Priority level	Very high	Monitoring – Observation	Intensive and regular
Protected area	YES	Hazards	Sector erosion, east of the port, sand and gravel extraction (alteration of the beach rock); coastal erosion in Afiagégnigba-Gbodjomé-Agbodrafo (destruction of houses and leisure sites ; loss of rural lands);

		RURAL	
TG1-e	171 - TOGOVILLE – AGBODRAFO - ANEHO		
BASELINE			
Diagnostics	Sandy littoral rim bounded in the east by the mouth of the outlet of lake Togo and to the north by the channel- outlet of the lake. Low elevation. This sector is situated within the morphodynamic erosion cell which stretches from east of the port to Lomé. Habitation of variable density in urban zones in the urban centre of Aného. The system is subject to heavy metal pollution related to waste from the phosphate mine at Kpémé.		
Dynamics	Very high instability at the level of the Aného lagoon mouth. High erosion noted across the whole sector since the 1980s (shore recession of 6 to 8 m per year). Improvements have been made, which, for the moment, have stabilised the situation. However, these groynes are rapidly deteriorating. Between the two systems of protection of Kpémé-Gumukopé and Aného, there is a small cell subject to rapid erosion, with a recession of approximately 100 m to 600 m between 1988 and 2008, an average of 5m/yr.		
Stakes	High risks of destabilisation of the unit of the wharf and the infrastructure of the National Phosphate Company plant with considerable economic impacts. The environmental impacts of this phosphate concentration plant (Kpémé). Heavy threat to the sparse population installed on the sandy spit east of Aného. High risk of flooding from continental waters.		
Actions	Monitor and possibly strengthen the developments at Kpémé and Aného. Deliberately restrict building on a coastal fringe 200 metres from the shore. Preserve or even restore the natural vegetation on the banks of the mouth and relicts of mangroves.		
Priority level	Very high	Monitoring-observation	Intensive and regular

DEVELOPMENTS SINCE 2010			
Evolution of stakes	New urban road in Aneho, new bridge; Pipeline gas; Wharf of Kpémé Maritime parking defined by the national navy;		
Characterization of port installations	The Terminal of Kpémé is owned by the state-owned Société Nouvelle des Phosphates du Togo (SNPT), created following the dissolution of Bureau Togolais des Phosphates et International Fertilizers Group-TOGO (IFG-TG) in 2007. It is directly linked to the Hahotoe phosphate mines (Dagbat) and the Kpogame mines. A phosphate processing plant and the SNPT administrative services are in Kpémé.		
Coastal protection	6 groynes in the east and one in the west of the terminal of Kpémé constructed before 2010. 9 new groynes in front of the village of Gumukopé. Installation of protection structures (5 groynes) in Aného, 1500 m west of the old structures built in 1985. The start of coastal protection work in the immediate vicinity has provoked the reaction of the Benin government, and a consultation and coordination mechanism has been put in place.		
Priority level	Very high	Monitoring – Observation	Intensive and regular
Protected area	YES	Hazards	Sector in strong erosion with retreat rates ranging between 2010-2014 from 5 to 20 meters per year; translation bay mouth bar, erosion, sediment transport to Benin; Bay mouth breach (sand barrier, rolling and lowering of the topographic level)

Transboundary Biosphere Reserve in the Mono Delta (proposed)	TG1-e	BJ1-a-b
WDPA ID : inexistent		
A project supported by GIZ is currently Togo and Benin considering the inclusion of the Mono delta in UNE-SCO's global network of biosphere reserves before 2019. It has a simplified management plan drawn up in September 2016.		

Gbaga Channel Transboundary Ramsar Site (proposed)	TG1-e	BJ1-a
WDPA ID : inexistent		
An initiative to register Gbaga Channel in the Wetlands of International Importance Network was initiated in 2014 with the development of the first version of the Ramsar Information Sheets for the Togolese and Beninese parts of the site.		



Erosion along the coastal segment of Agbodrafo (2013) - source MOLOA country branch of Togo



Break of the sandy spit at Aného - source MOLOA country branch of Togo



Aneho fluvio-marine system (the groynes and rock fill can be seen at the bottom of the picture. (Source Google earth)



Micro-cliffs due to erosion in Aneho (MOLOA)



Groynes at Aneho



Benin

Benin's coastal waters are crossed by the West African Gas Pipeline which runs from Nigeria to Takoradi in Ghana.

The transboundary management of the shoreline dynamics between Togo and Benin is also an important issue, given the extreme sensitivity of coastal systems from Aného in Togo to Grand Popo in Benin and the implications of the shoreline mobility which must be assessed in a concerted manner.

The harmonization is ongoing with regard to the zoning and sectoring of the Benin Coast. The sector boundaries will remain the same but the major zones defined in the SDLAO will be harmonized with the nomenclature used in Benin and resulting from the master plan for the West African coastal area : (BJ1-a and BJ1-b), Central West Zone (BJ1c and BJ2a), East-Center Zone (BJ2-b, BJ2-c and BJ2-d) and the East Zone (BJ2-e).

BJ1 BENIN WEST AFRICA

			AGRICULTURE & TOURISM
BJ1-a	179 - TOGO BORDER - GRAND POPO		
BASELINE			
Diagnostics	Narrow terraces in a practically insular position bordered by continuous lagoons and channels. Coconut groves densely inhabited in islets separated by strips of less dense dwellings. Hard-surfaced road corridor back from the beach, but too close in places.		
Dynamics	<p>Beaches and very unstable and dynamic sandy formations. Formation of bars on the fore shore and duplication of the rim.</p> <p>Along to Grand Popo: This zone is in dynamic equilibrium and is subject to average seasonal fluctuations of approximately 25 metres. In the event of an exceptional storm this value may reach 60 metres. Real tendencies to erosion are felt at certain places.</p> <p>From Grand Popo to the border: this portion of the littoral zone has been highly eroded in the past, then a tendency to accretion between 1985 and 1990 and then a tendency to dynamic equilibrium since this period (Benin National Diagnostic Study).</p>		
Stakes	<p>Security of the population settled practically on the beach. Densification of human land use foreseeable with the corresponding stakes. In the long term, exposure of the buildings, infrastructure and populations of the Grand Popo site.</p> <p>Certain sections of road are too close to the beaches.</p>		
Actions	Monitor changes in the coastal system. Restrict new buildings and locate them back from the beach. Draw up a flood/submersion risk prevention plan. Preserve natural areas behind the channels parallel to the coast.		
Priority level	Very high	Monitoring-observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Rehabilitation of the inter-state national road Cotonou - Hillacondji. Construction of a car-park on the beach. Building of a high standing Millennium hotel ranked 4 in Grand Popo. Gas pipeline. Important development of market-gardening.		
Coastal protection	Start-up phase of a coastal protection with rock fill. Environmental impact studies are under way to ensure that Aneho-Sanvi Codji (Togo) and Hillacondji-Grand Popo (Benin) zones can be protected simultaneously and in an integrated manner.		
Priority level	Very high	Monitoring – Observation	Intensive and regular
Protected area	YES	Hazards	Intensification of the erosion phenomenon affecting Hillacondji and Agoué (10 to 14m per year), in an area considered as a strip of land between the sea and the border of Togo and threatening road infrastructure, added to a dynamic equilibrium phenomenon between Agoué and Grand -Popo.

<p>Transboundary Biosphere Reserve in the Mono Delta (proposed)</p>	<p>TG1-e</p>	<p>BJ1-a-b</p>
<p>WDPA ID : inexistent</p>		
<p>A project supported by GIZ currently allows Togo and Benin to consider the inclusion of the Mono delta in UNESCO's global network of biosphere reserves before 2019. It has a simplified management plan drawn up in September 2016.</p>		

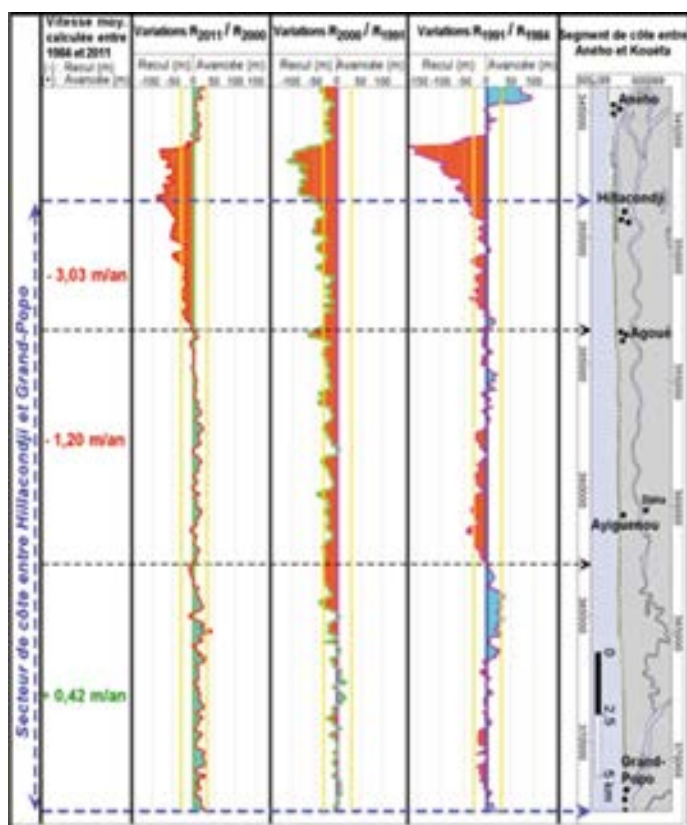
<p>Gbaga Channel Transboundary Ramsar Site (proposed)</p>	<p>TG1-e</p>	<p>BJ1-a</p>
<p>WDPA ID : inexistent</p>		
<p>An initiative to register Gbaga Channel in the Wetlands of International Importance Network was initiated in 2014 with the development of the first version of Ramsar Information Sheets for the Togolese and Beninese parts of the site.</p>		



Strong erosion on the lido of Grand Popo (source MOLOA country branch of Benin)



Conditions of the lido of Grand Popo (source MOLOA country branch of Benin)



On the Togo border, the shoreline retreat rate reaches more than 3m/year (source MOLOA country branch of Benin)

Hillacondji lagoon in the north of the lido of Grand Popo (source MOLOA country branch of Benin)

ENVIRONMENT & RURAL	
BJ1-b	173 - MONO AND KOUFFO ESTUARINE LAGOONS
BASELINE	
Diagnostics	Vast complex of channels, lagoons, wetlands, fresh and brackish water milieus. Hydric systems connected during seasonal spates of the Mono and the Kouffo. Littoral rim very narrow in places, broken at two points, final outlet of the Kouffo and its lagoons. Rural habitation in places in a high-risk situation. The dynamics of the «Bouche du Roi» river mouth were greatly affected by the Nangbéto dam built on the Mono in 1987.
Dynamics	Completely unstable sector with fluvio-marine dynamics: At the mouth of the river Mono called "BOUCHE DU ROY", where the river flows into the sea, complex morphological changes have taken place and the outlet is shifting along a stretch of around ten kilometres between Avlo and Djondji. The situation has greatly deteriorated since 1990 with the implementation of the NANGBETO dam and there has been a great deal of erosion during the period of spates; several dwellings and installations have been washed away. In August 1999, the village of Djondji was affected following the submersion of the village of Doclobœ in previous years. This deterioration has continued since 2000 (source: case study).

Stakes	High risks (flooding-submersion) for the few small villages. Important hub of the coastal fluviomarine system of undoubted biological value.		
Action	Monitor changes in the fluviomarine coastal system. Secure the population and habitations at risk (of submersion/flooding from continental waters and storm surges or conjugations of both) and totally restrict installations in the dynamic zones. Measures to preserve and conserve this unique system of wetlands.		
Priority level	Very high	Monitoring-observation	Intensive and regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Rehabilitation of the National Road 1, Hillacondji - Cotonou;		
Coastal protection	Periodic opening of the Bouche du Roi by the government		
Priority level	Very high	Monitoring – Observation	Intensive and regular
Protected area	YES	Hazards	No changes (continuation of the morphodynamic development due to the mobility of the Bouche du Roi mouth)

Ramsar Site of the Low Valley of Couffo, Coastal Lagoon, Aho Channel, Lake Ahémé WII / Ramsar site : WII ID : 1BJ001 – 1017 / WDPA ID : 220056	BJ1-b / c
The Ramsar Site of Couffo Low Valley , Coastal Lagoon, Aho Channel, Ahémé Lake was designated as a Wetland of International Importance / Ramsar Site on January 20, 2001 (47,500 ha), the boundaries are not available in WDPA.	



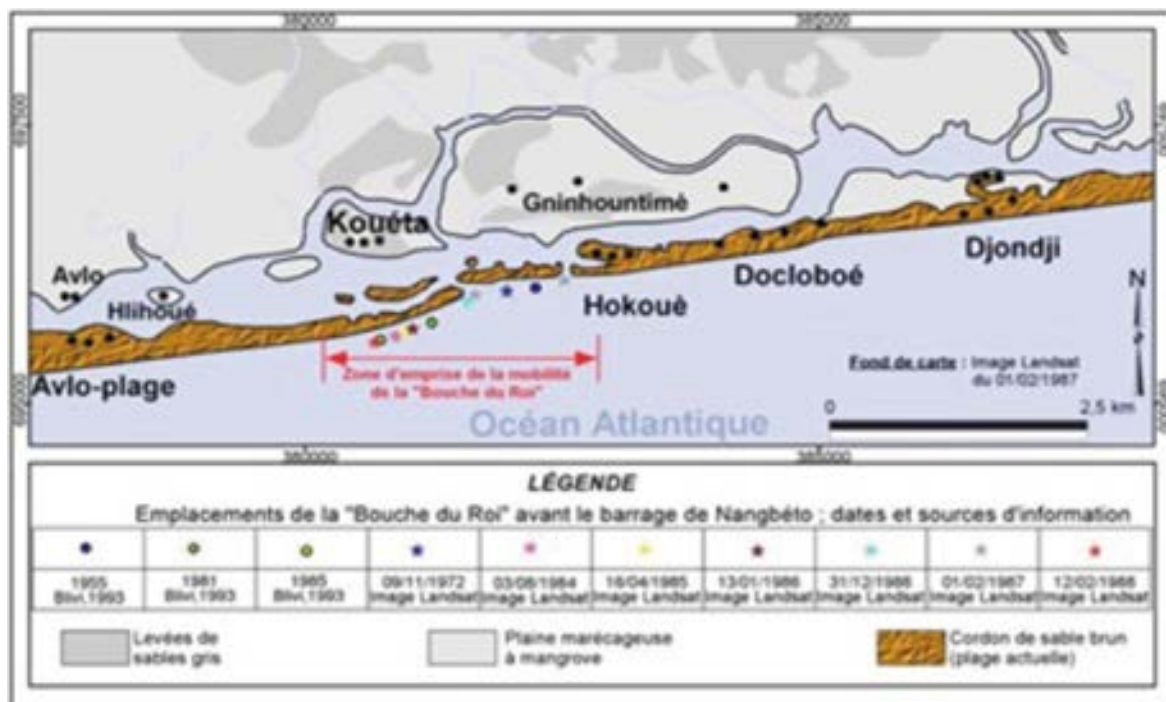
Map of proposed Marine Protected Areas in Benin, basing on the feasibility studies conducted in 2007 and 2011 in the framework on the Guinean Current Large Marine Ecosystem Project³

³ CEDED-NGO 2007. Creation of marine protected areas in Benin: Sites identification and description / CEDED-NGO 2011. Project for the creation and management of marine protected areas creation in Benin

<p>The Bouche du Roy's community conservation area</p> <p>WDPA ID: nonexistent</p>	<p>BJ1-b</p>
<p>The Bouche du Roy's biodiversity community-managed conservation area was created by the Comé's municipal order n°93/77/CC/SG-SADE of 15 September 2016. This community conservation area is integrated into in the zoning of the Mono biosphere reserve and is a component of the latter's central and buffer areas. The area has a simplified management plan drafted in September 2016.</p>	



The Bouche du Roy is one of the most dynamic sectors (migration of the river's mouth) of Benin's coastline, with local populations



Diachronic elements showing the migration of the Bouche du Roy (source : MOLOA's country branch in Benin)

BJ2 BENIN CENTRAL WEST AREA

		ANTICIPATION
BJ2-a	174 - WEST OUIDAH - COTONOU (Previous BJ1-c)	
BASELINE		
Diagnostics	<p>Relatively homogeneous sector. Sandy terrace bordered on the landward side by a network of lagoons and channels practically connected, but with few intermediate channels between this network and the coastline.</p> <p>Land use, predominantly coconut palms, interspersed with staple crops on small/average properties with «large huts». Residential dwellings on the edge of the beach approaching Cotonou. Appropriate land ownership regime. Registered concessions?</p> <p>Coastal track the line of which approaches the beach (sometimes approximately 100 m). Precarious settlements in segments or in concessions inserted between the track and the beach. Wetlands of Ouidah to be preserved in association with the listed historical site.</p>	
Dynamics	Coastline which is homogeneous, longitudinal, straight profile, slight tendency to undulation near Cotonou expressing the presence of waves of «sediment trains» along the coastline. Alternate areas undergoing slight erosion and progradation. Presence of bars on the shoreface.	
Stakes	<p>In the medium term, accompaniment and supervision of the development of a West Cotonou residential and tourism area which will require:</p> <ul style="list-style-type: none"> <input type="checkbox"/> · The defining and drawing of boundaries of a littoral strip that is not secured and not suitable for equipment (road and dwellings). <input type="checkbox"/> · The most exposed segments of road should be moved landward. <input type="checkbox"/> · Withdrawal landward of dwellings on the edge of the beach. <input type="checkbox"/> · The probable densification of the periurban area of West Cotonou in a residential area should be accompanied. 	
Actions⁹	<p>Agreed development area, and implementation of a sector scheme comprising improvement works structured by the building of a road or new, secured track more than 500 m from the beach with satellites towards the beach, which would be a powerful engine for densification. In this scenario, the former track would be abandoned.</p> <p>This mechanism could propose a natural seafront (essentially plantations of coconut palms?) preparing the land for a possible future change in the shoreline. Supervision of the preservation of the wetlands of Ouidah should enable better promotion of these areas which are an integral part of the historical site.</p> <p>Such an operation would require expropriations and a replotting of land with a view to withdrawing existing installations on the beach to the landward side of the road. This operation would have a high impact on land ownership (winners and losers regarding real estate and land property values).</p> <p>Supervise and officialise the preservation of the wetlands and sea marshes of Ouidah;</p>	
Priority level	High	Monitoring-observation Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010		
Evolution of stakes	Ouidah - Cotonou highway. Entry-point of the West-African pipeline. Start of the fishers-road project. Rehabilitation of the Cotonou-Hillacondji RNIE1 road	
Coastal protection	Development of protective works (5 spurs) in Aného, 1500m West of the old facilities built in 1985.	

⁹ The followings are only general comment and they do not specifically take into account the above-mentioned fishery route project on which the national study did not provide additional information.

Priority level	High	Monitoring - Observation	Regular
Protected Area	YES	Hazards	Moderate erosion, local shoreline retreat estimated between 0.25 and 0.55 m/year, others viable sectors.

Vodountô's community conservation area	BJ1-c
WDPA ID: nonexistent	
The Vodountô's biodiversity community conservation area was created in 2014. The area has a simplified management plan drafted in March 2014.	

Togbin-Adounko's community conservation area	BJ1-c
WDPA ID: nonexistent	
The Togbin-Adounko's biodiversity community conservation area was created in 2014. It has a simplified management plan prepared in April 2014.	

The "Fishermen's road" tourist project (Municipalities of Cotonou, Abomey-Calavi and Ouidah)

The whole of this area is directly concerned by the Fishing Road tourist development project which will be conducted in the form of a public-private partnership. This is a land planning and regional development operation under the aegis of the government of Benin. The first section of the coastal road will be moved northward 150 to 200 m, taking it to mid-way between the edge of the coast and the coastal lagoon. The area extends from Fridjrossè to Ouidah along a stretch of around thirty kilometres. More precisely, the area covers a total surface area of 5,000 ha, including 1,500 ha for building and 3,500 ha devoted to leisure facilities¹⁰. For a total cost of approximately 132 billion, the Fishing Road Project is one of the most ambitious undertaken by the government of Benin.

The project was conceived of several years ago, and this perspective has encouraged land speculation on the whole coastline, especially on the Fishing Road where a hectare of land today costs more than 20 million CFA francs (source: national diagnostic study). Conflicts are emerging over usage, in particular with the fishermen's coastal establishments which fear expropriation and having their access to the beaches reduced. The area has been listed since 2005 (Decree no.2005-684 of 3 November 2005 classifying the fishing road as an area with an exclusively touristic vocation).¹¹ - source SDLAO 2011.

Additional information 2015

The projects provides for the creation of tourist area, with the construction of hotels (6 000 rooms), housing developments (7 000 units, from to villas to apartments), leisure, commercial, transportation and services facilities...This resort should favour the creation of about 23 000 direct employments (230 000 indirect employments) et receive up to 95 000 visitors per day.

In 2015, only the developments work of a 12.5 km road section between Cotonou and the Village of Adounko were initiated in February 2014, with an amount of 13.6 billion F CFA (about 20.7 million euros).

¹⁰ Source: Republic of Benin The Ministry of Tourism and Handicraft. 2005. *The Fisherman's road Development project. Summary sheet. 16 p.*

¹¹ For more information: <http://laroutedespeches.bj>



Source: MOLOA's country branch in Benin

		ANTICIPATION	
BJ2-b	175 - WEST AIRPORT (Previous BJ2-a)		
BASELINE			
Diagnostics	Dense urbanisation in proximity to the airport, followed, towards the west, by luxury housing. Precarious settlements and "informal" land use in proximity to the shore along its length. Catering and leisure facilities along the beach on the whole of the area on the backshore served by a coastal track in immediate proximity to the beach.		
Dynamics	Longitudinal, slightly undulated profile, beach foreshore with some development in the eastern part, but restricted (approximately 100 metres) to the west. Area undergoing accretion (related to the harbour works at Cotonou). Low topography and exposure to storm risks.		
Stakes	In the medium term, accompaniment of building development, which will undergo high densification in this sought-after, connected area. Management of precarious installations on the back beach.		
Actions	Restrict new buildings in the areas close to the shore, planned withdrawal of habitations at risk on the edge of the beach. Closely monitor the changes in the shoreline along the entire area. Anticipate installation of facilities and development through a sector scheme.		
Priority level	Medium	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Construction of high-quality housing units (on 100 ha?) and tourists (3 hotels) facilities; gas pipeline; optical fibre.		
Priority level	Medium	Monitoring - Observation	Regular
Protected Area	NO	Hazards	Increase of the accretion, west of the port

BJ3 BENIN CENTRAL EAST

		URBAN	
BJ3-a	176 - HARBOUR AIRPORT (Previous BJ2-b)		
BASELINE			
Diagnostics	Very diversified and dense urbanisation, besides the airport footprint. Residential habitation at various levels of quality (swimming pools), large hotel infrastructure, unbuilt land, but projected increasingly close to the shore or encroachment of precarious, random buildings. Vegetable growing area. Urban effluent outlets on the beach at the level of the harbour. Large quantity of solid waste.		
Dynamics	Slightly undulated longitudinal profile, foreshore and beach highly developed (accretion favoured by the harbour developments). Area exposed in the event of storm waves. This area, situated immediately to the west of the harbour, is undergoing constant accretion under the influence of the harbour structures. The recession of the sea in this area is estimated at between 20 to 25 metres per year (Benin National Diagnostic Study).		
Stakes	In the medium term, implementation of a coherent project to develop the seafront and control the extension of building.		
Actions	Restrict new buildings in the areas close to the shore. Closely monitor the changes in the shoreline along the entire area. Anticipate installation of facilities and development through a sector scheme.		
Priority level	High	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Construction of the Ganhi's commercial area; Gas pipeline; harbour development works (prolongation of the Western pier, dredging of the harbour's basin; Optical fibre		
Priority level	High	Monitoring - Observation	Regular
Protected Area	YES	Hazards	Increase of the accretion, west of the port

Lake Nokoué's (proposed) protected area.	BJ2-b
WDPA ID: nonexistent	
A first study on the marine protected areas to be protected was conducted in 2007 and led to the beginning, in 2009-2010 of a process to carry outreach activities towards local communities, a participatory mapping and to define management measures. 4 areas that need to be protected were identified, among those areas is the Lac Nokoué's protected area which hosts the western part of the lake. This proposed protected area is not listed in WDPA.	

		URBAN AND PORT	
BJ3-b	177 - HARBOUR SECTOR AND COTONOU CHANNEL (previous BJ2-c)		
BASELINE			
Diagnostics	Complex, highly urbanised sector, habitation and harbour facilities, random dwellings at risk of flooding on the left bank of the lagoon outlet. Right bank in rock fill ending with a pier in the sea.		
Dynamics	<p>Beach on the right bank in a complex situation: The western part is undergoing accretion at a high rate, the eastern part possibly has a tendency to erosion or is stabilised (anchorage to two piers at the ends of the beach).</p> <p>Coastline situated between the lagoon outlet and a second protective structure built at the same time as the harbour: this area is in dynamic equilibrium under the influence of the protective groyne commonly known as «east groyne or Sifato groyne». Coastline situated between the port and the outlet of Cotonou Channel. This area is protected by a groyne of rock fill (commonly known as West groyne). The area is currently in dynamic equilibrium. The lagoon outlet is an area of variable morphology which has been subject to considerable changes since Cotonou Harbour was built (Benin National Diagnostic Study).</p>		
Stakes	In the medium term, preservation of the buildings and infrastructure close to the shore.		
Actions	Restrict new buildings in the areas close to the shore. Requalification accompanied by a withdrawal of habitations situated on the edge of the left bank of Cotonou Channel. Possible additional structures against erosion. Closely monitor the changes in the shoreline along the entire area.		
Priority level	High	Monitoring-observation	Regular
DEVELOPMENTS SINCE 2010			
Evolution of stakes	<p>Harbour development works (prolongation of the western pier in 2014, dredging of the harbour's basin), launching of the «Epine Dorsale» project that includes a deep-sea, oil, mineral and commercial port in Sèmè-Podji (Benin), a functioning railway from Cotonou to Parakou that should be extended from Parakou to Dosso and Niamey (Niger), as many dry ports as needed, especially in Parakou and Dosso, as well as an international airport in Kraké, on the border between Benin and Nigeria.</p> <p>Project to extend and exploit the banks of the lagoon and the optical fibre transit area; Gas pipeline; Rehabilitation of the Cotonou - Sèmè-Kraké road;</p> <p>Renovation and extension of the protective spurs west of the Cotonou channel</p>		
Characterization of port installations	<p>The port of Cotonou was built in 1962. The concession of the Cotonou's port has been granted to Bolloré Africa Logistics since 2009 for a 25-year period, in the framework of the public-private partnership with the port's Authority.</p> <p>The reception of a 540-m marked the beginning of the terminal's development works.</p> <p>90% of exchanges with foreign countries/more than 60% of the countries GDP/8 million tonnes. It is through this port that Areva exports the Uranium extracted in the north of Niger.</p>		
Coastal Protection	Start of the emergency protection works in the CAME area.		
Priority level	High	Monitoring - Observation	Regular
Protected Area	YES	Hazards	Not reported



Distribution of protection works around the port (source: SDLAO, National Study, Benin)

			URBAN
BJ3-c	178 - AMBASSADORS SECTOR (Previous BJ2-d)		
BASELINE			
Diagnostics	Largely urbanised, the eastern part is structured in quadrats. High density right to the edge of the beach. No development of the sea front. Since the 1980s, in the West part of the sector, affected by erosion, beach sandstone (beachrock) has appeared, unearthed by erosion.		
Dynamics	Sector subject to high rate of erosion upstream of the channel and the port of Cotonou, despite several old structures (groynes + stabiplage). This area is currently undergoing strong erosion at rates of approximately 20 metres per year in the east in the immediate proximity to the Sifato groyne. These rates decrease eastward and remain greater than one metre per year towards Kraké on the border with Nigeria. This part of the littoral was also where the largest sand quarries were situated. More than 800.000 m ³ of sand were extracted annually (source: Benin national diagnostic study).		
Stakes	In the short term, considerable shoreline recession threatening dense urban districts.		
Actions	Absolute restriction on new buildings in the areas close to the shore Defensive project underway involving a groyne mechanism. Close monitoring of the impact of the developments.		
Priority level	Very high	Monitoring-observation	Intense and regular
Case study	The beaches of Benin in the Gulf of Guinea in West Africa: changes and socio-economic consequences. See annex 1.		
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Rehabilitation of former infrastructure built by SAGA Petroleum for the exploitation of the residual oil reserve of the Sèmè field by the SAPETRO company ; Gas Pipeline. Ongoing exploration of the country's whole offshore		
Coastal protection	Construction of 07 protective spurs between 2012 and 2013 and a coating on a 7.5 km distance from the Sifato spur westwards		
Priority level	Very high	Monitoring - Observation	Intense and regular
Protected Area	YES	Hazards	Important morpho-dynamic change following the establishment of the spurs.



Important erosion (reflexive beach) in front of the port (Source, MOLOA's country office in Benin)



Development of the spurs system west of the port of Cotonou (source: MOLOA's country office in Benin)



Development of the spurs system west of the port of Cotonou (source: MOLOA's country office in Benin)



Development of the spurs system west of the port of Cotonou (source: MOLOA's country office in Benin)



Rock-filled coastline north of the port of Cotonou (Source: Google Earth)

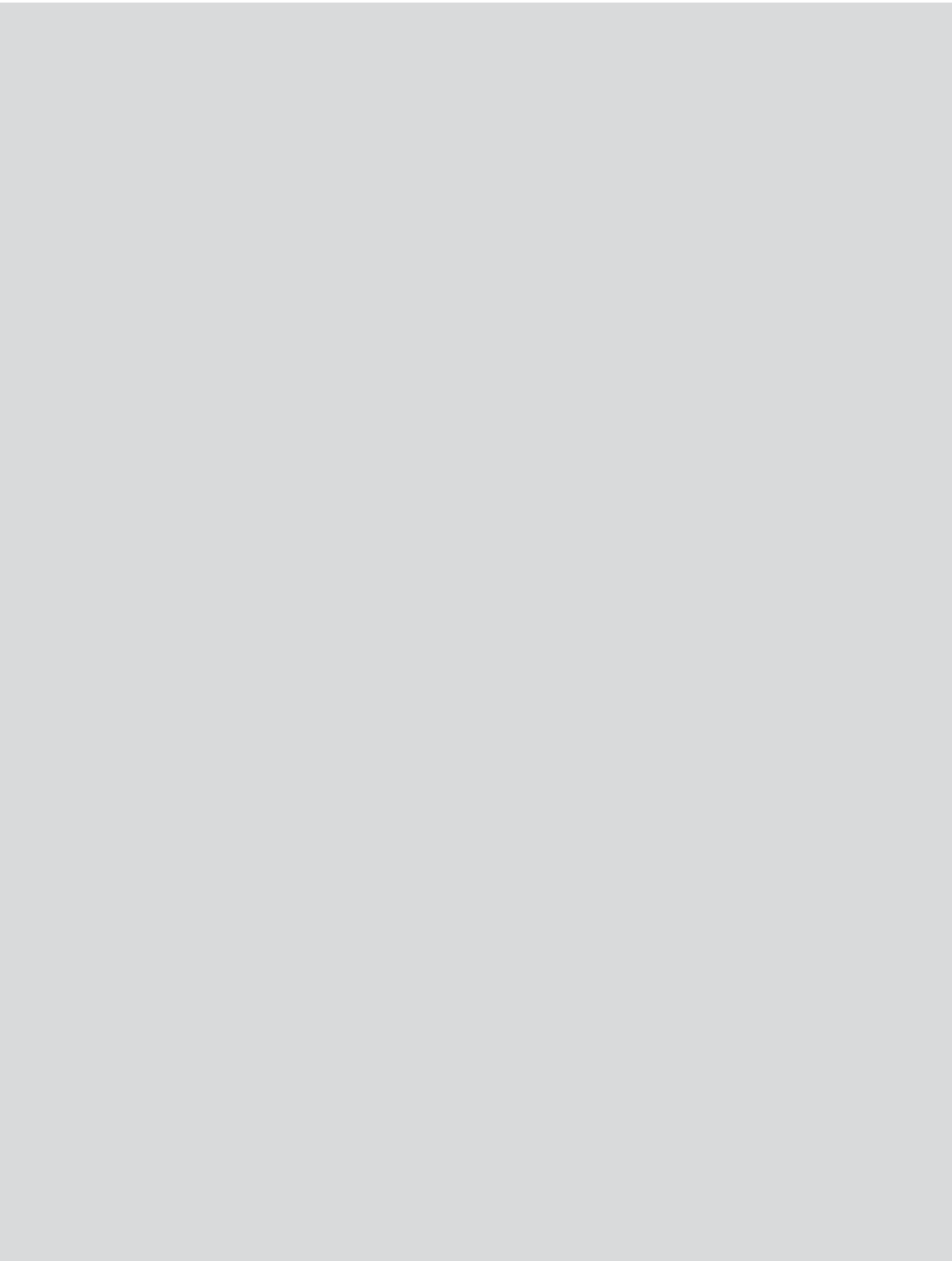
BJ4 BENIN EAST AREA

		PERI-URBAN	
BJ4-a	179 - EAST COTONOU (Previous BJ2-e)		
BASELINE			
Diagnostics	Coastline sparsely populated, despite the proximity of urban centres. Coastal road between 1.2 and 1.6 km from the shore. Large plantations (coconut palms). Land reserves destined for future use on terrains close to Nigeria. Area suitable for equipment (high, well-drained terraces).		
Dynamics	Recession of the shoreline to be anticipated depending on the developments planned for the Ambassadors area.		
Stakes	Urbanisation respecting the seafront with no buildings and developed, anticipation of developments and land use/urbanisation of the sector		
Actions	Anticipate equipment and development. Closely monitor the changes in the shoreline.		
Priority level	High	Monitoring-observation	Watch-keeping for the purpose of anticipation
DEVELOPMENTS SINCE 2010			
Evolution of stakes	Construction of the Cotonou-Nigeria road; Gas pipeline Construction of a customs inspection station juxtaposed to Sèmè-Kraké Project for the construction of the deep-sea port of Sèmè-Podji.		
Priority level	High	Monitoring - Observation	Intense and regular
Protected Area	YES	Hazards	It is necessary to closely monitor the impacts of the implementation of the spur system East of the Port of Cotonou that is already resulting in a substantial recess of the shoreline west of the spurs systems.

Ouémé Low Valley Ramsar Site, Porto-Novo Lagoon, Nokoué Lake WII / Ramsar site: WII ID: 1CI003 – 1018 / WDPA ID : 220055	BJ2-b / c / d / e
The Ouémé Low Valley, Porto-Novo Lagoon, Nokoué Lake Ramsar site was classified as a wetland of international importance/ Ramsar site on 24 January 2000 (91 600 ha) (no map in the WDPA)	

Bymins' community conservation area WDPA ID: nonexistent	BJ1-c
The Bymins' biodiversity community conservation area was created in 2014.	

Notes



Assessment
2016

West Africa
coastal
areas

DETAILED MASTER PLAN

2016 UPDATING