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ADAPTATION



# Final Report Climate Risk Assessment Urban Adaptation and Resilience in Africa



**LIBREVILLE**

# Accountability

<b>Titel</b>	Climate Risk Assessment: Urban Adaptation and resilience in Africa
<b>Project Number</b>	51008339
<b>Client</b>	Global Center on Adaptation
<b>Project Management</b>	Enrico Moens
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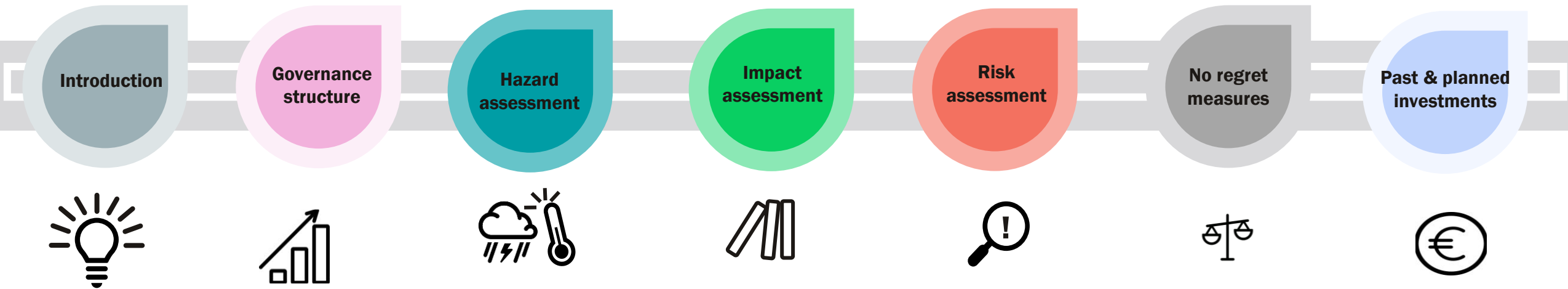
- a) Past investments
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## Acknowledgement

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# Steps Climate Risk Assessment

The Climate Risk Assessment consists of the following steps. This report presents the results per step. Results are based on an **extensive literature study** and **city stakeholder interviews**.



# City Stakeholder Participation

An important aspect of this Climate Risk Assessment is the **co-creation** and **validation** of results with stakeholders from the city of Libreville. Their input is crucial for obtaining good results. City stakeholder participation took place on 3 levels:



**Our local Partner.** Our local partner was our person on the ground. He identified key stakeholders, made an initial contact with them presenting the project and its objectives. He collected local data and reports and kept a record of the hazards being presented in the local media. He took pictures of these events and informed us on the current situation.



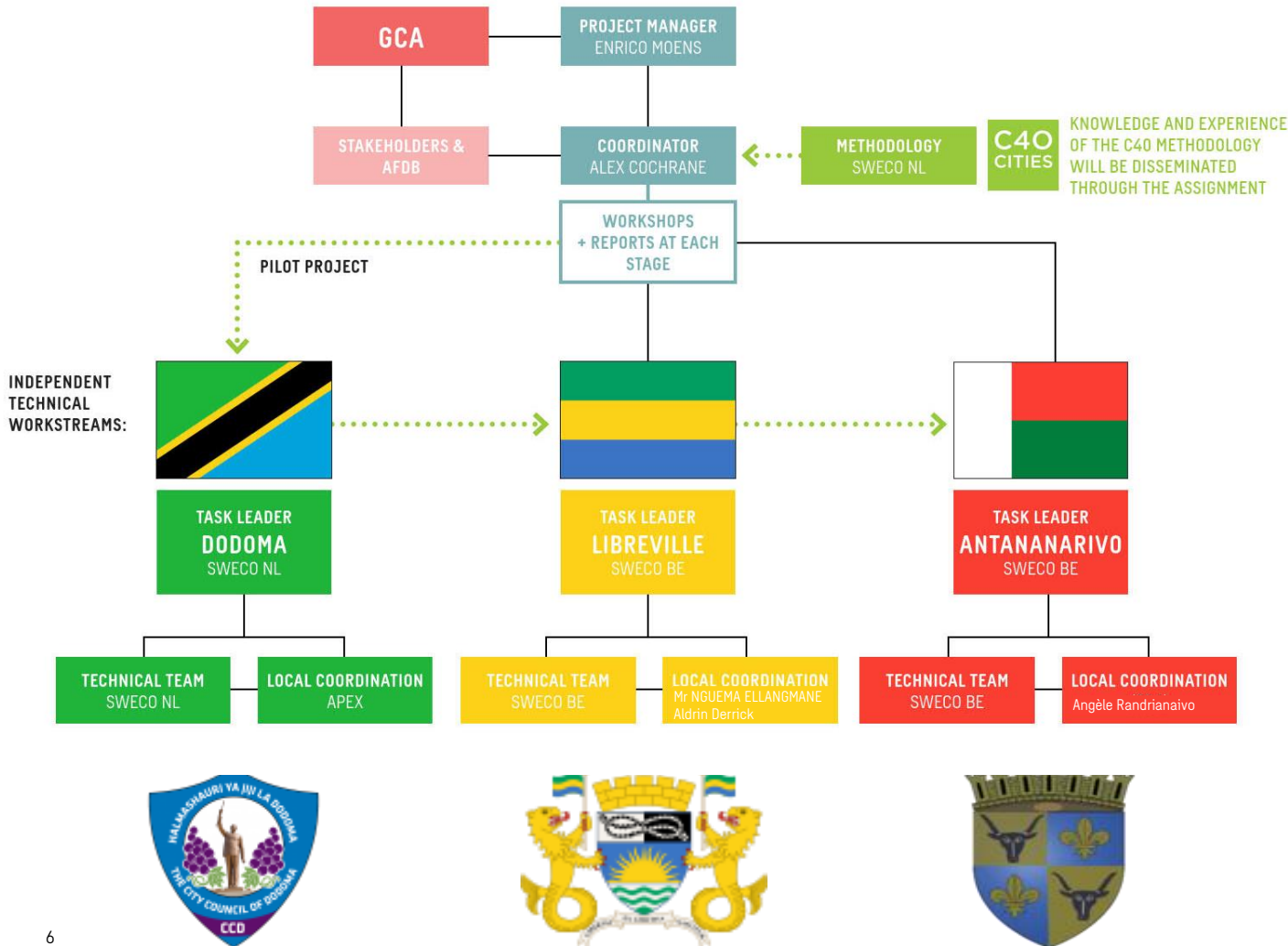
**Our City Advisor and key stakeholders:** While we originally planned to interview the Chief of the Mayors Office. He couldn't receive us during the time frame of the mission. Thus, we contacted the Deputy Director of Risk who informed us of relevant areas to go to make ground investigation. He provided us 3 agents and help us to develop the questionnaire. He also reports on current situation in Libreville regarding risk assessment.

Additionally, we had interviews with key stakeholders. In these interviews the goals of the project, the data availability, the planned, current and past investments, were discussed. We couldn't have their opinion on the no regret measures



**Survey.** We conducted a survey filled in by residents in the vulnerable parts of the city. In total **61 persons** were interviewed with a balanced coverage over the **3 districts** visited. We also ensured gender-balanced in our interviews.

# Approach and Team



Organisation	Name	Role
General Coordination	<b>Enrico Moens</b>	<b>Project Manager</b>
	Anna Älgevik	Contract Manager
	Alexander Cochrane	General Coordinator and liaison to the AfDB city diagnostic teams
	Jens Aerts	Quality Assurance
Dodoma	<b>Jeroen van Eekelen</b>	<b>Country Project Leader and Climate Adaptation Expert</b>
	Richard Mushi	Local Consultant
	Severine Alfred	Local Consultant
	Floor Mossink	Climate Adaptation Expert
	Don Ottenheim	Intern
Libreville	<b>Séverine Hermand</b>	<b>Country Project Leader and Climate Adaptation Expert</b>
	Aldrin Derrick Nguema Ellangmane	Local Consultant
	Ghulam Sakhi Saba	Intern
Antananarivo	<b>Anaïs De Keijser</b>	<b>Country Project Leader and Climate Adaptation Expert</b>
	Angèle Randrianaivo	Local Consultant
	Lynn van Wissen van Veen	Intern
Supporting Pool of Experts	Lazare Nzeyimana	Climate Resilience and Drought Expert
	Jart Ligterink	Expert data and GIS
	Jelmer van de Ridder	Senior Climate Adaptation Expert
	Kevin Penalva Halpin	Senior Expert Strategic Urban and Regional Planning

# Introduction



An aerial photograph of a wide, muddy river meandering through a vast, dense tropical rainforest. The river flows from the top right towards the bottom left, forming a large loop. The forest is a deep, vibrant green, and the river's banks are also covered in lush vegetation. A small boat is visible on the river in the lower right quadrant. The word "Gabon" is overlaid in white text in the center of the image.

# Gabon





# GABON



**Context:** Gabon, a central African country, is rich in natural resources. Located on the Atlantic Ocean, it borders Cameroon, Equatorial Guinea, and the Republic of Congo. It is sparsely populated, with a population of 2 million and forests covering 85% of its territory.

**Population:** 2,2 million

Male: 1,179,528 (50.86 %)

Female: 1,139,528 (49.14 %)

**Provinces:** 9

**Capital:** Libreville

Source: <https://www.worldbank.org/en/country/gabon/overview#1>

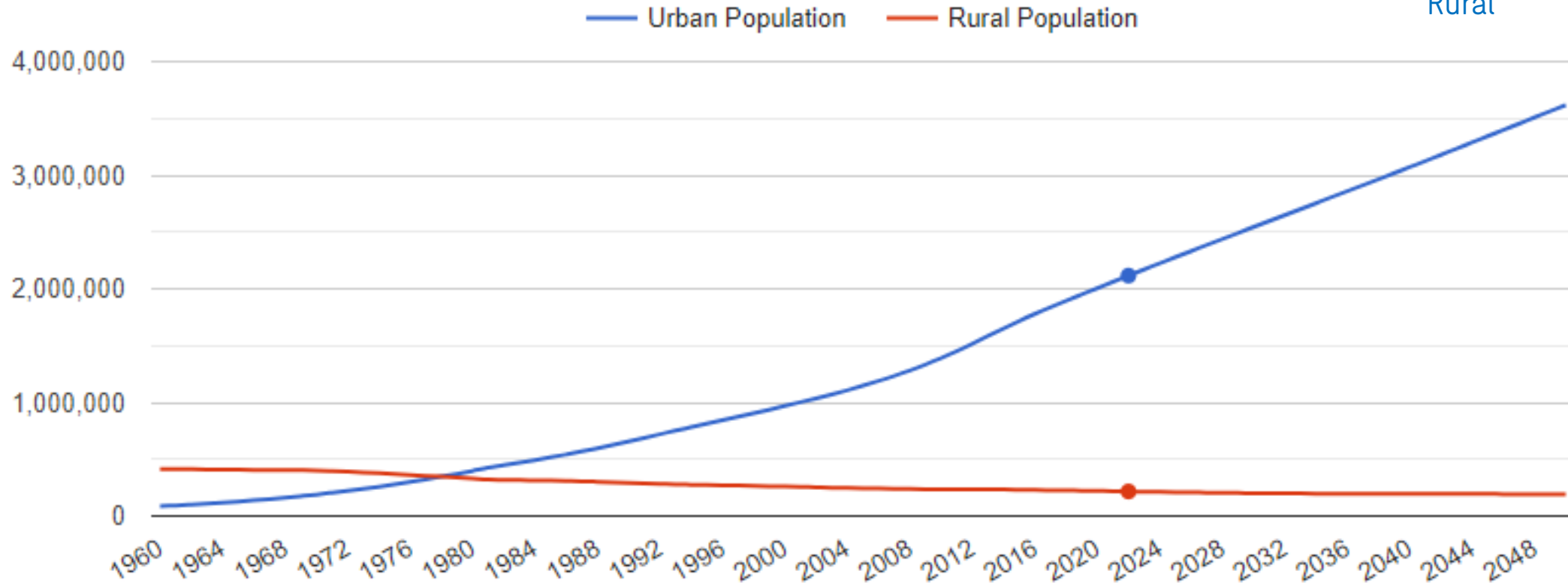
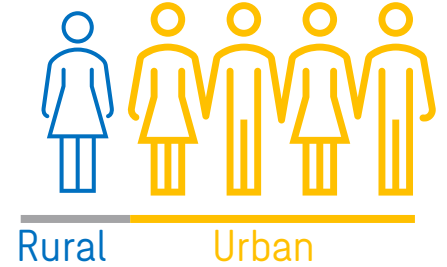
## CARTE ADMINISTRATIVE



Source: <https://www.globestoppeuse.com>

# GABON-Urban population

87% of the Gabonese population lives in urban areas, one of the highest urbanization rates in Africa. More than four in five Gabonese citizens live in cities.



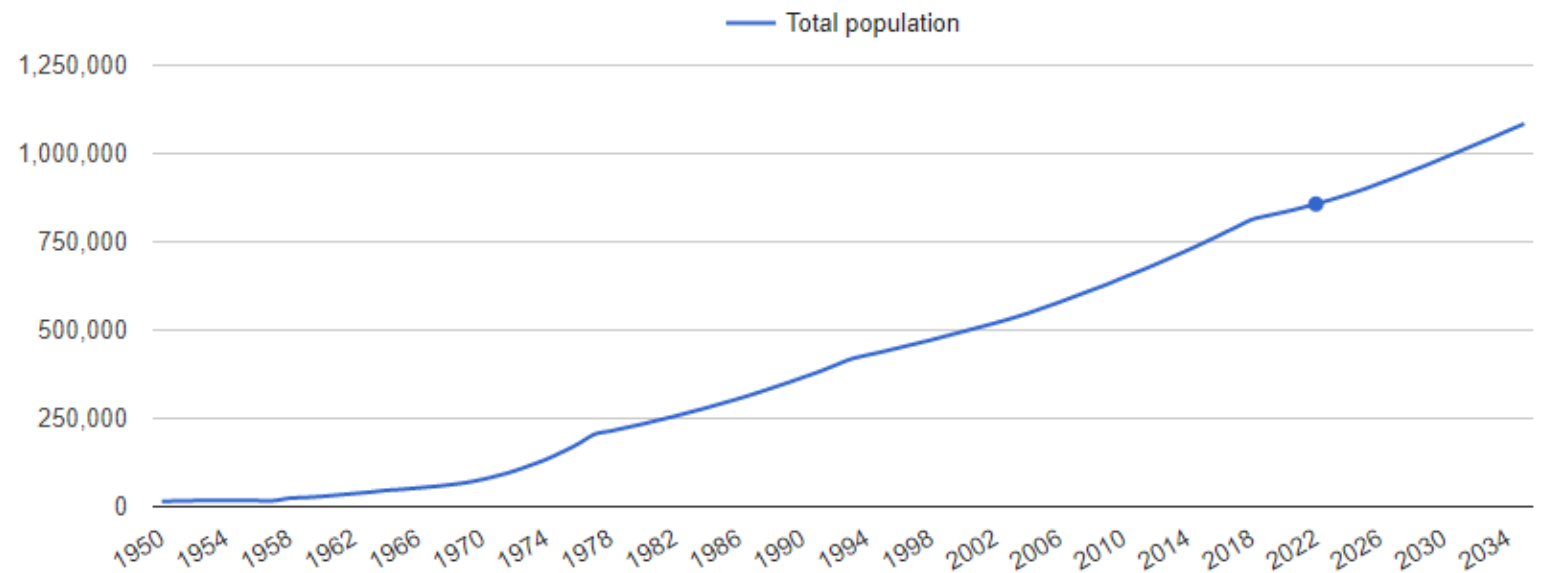
# GABON-Urban population

Over the past 40 years, the population has gradually moved to the country's four main cities of the country: **Libreville, Port-Gentil, Franceville and Oyem** thus creating a profound demographic imbalance.

These four cities represent **80% of the population of Gabon**. The capital, Libreville, and Port Gentil—the economic capital of the country—are home to **59% of the population**.

	CITY NAME	POPULATION
1	<b>Libreville</b>	856,854
2	<b>Port-Gentil</b>	147 817
3	<b>Franceville</b>	128 729
4	<b>Oyem</b>	71 259

Libreville Urban Area Population Graph



# GABON

Gabon is **one of the most developed countries** in sub-Saharan Africa. Abundance of natural resources such as oil and timber sustain Gabon's economy.

However, **mismanagement and corruption result in inequality in wealth distribution.**

The Corruption Perceptions Index (CPI) 2021 published by Transparency International shows that corruption levels in Gabon remain at a standstill, with the country having made no progress in the last ten years.

The situation remains endemic, with the country ranking 124th in the world, with a score of 31/100\* and gaining one point and five places compared to 2020.

\*THE CPI USES A SCALE FROM 0 TO 100  
100 is very clean and  
0 is highly corrupt

## POPULATION



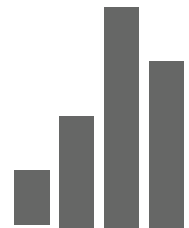
2018 estimate

**1.8**  
(million people)

2050 projection

**3.8**  
(million people)

## GDP



2018 estimate

**16.9**  
(billion \$)

2050 projection

**67.7**  
(billion \$)

UNDRR (2020). Gabon: Risk-sensitive Budget Review

# LIBREVILLE



# Libreville



**Context:** In the Estuaire province, Libreville is located on the right bank of the Komo river estuary. The city and its environments occupy about 16 000 hectares on the northern shore of the estuary.

Hills dominate the central part of the land of Libreville, whereas the north and the north-east are made up of plains. These hills and flat valleys produce physical constraints that determine the social geography and have oriented occupancy of land of Libreville.

Libreville first served as capital of French Equatorial Africa until the function was moved to Brazzaville in 1904.

*In 1960*, when Republic of Gabon attained independence, Libreville became its capital and rapidly developed into an important commercial centre.

## Libreville City:

Population: 856,854

Area: 125.1 KM<sup>2</sup>

Districts: 6

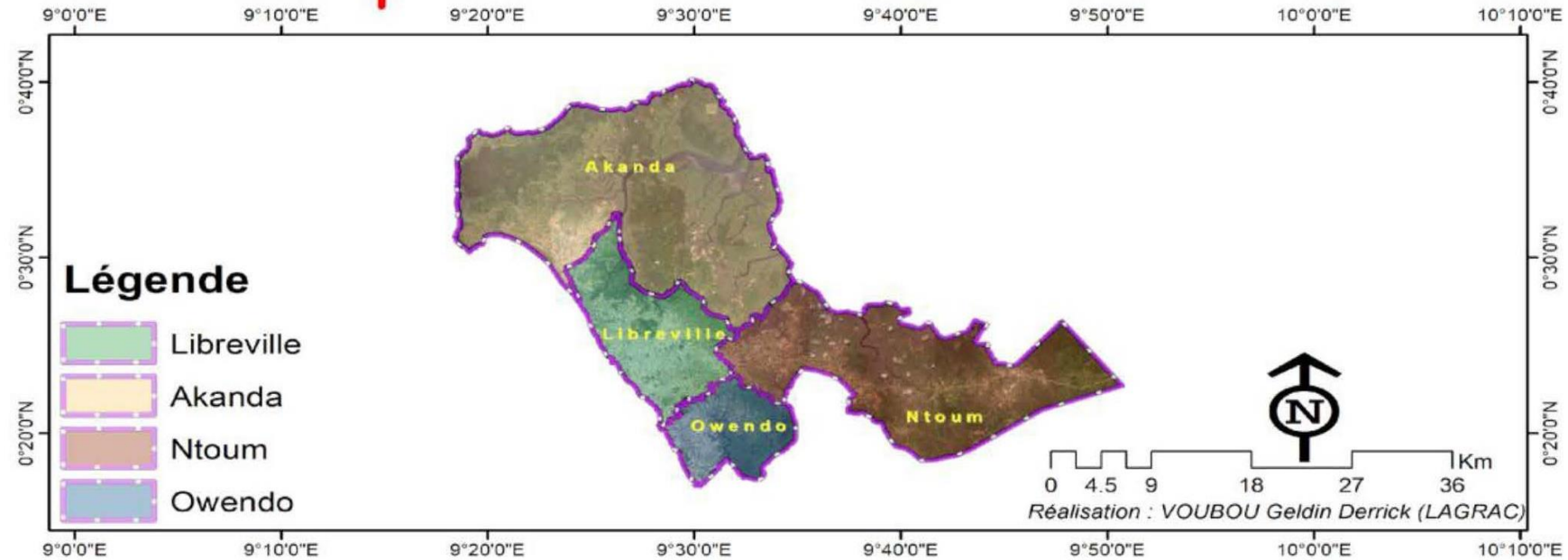
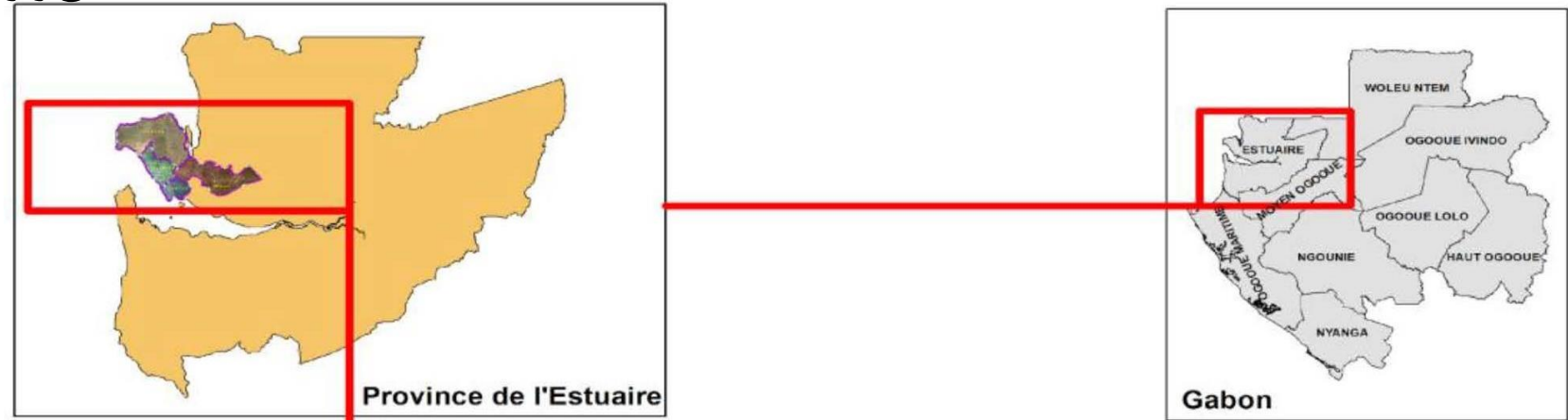


# The great Libreville

Urban structure

4 communes:

- Libreville,
- Akanda,
- Ntoun and
- Owendo.

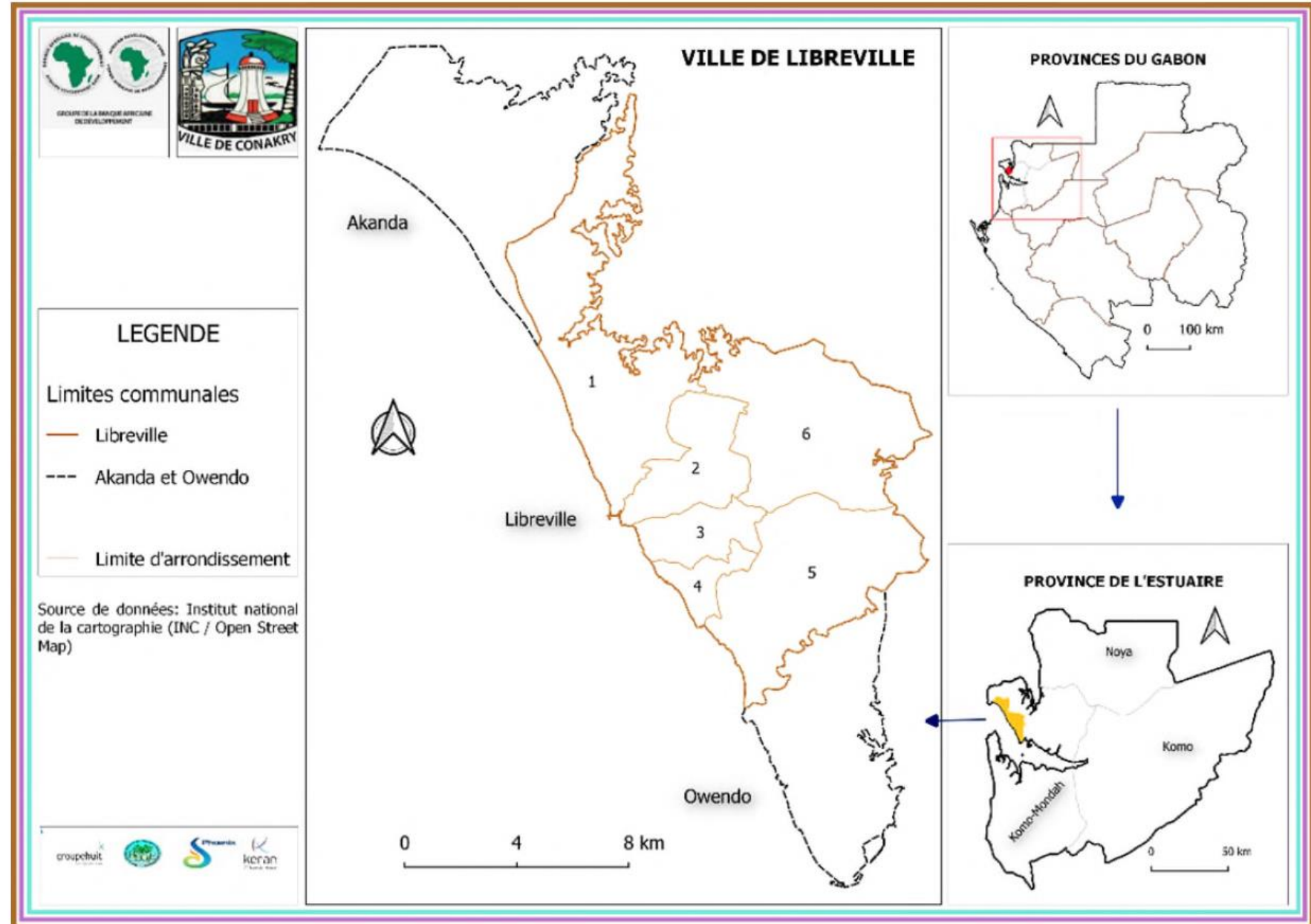


Source: Projet de Renouvellement, Renforcement et Extension du Réseau d'Eau du grand Libreville (PRERAEP)

# Libreville

## Urban structure

6 districts in Libreville city (City Diagnostic, 2021\_)



Source: City diagnostic Groupe Huit/ Auddi / Phoenix / Begie / KAO



# Libreville

Cosmopolitan

In 1960, the capital of the Gabonese Republic had only 30,000 inhabitants. Since then, its **population has increased** twentyfold: the urban area, made up of the commune of Libreville and Owendo (the port extension of the capital), had approximately 900,000 inhabitants in 2022.

## Population structure:

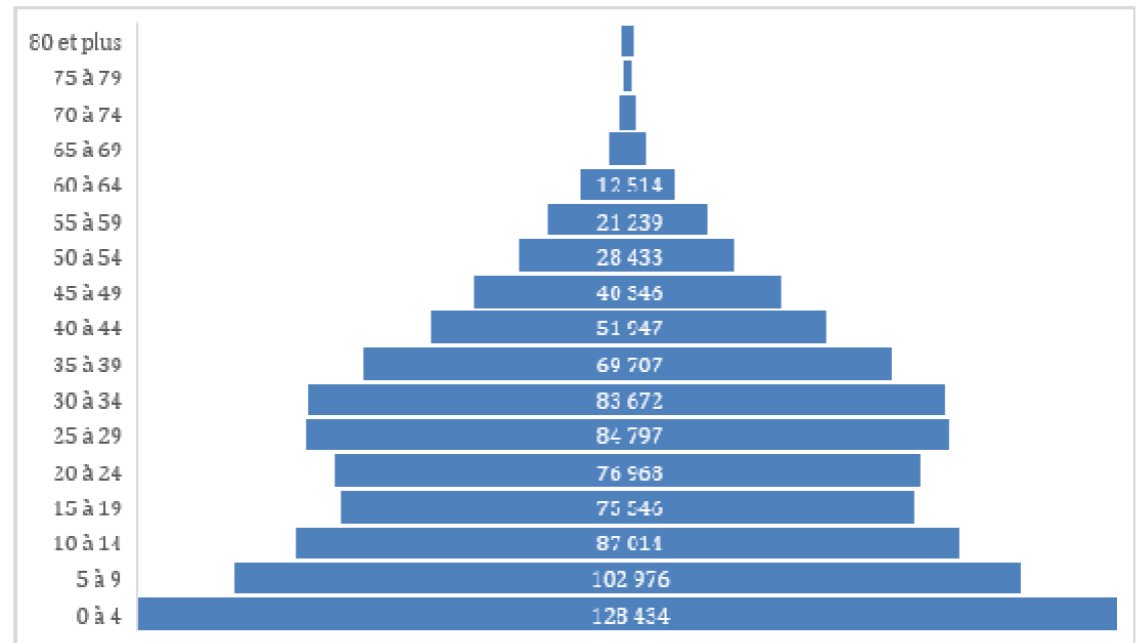
**The population of the city is “young”.** More than half of the inhabitants are under 25 years old (about 54%) and almost 87% of the population is under 50 years old.

Source: City diagnostic Groupe Huit/ Auddi / Phoenix / Begie / KAO

## Population:

Male: 51 %

Female: 49 %



Source: RGPL 2013, National Institute of Statistics

# Libreville

## Urban structure

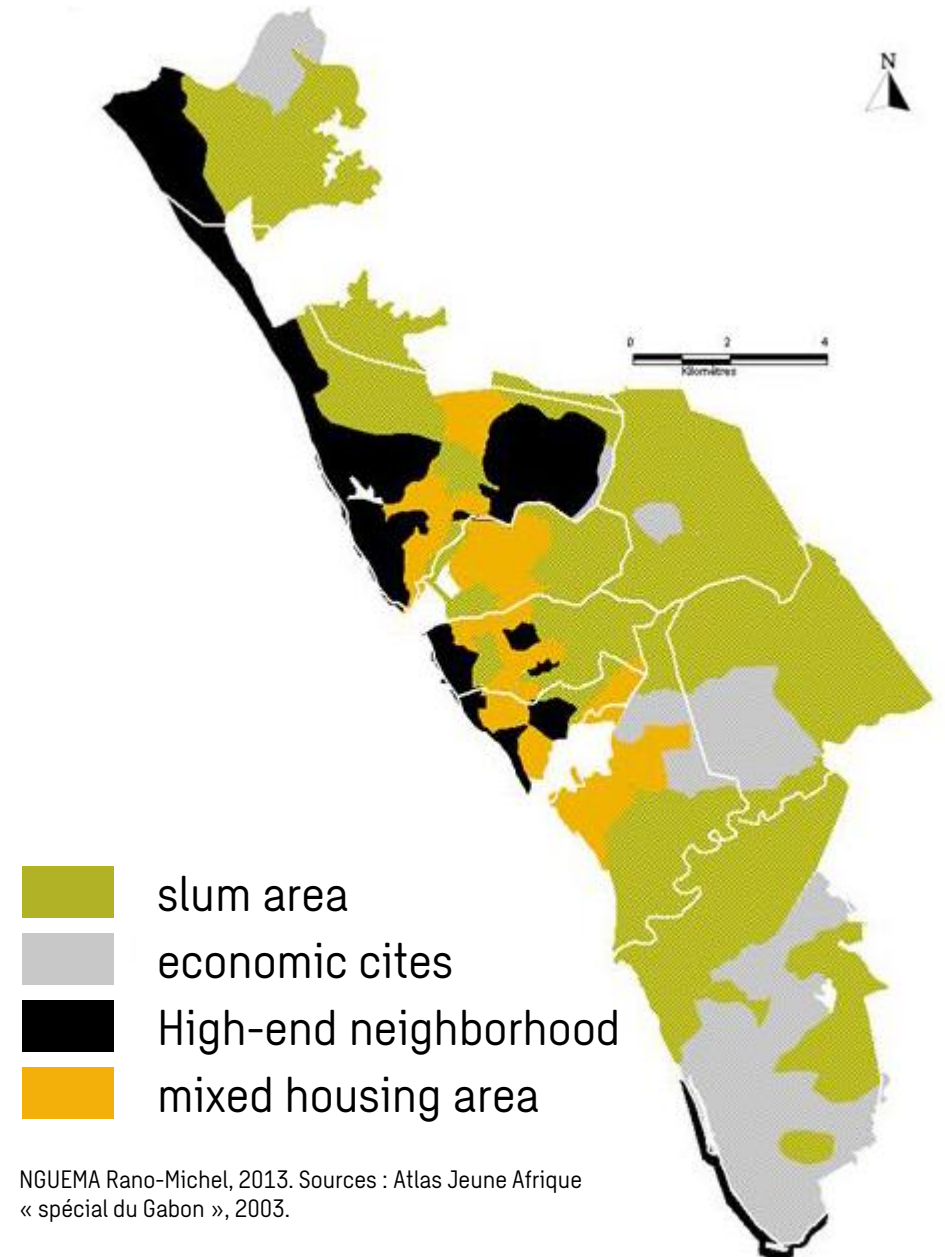
According to a study by the Projet d'Ajustement et de Planification des Secteurs Urbains et Transports (PAPSUT) in 2001, **80% of Libreville's urban inhabitants live in under-integrated districts.**

The site of Libreville, composed of alternating hills (123 metres at Mount Bouët) and valleys with flat bottoms that are often marshy, imposes strong constraints on the organization of urban space and guides its social differentiation.

The high-end neighborhoods favored the hilltops and the seafront, while working-class housing was relegated to the bottom of the valleys.

Urbanization now extends over more than thirty kilometers along the estuary and progresses inland (Ntoum road, planned neighborhoods of Nzeng Ayong).

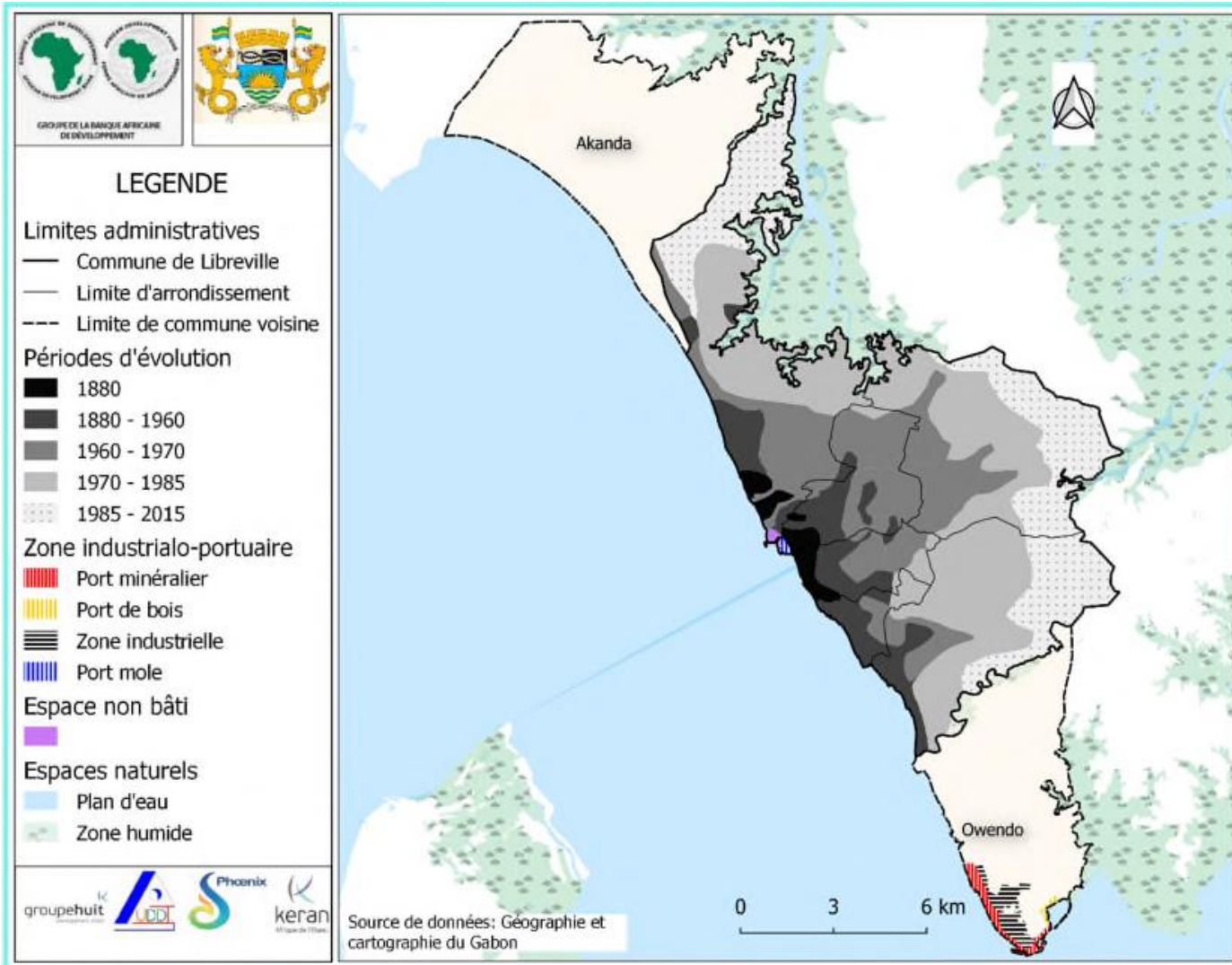
Source: Rano-Michel Nguema, <https://doi.org/10.4000/espacepolitique.3014>



NGUEMA Rano-Michel, 2013. Sources : Atlas Jeune Afrique « spécial du Gabon », 2003.

# Libreville

## Urbanization – Estuaire Province



Source: City diagnostic Groupe Huit/ Auddi / Phoenix / Begie / KAO

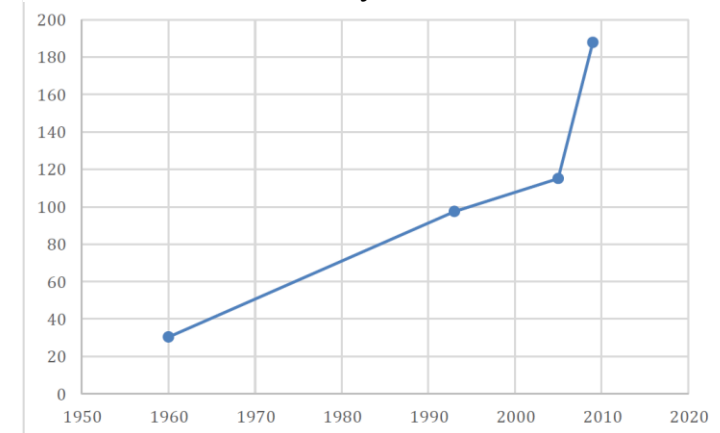
### City Expansion:

Libreville extends over a set of hills, separated by lowlands, formerly marshy areas and other historical constraints.

### Modes of Extension:

- Central core around which villages clustered
- East development
- Development of isolated districts

### Evolution of the city's surface area in Km2



Source : Marjolaine OKANGA GUAY, 2013

# Libreville

## Topography



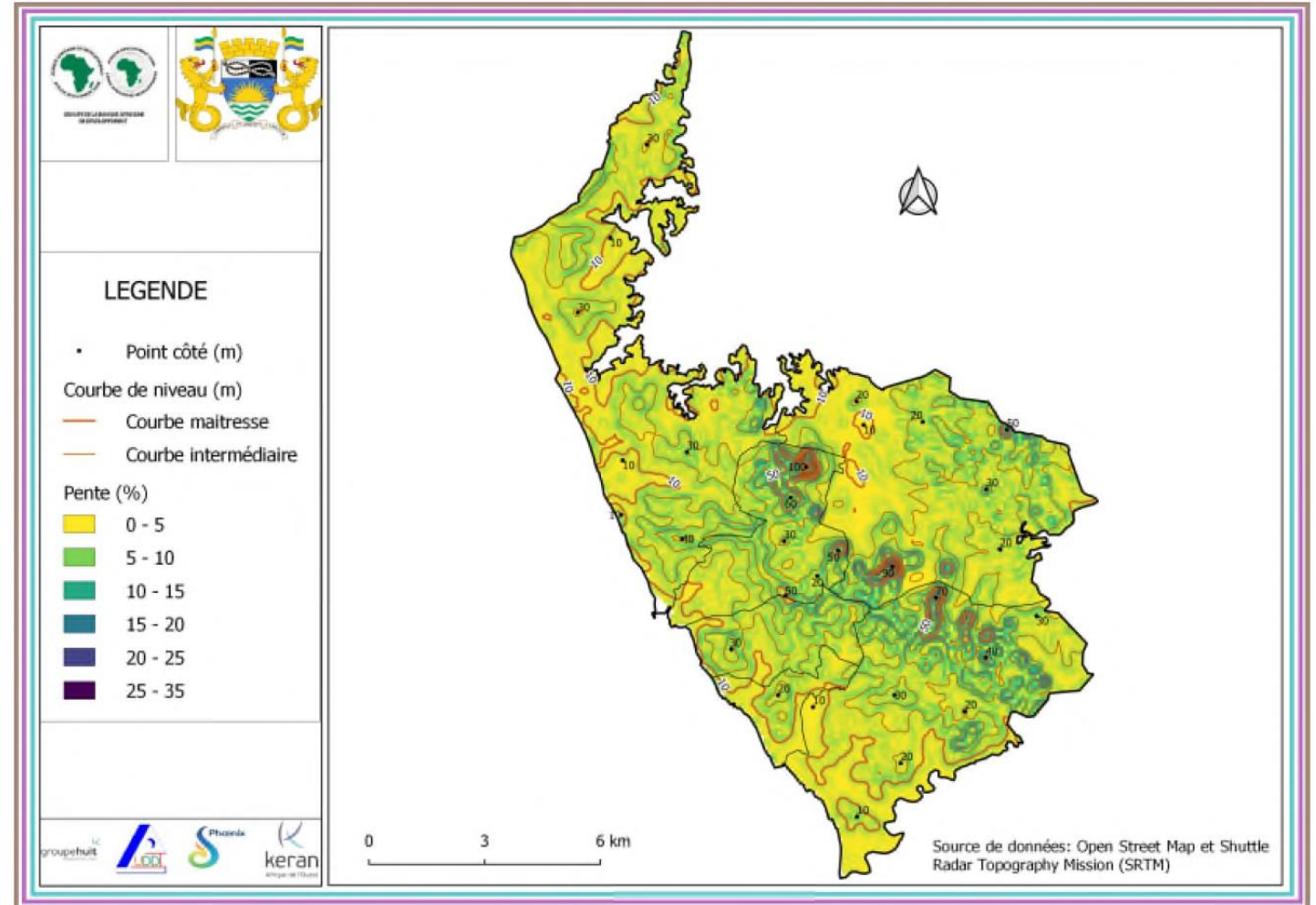
**Libreville is a hilly city** and yet it is considered a flat area.

The dismantling of the plateau by the erosion of the small coastal rivers that drain it has shaped the present topography to an **average altitude of 40 m**.

Altitudes vary from the coastline (0 m) in the west to the continental undulations (around 126 m).

Slopes above 25% are absent in Libreville

Source: Book "De la ville pensée à la ville pansée" chapter 6, J.B. Mombo et M.T. Itongo, 2021

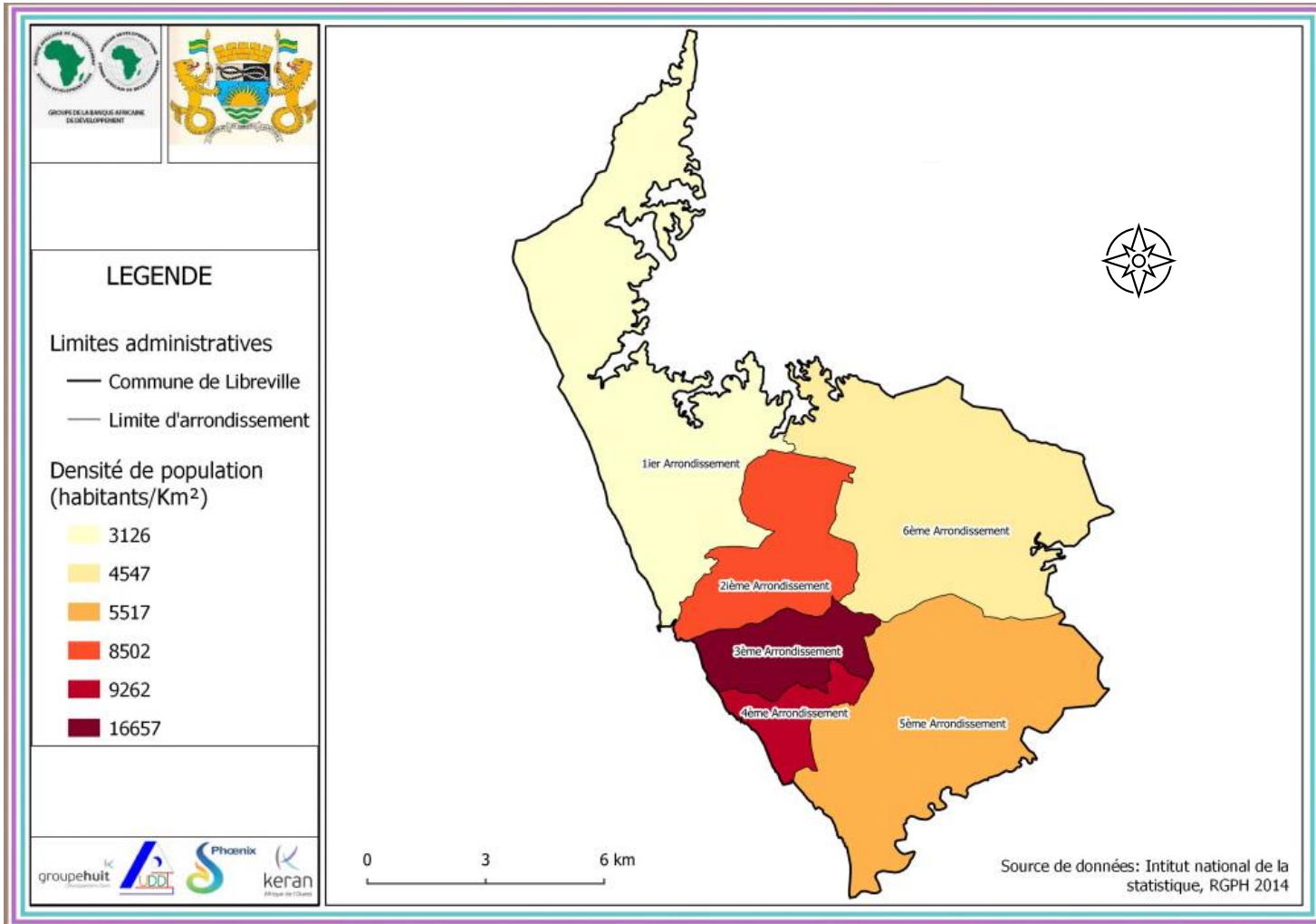


Source: City diagnostic Groupe Huit/ Auddi / Phoenix / Begie / KA0

# Libreville

Population density

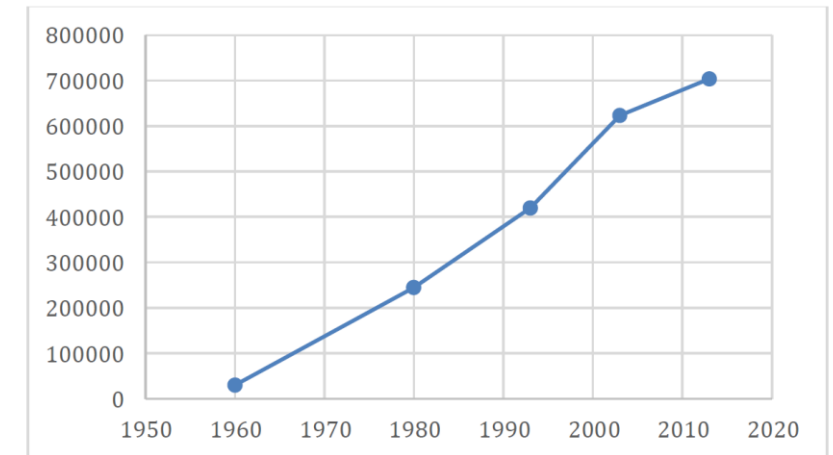
Population 2021: 873 925 hab\*



The city is divided into 6 districts.

The 1st and 5th districts have the city's major infrastructure (airport, port), while the central districts (4th, 3rd, 2nd) host the main administrative facilities.

Fig. 1 - ÉVOLUTION DE LA POPULATION DE LA VILLE



Source : D'après Marjolaine OKANGA GUAY, 2013<sup>3</sup>

\* according to estimates from the Ministry of Economy and Finance (2019 - 2025 population projection) of Gabon

Source: City diagnostic Groupe Huit/ Auddi / Phoenix / Begie / KAO

# Libreville

## Identification of Risks

- Exclusion of Vulnerable People
- Increase of heat island effect
- Decrease of Air quality (industries, heating, electricity production, motors ...)
- Decrease of quality of citizens' health (stress, chronic diseases...)

## Deforestation:



Libreville area increased from 10 km<sup>2</sup> in 1960 to 174 km<sup>2</sup> fifty years later (Rabenkogo; 2015: 2). Consequently, it is gradually losing its forest cover, and the rate of forest loss in Libreville is currently around 17.57% compared to 7.43% in 2010 and 7, 33% in 2005 (OSFAC).



Integrated Biodiversity and Deforestation map: 



<https://www.reuters.com/>

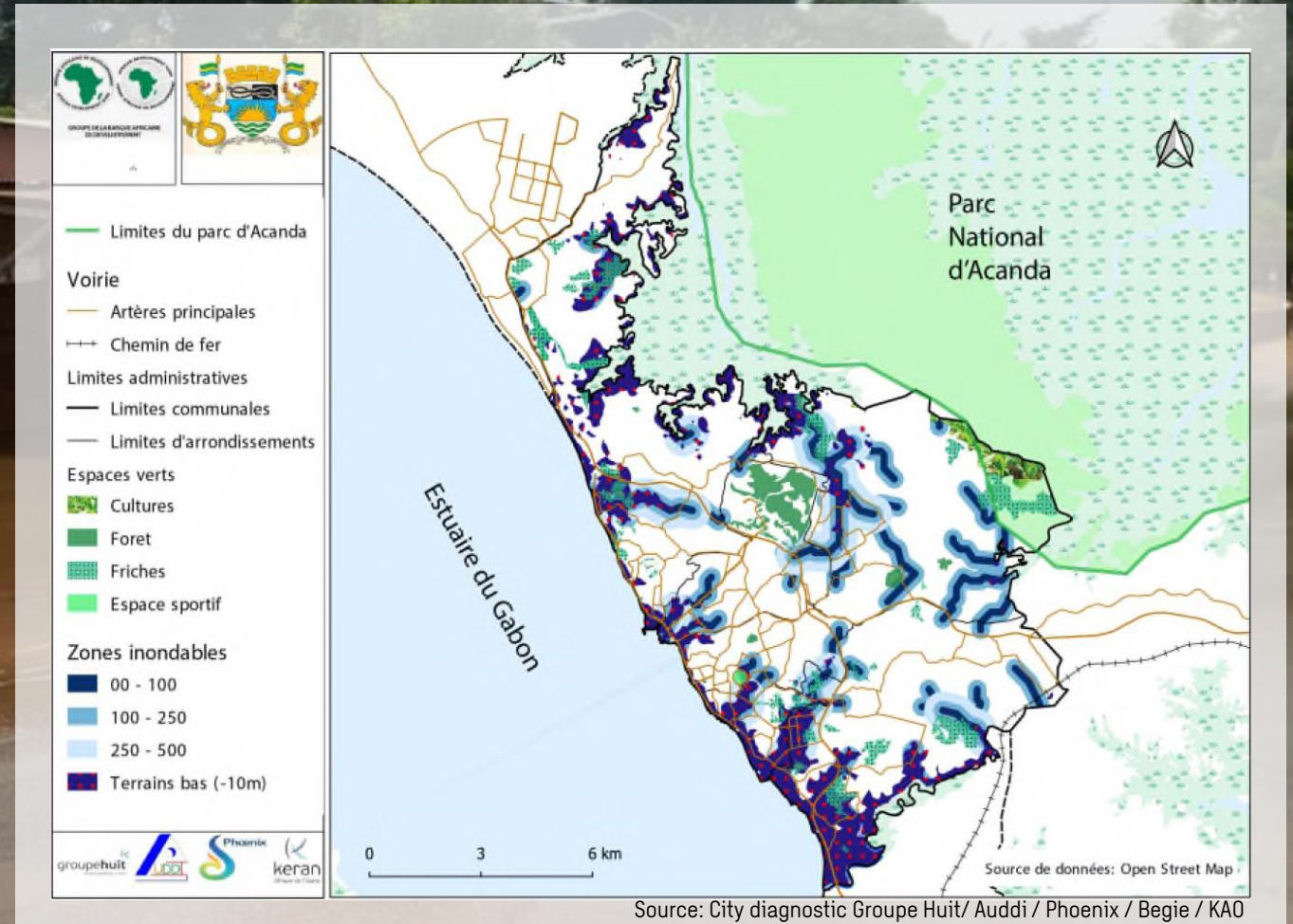
**In the Libreville center, the vegetable cover went from 75% in 1960 to 5% in 1996 (PNAE, 2001).**

# Libreville

## Flood

Floods constitutes a crucial problem for the people of Libreville.

- **260,784 inhabitants** are directly threatened by floods and **37.04%** of the Libreville population.
- The spaces that are subject to this natural disaster have an important surface area, that is 53.20 Km<sup>2</sup> which is **42.5% of the total surface area** of the municipality.



# Libreville

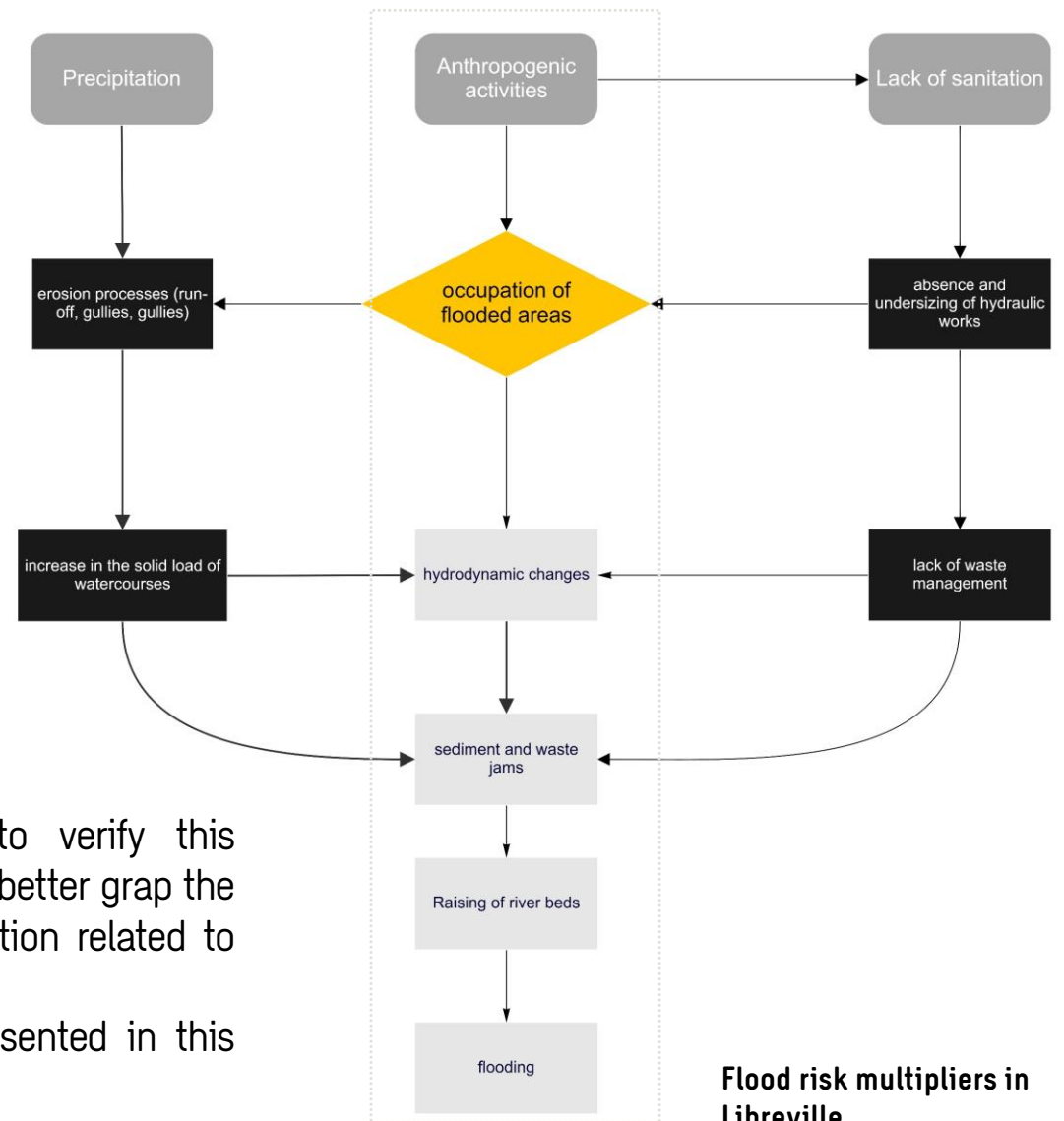
## Flood

### Challenges:

- +++ Topography (valleys, Marshes, & flat Surfaces)
- +++ Illegal Occupied Land (planning authorities)
- +++ Blockage of Drainage Systems (waste management)



We conducted a field survey to verify this information with the inhabitants to better grasp the challenges perceived by the population related to climate change and city resilience. The results of this survey are presented in this presentation.



### Flood risk multipliers in Libreville

Adapted from Ekome Waga M., 2003 in in : BNETD, SDAU Libreville, Diagnostic urbain



# Libreville

## Urbanization in a flood-prone areas

Here, the phenomenon is illustrated in Plaine Oreyty district close to the Libreville town hall, with a picture taken during a flood on January (left picture) & February 2022 (right picture).



Picture © NGUEMA ELLANGMANE Aldrin Derrick

# Libreville - Field survey in the under-integrated area\*

9<sup>th</sup>-11<sup>th</sup> March 2022\*\*

- 2 sites in the 3rd district that are *heavily flooded during every heavy rain*.
- 1 site in the 5th district where *the floods have economic consequences*.
- Visits to the areas where *landslides are frequent*, namely in the 3rd, 5th and 6th district.



\*In Libreville, the districts where the vulnerable people are living are named in French as “quartiers sous-intégrés” this translates to under-integrated areas.

\*\* The surveys were conducted by **Mr. NGAPAGA Idelien**, Head of the Sanitation and Natural Environment Monitoring Department (City Hall), **Mr KOUMBA PAMBOU Essy Martial**, municipal inspector, **Mr. KOUMBA MOUGYAMA Eddis Brice**, head of the risk prevention department at the Directorate General of the Environment and **Mr NGUEMA ELLANGMANE Aldrin Derrick**, our SWECO local partner

Picture © NGUEMA ELLANGMANE Aldrin Derrick



# Libreville – Field survey: 3 districts

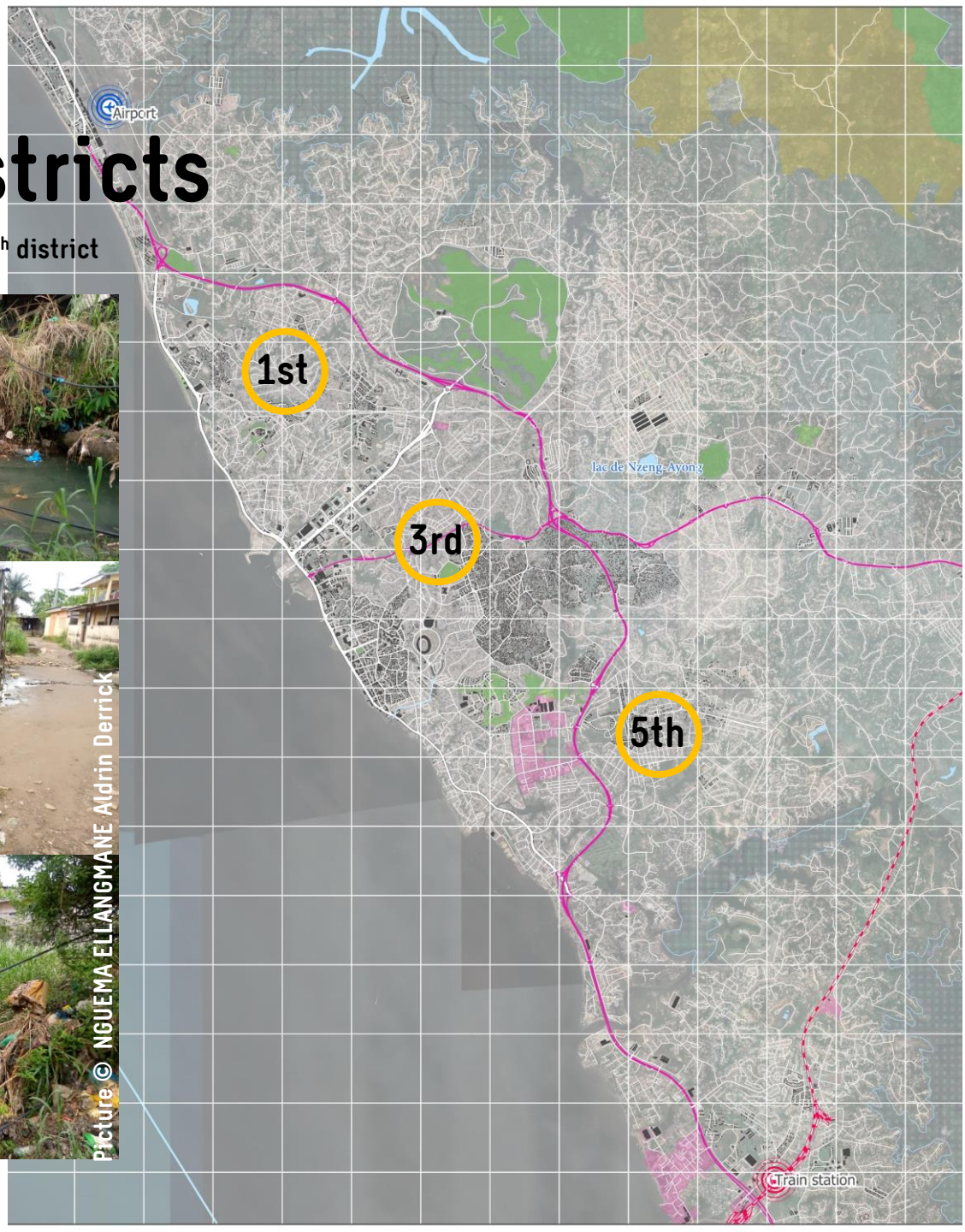
Kalikak district in the 1<sup>st</sup> district



Bessieux district in the 3<sup>rd</sup> district



Ozangué district in the 5<sup>th</sup> district



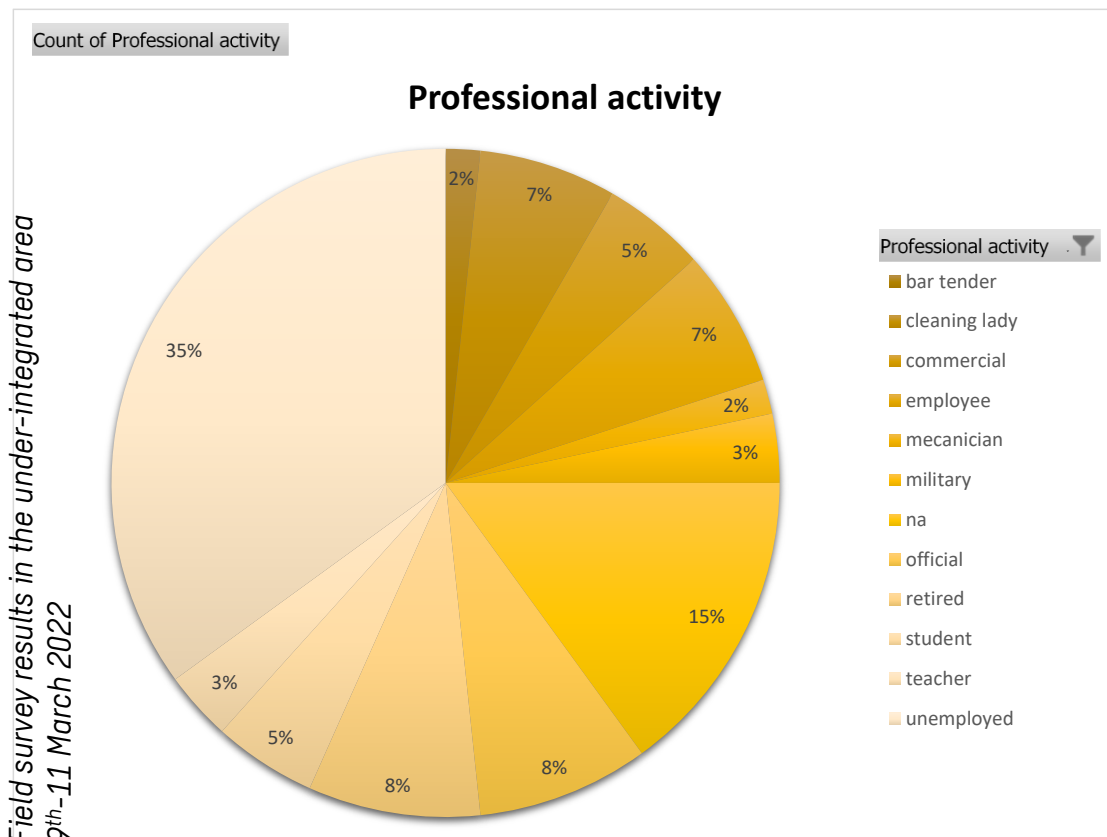
Picture © NGUEMA ELLANGMANE Aldrin Derrick

# Libreville – Field survey: Population profile

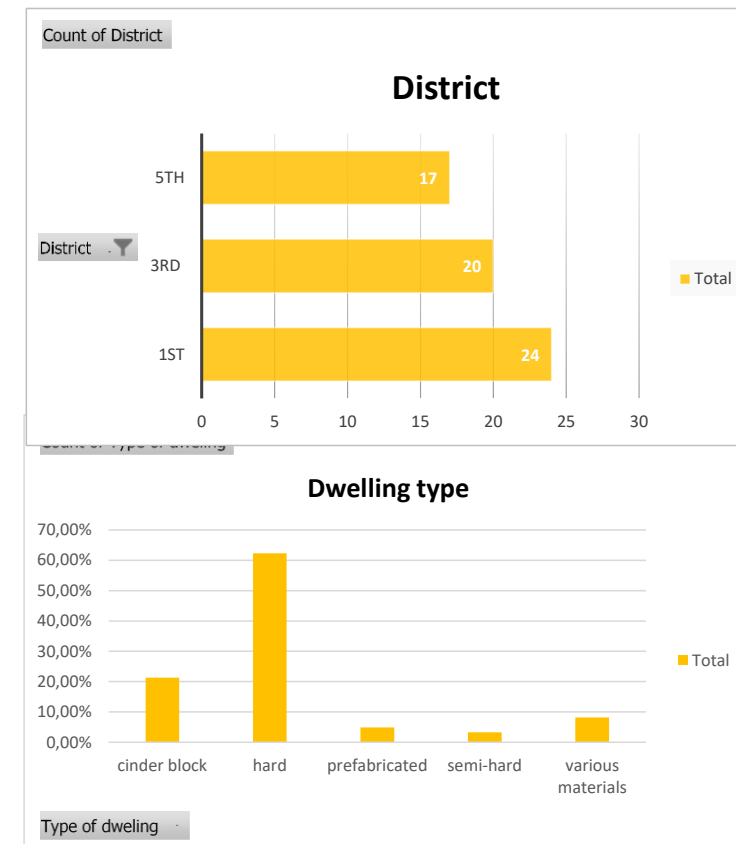
61 people interviewed

- Balanced coverage over the 3 districts.
- Gender balanced. Majority lives in cinder block and hard type dwelling.
- One third of the interviewees are unemployed.

Field survey results in the under-integrated area  
9<sup>th</sup>-11 March 2022



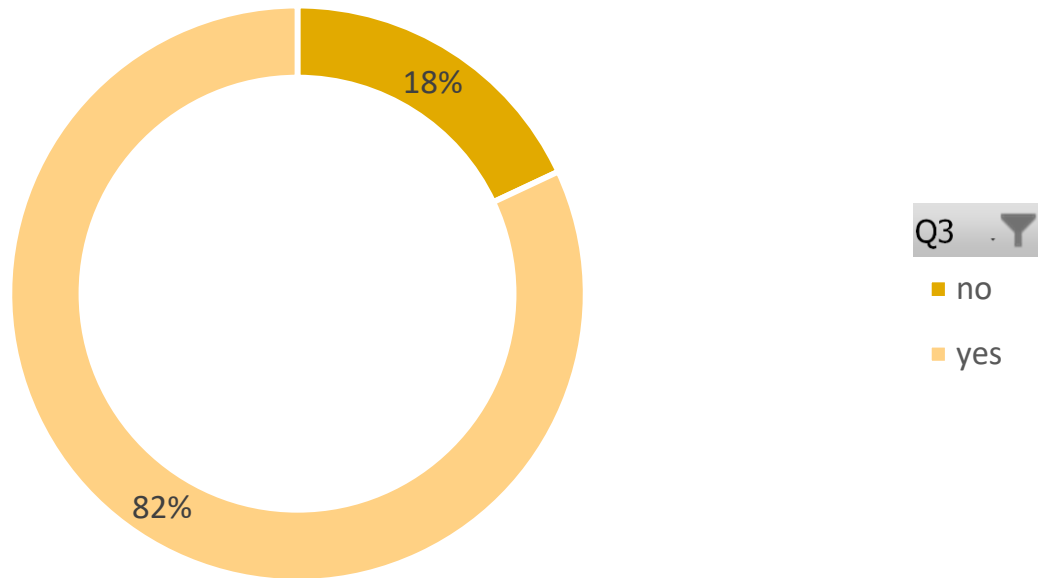
Age	Count of Gender
<b>F</b>	<b>52,46%</b>
20-30	11,48%
30-40	16,39%
40-50	4,92%
50-60	9,84%
60-70	3,28%
70-80	4,92%
80-85	1,64%
<b>M</b>	<b>45,90%</b>
20-30	4,92%
30-40	8,20%
40-50	13,11%
50-60	13,11%
60-70	6,56%
<b>na</b>	<b>1,64%</b>
20-30	1,64%
<b>Grand Total</b>	<b>100,00%</b>



# Libreville – Field survey: Waste collection

Do you use the waste collection point near your home?

Count of Q3



Field survey results in the under-integrated area  
9<sup>th</sup>-11 March 2022



Picture © NGUEMA ELLANGMANE Aldrin Derrick

The majority of respondents use the waste collection points near their homes.

However, a tendency of **dumping waste in nature** or **storing waste behind the house** remains ingrained in some residents. Under such conditions, waste is either disposed of by private incineration or left in piles and causes congestion in the sewage system during floods or storms.

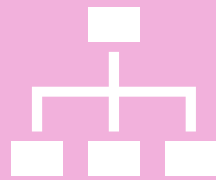
In addition, the survey revealed a **parallel economic activity** that is developing in these under-integrated neighborhoods, namely **the collection of household waste by young people** from the neighborhood under the condition of being paid.

# Libreville

## Main environmental challenges

- 1. Urban growth and Informal settlement:** The constraints of urban sprawl and the absence of a real urban policy. The analysis of land practices reveals the gap between public urban planning policies individual and collective behavior. **Anarchic urban development** is currently the main cause of environmental degradation.
- 2. Surface water pollution:** Water degradation results from the discharge of domestic sewage without prior treatment, as well as from the lack of a solid and liquid waste collection system.
- 3. Waste management:** no waste management plan, lack of waste treatment facilities. Collection is made difficult because of the inaccessibility of under-integrated areas (very poor access roads, sub-districts without roads, spontaneous and disorganized housing), collection difficulties (lack of collection points),
- 4. Floods:** lack of piping for a very dense network of catchment areas (21).

# Governance structure



# Governance structure

## Introduction

### Presentation of governance structures

The presented information on the governance structure is based on an analysis of relevant policy documents and stakeholder interviews.

It specifically focuses on the official responsibilities related to the aspect of “climate adaptation and resilience”.





# GABON National Climate Plan

“ **THE NATIONAL CLIMATE PLAN Responding** to the need to introduce the climatic dimension in the "Gabon Emergent" development project and thus ensure sustainable development in phase with the planetary issues.

**The National Climate Plan is a strategic plan, including:**

- a state of places and short- and medium-term development strategies of the activity sectors with a strong impact on climatic changes (carbon balance, energy intake);
- the sectoral strategies for controlling GES emissions;
- the territory's adaptation strategy to the effects of climate change;
- the device for implementing and monitoring actions of the climate plan;
- the major financing options of the plan.



2011

2012



2015



2014

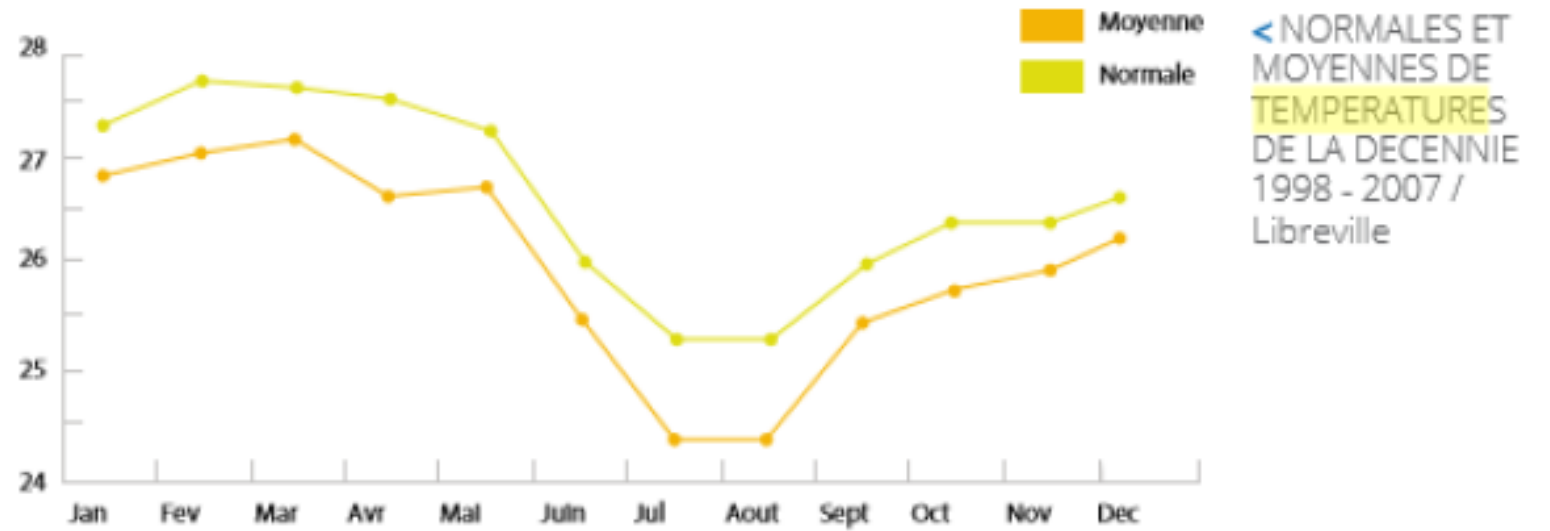
# GABON

## National Climate Plan

In terms of temperatures: data from the National Center for Oceanographic Data (CNDO) was used in the **National Climate Plan**.

They present the evolution of normal and average temperatures between 1998 and 2007 (temperature increase of 0.5°C.)

However, “these observational data are insufficient to infer changes in daily temperature extremes...”



# GABON

## National Climate Plan

In terms of precipitation: **data from the General Directorate of Meteorology** were used in the 2nd national communication.

Of the various meteorological stations attached to the airport system, only 3 stations currently seem to provide data: **Libreville, Port-gentil and Franceville**

### ➤ Shortage of meteorological stations

*“the UNDP, a meteorological service project is being closed, which will look at adaptation planning at the national level. So, the installation of weather stations along the coast.”*

(interview, Ms. Anaëlle RAOUMBE, in charge of Climate Finance & Janvier Kevin NDONG NZOGHO, National Greenhouse Gas Inventory Coordinator, 4Feb., Libreville)

# GABON

## National Climate Plan

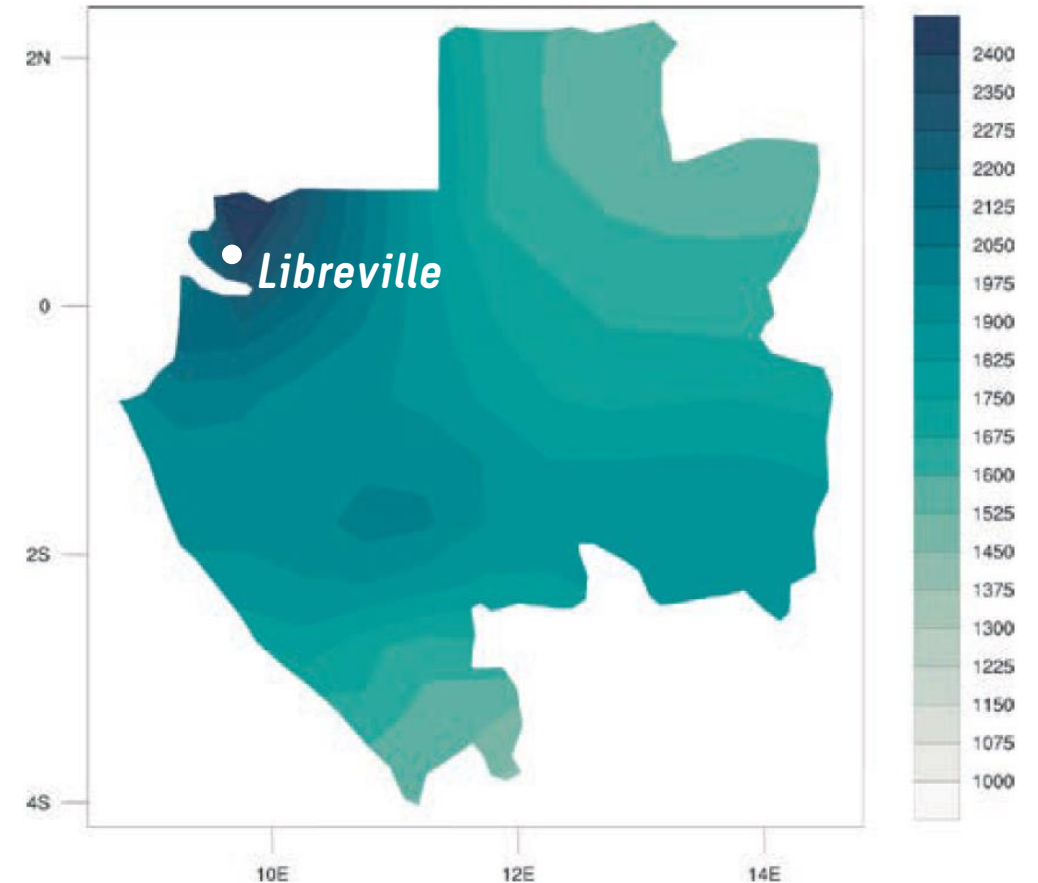
In the management of water resources, the Directorate General of Studies and Laboratories contributes its expertise in water analysis to ensure, on behalf of the Ministry of Energy, the **quality control** of the resource used in the framework of rural hydraulics and of the treated and distributed water in urban areas.

***“In Gabon, the rainfall stations date from 1974 and are out of service today.***

***Official data on water levels are insufficient or even absent due to lack of equipment.”***

(Yves YKOUNGOUROU, water director, DGEL, interviewed 17<sup>th</sup> Feb., Libreville)

Mean annual rainfall: Libreville ± 2020 = 1970,6 mm



Source: Gabon Climate Risk Profile p.6, 2021


# Structure of Gabonese climate research

The Gabonese research system is that its actors are very diversified, consisting of:

## +++ UNIVERSITY TEAMS (UOB, USTM, CENAREST),



UNIVERSITE OMAR BONGO  
SAVOIR • PROGRES • UNIVERSALITE




Université des sciences  
et techniques de Masuku, Franceville, Gabon




**CENAREST**  
Centre National de la Recherche Scientifique  
et du Développement Technologique


## +++ APPLIED RESEARCH AGENCIES (AGEOS, CNDIO, ANPN, ASECNA, DGM...).



**AGEOS**  
AGENCE GABONAISE D'ÉTUDES  
ET D'OBSERVATIONS SPATIALES




Centre National De Donnees Oceanographiques Du Gabon




Parcs  
Gabon

Recherche Scientifique

National Agency for Nature Preservation Gabon





REPUBLICUE GABONAISE  
**MINISTÈRE DES TRANSPORTS**

Directorate General of Meteorology (DGM)

# GABON National Council

## Decree N°0122/PR/MRPICIRNDH of April 20, 2010



Vu la Constitution ;

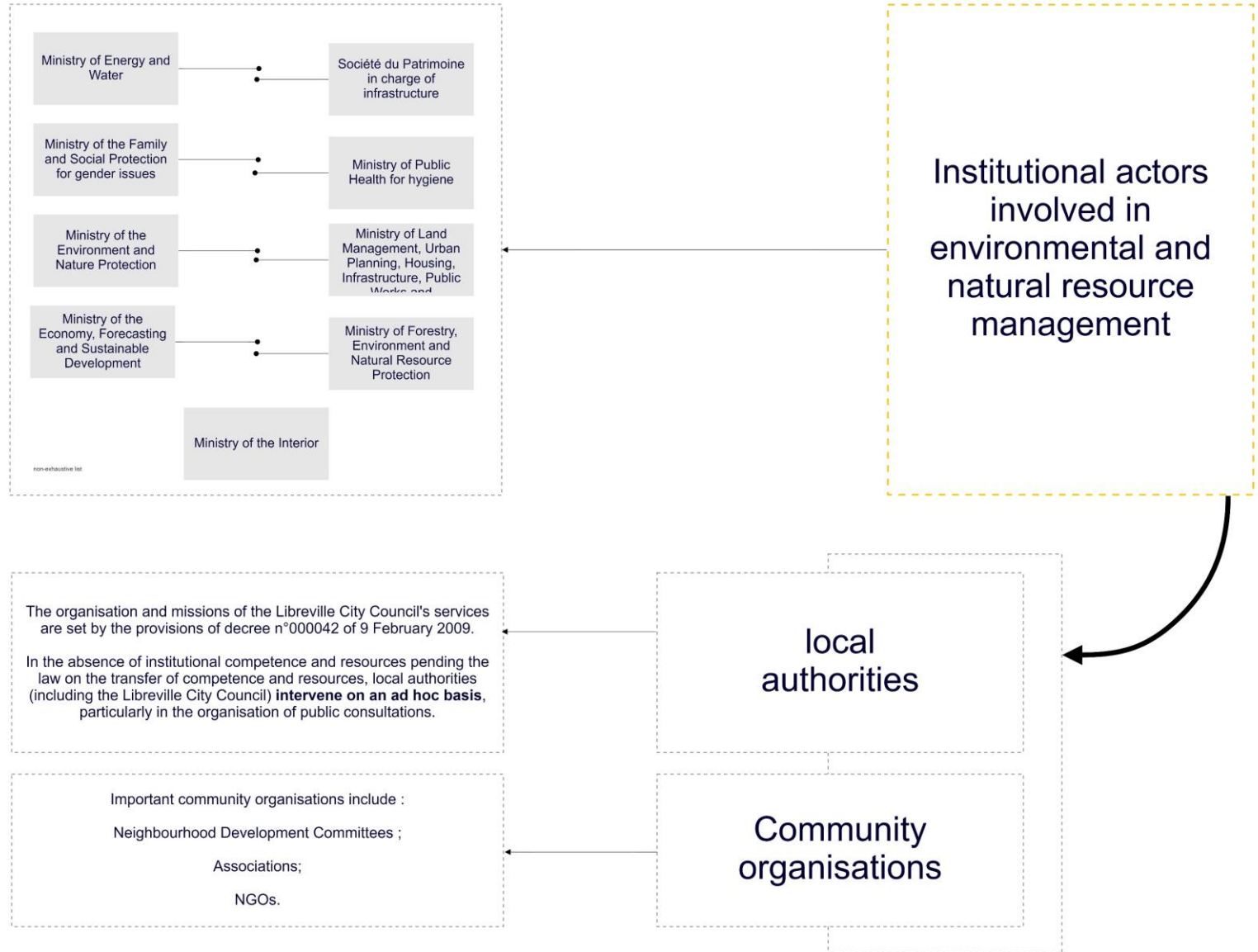
DECRET n° 0122 /PR/MRPICIRNDH  
portant création, attributions, organisation et  
fonctionnement du Conseil National sur les  
changements climatiques

Le Président de la République,  
Chef de l'Etat ;

### MISSIONS

- Further introduce the climate dimension into the development of Gabon
- Remedy and anticipate the vulnerability of territories and populations to the effects of climate change
- Move towards industrialization with low greenhouse gas emissions

# Gabon (water and climate) Governance structure



➤ Such a distribution of responsibilities gives the sector a fragmented character and makes it difficult to coordinate actions

# Sanitation and drainage

## Structure & mode of Governance

**Law No. 15/96 of June 6, 1996**, stipulates that the municipalities are responsible for the management of sanitation and rainwater drainage (Article 237). However, the transfer of powers must take place gradually and be accompanied by the transfer of the corresponding resources. ***The sector therefore remains largely managed by central institutions.***

Specifically :

- **The Ministry of Public Works, Equipment and Infrastructure**
  - responsible for monitoring and implementing the Government's policy in terms of infrastructure, equipment, road construction and sanitation. This is the contracting authority for the drainage of rainwater.
- **The Ministry of Energy and Hydraulic Resources**
  - its mission is to develop and implement the Government's policy on energy, water resources and ionizing radiation.

la vie de la nation. Elles assurent leur épanouissement et l'expression de leur diversité et garantissent à leur niveau l'expression de la démocratie.

**Article 232** : Les collectivités locales disposent d'un pouvoir de décision dans tous les domaines de compétence qui leur sont transférés par la loi. Elles donnent des avis sur toutes les questions relevant de l'Etat, lorsque celles-ci les concernent.

### CHAPITRE III: DES MODALITES DE TRANSFERT DE COMPETENCE

**Article 233** : La répartition des compétences entre l'Etat et les collectivités locales s'effectue en distinguant les compétences qui sont du ressort de l'Etat et celles qui sont dévolues aux communes et aux départements, de telle sorte que les charges financières résultant des transferts soient identifiées et que les compensations correspondantes en ressources humaines et financières soient évaluées par les services de l'administration centrale de l'Etat, affectées par la loi et transcrites au budget de l'Etat. Ce transfert des compétences s'accompagne du transfert des ressources correspondantes.

**Article 234** : Les collectivités locales ne peuvent s'attribuer des compétences, ni traiter de matières qui, par leur caractère ou leur ampleur débordent du cadre de leur ressort territorial et relèvent de la compétence de l'Etat.

### CHAPITRE IV: DU CHAMP DE TRANSFERT DE COMPETENCE

**Article 235** : Les compétences à transférer concernent notamment certains domaines des secteurs suivants :

- l'aménagement du territoire;
- la santé ;
- l'action sociale ;
- le cadastre ;
- le logement et l'habitat ;
- l'environnement et l'assainissement ;
- l'urbanisme;
- la culture ;
- le tourisme;
- l'hydraulique villageoise ;
- l'équipement;
- la voirie ;
- les transports urbains, inter-urbains et inter-départementaux ;
- les eaux;
- la jeunesse ;
- les sports;
- l'agriculture ;
- la pêche;
- l'élevage;
- les carrières.

**Article 236** : En fonction de leur type, les collectivités locales reçoivent des compétences spécifiques dans les domaines transférés.

**Article 237** : La répartition et les modalités d'exercice des compétences par type de collectivité locale, telles que prévues à l'article 238 ci-dessus, font l'objet d'une loi.

### TITRE IX : DE LA TUTELLE DE L'ETAT SUR LES COLLECTIVITES LOCALES

**Article 238** : La tutelle est le contrôle exercé par une autorité administrative sur une collectivité secondaire.

**Article 239** : Les actes pris par les collectivités locales sont exécutoires de plein droit dès leur publication ou leur notification sous réserve des dispositions relatives à la tutelle.

**Article 240** : La tutelle de l'Etat sur les collectivités locales se traduit essentiellement par un contrôle exercé sur les actes. Ce contrôle procède de la saisine des juridictions compétentes pour la légalité des actes, et des services techniques pour la conformité avec les cahiers de charges.

**Article 241** : Seules les juridictions administratives et des comptes ont compétence pour annuler ou suspendre les actes des collectivités locales, sous réserve des restrictions prévues par la présente loi.

### Chapitre I : DE LA TUTELLE ADMINISTRATIVE

**Article 242** : La tutelle administrative des collectivités locales est exercée au sein de l'administration centrale par le Ministère des collectivités locales. Cette tutelle est assurée au niveau local par les Gouverneurs et les Préfets. Toutefois, les pouvoirs de tutelle des Gouverneurs et des Préfets peuvent être délégués en totalité ou en partie aux Sous-préfets.

**Article 243** : Une copie des actes pris par les collectivités locales est obligatoirement transmise à l'autorité de tutelle.

### Chapitre II : DE LA TUTELLE FINANCIERE

**Article 244** : La tutelle financière des collectivités locales est exercée au sein de l'administration centrale par le Ministère chargé des finances. Cette tutelle est assurée au niveau local par les services déconcentrés du Ministère des Finances.



# Libreville- Governance

## The Municipal Council of Libreville

Libreville is administered by an **executive mayor** elected from and by the 98 councillors of this Municipal Council.

They in turn are chosen in a citywide election organised at ward level by residents.

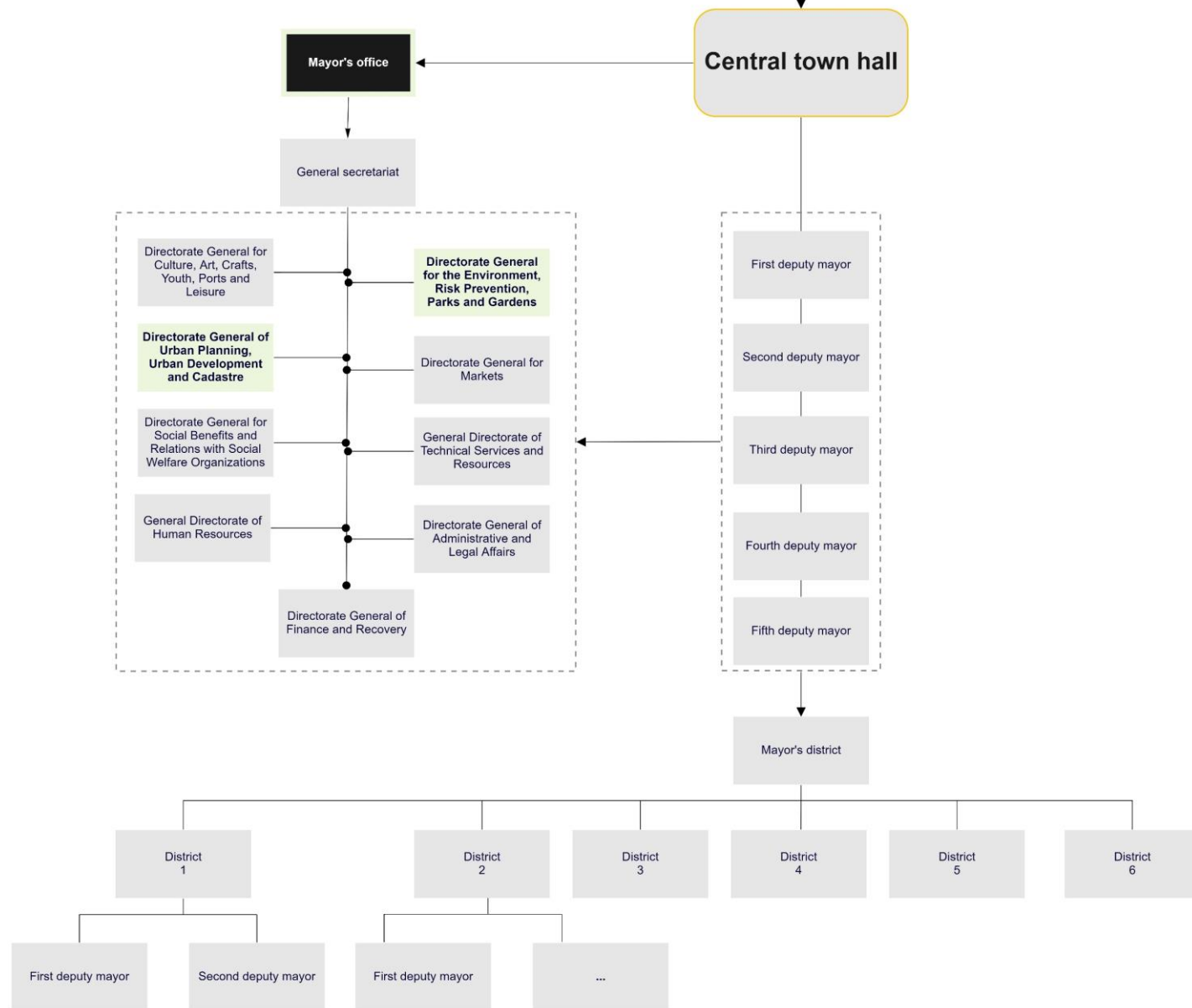
**Five deputy mayors** are also elected, and a **secretary-general**, appointed by the state, assists the mayor.

The city is also divided into six districts, which are administered by a **district mayor** and councillors representing wards this district.

The city Council of the city is **not involved in the decision-making process**, which is guided by the Central Ministry.

- **Problem of accusation and counter-accusation regarding responsibility for planning and service delivery issues in this city**

Source: Book, 2006, Reflections on Identity in Four African Cities, S. B. Bekker, Anne Leildé



# Libreville- Governance

Libreville Town Hall and the district town halls are associated with the steering committees of the various ongoing sanitation programs and projects.

The analysis of the government structure shows that there is *a diversity of actors* involved in local governance in Libreville:

**Prefect:** local representative of the central state;

**Mayors:** elected, they execute the decisions taken by the Libreville municipal council;

**District mayors:** locally elected officials of the districts who execute the decisions of the district municipal councils.

➤ **important that Libreville has political stability at its head with a constructive and progressive leadership in order to overcome the challenges and involve the population.**

***“Since March 2019, the city has had three Mayors, the last of whom was appointed on 14 July 2021.”***

(Group8 Keran and AfdB, city diagnostic, interviewed 17<sup>th</sup> Jan.)

# Libreville- Governance

## Politic of the Eviction and Process of Reorganization of the Territories of Libreville

Displacement is expressed through land conflicts between the **tenants of modern land law** and those **of customary law**.

In Libreville, land use practices are placed under the sign of the in-between, 'between tradition and modernity, between law and custom'.

**The eviction did not limit illegal self-construction** in the production of housing in the periphery. It simply transferred illegal urbanization from the center and pericenter to the periphery where informal urbanization continued.

- **Important that urban policies emphasize the modernization of the periphery which remains a demographic outgrowth.**

In Libreville we have observed a gradual **loss of influence of customary chiefs and customary land law**, which is only exercised in certain old Libreville districts (Louis and Glass).

The chiefs are supported by the “**Comité Mpongwe**” who secured the nomination of its candidates for *chef de groups de quartier*.

- **Strong traditional governance structure organization remains in the illegal settlement**

# Libreville- Governance

## Budgeting

The budget of the municipality appears ***extremely constrained*** with resources coming mainly from duties, taxes and levies collected by the State and paid to the municipality.

Personnel costs represent a considerable burden on municipal finances, leaving little room for other expenditure (maintenance of assets, social services, etc.).

The budget surpluses generated to finance investments are also extremely limited.

Thus, most of the investments made on the territory of the municipality are financed by the State or its divisions.

**The municipality is not allowed to borrow.**

## BUDGET OF THE MUNICIPALITY OF LIBREVILLE 2018-2020

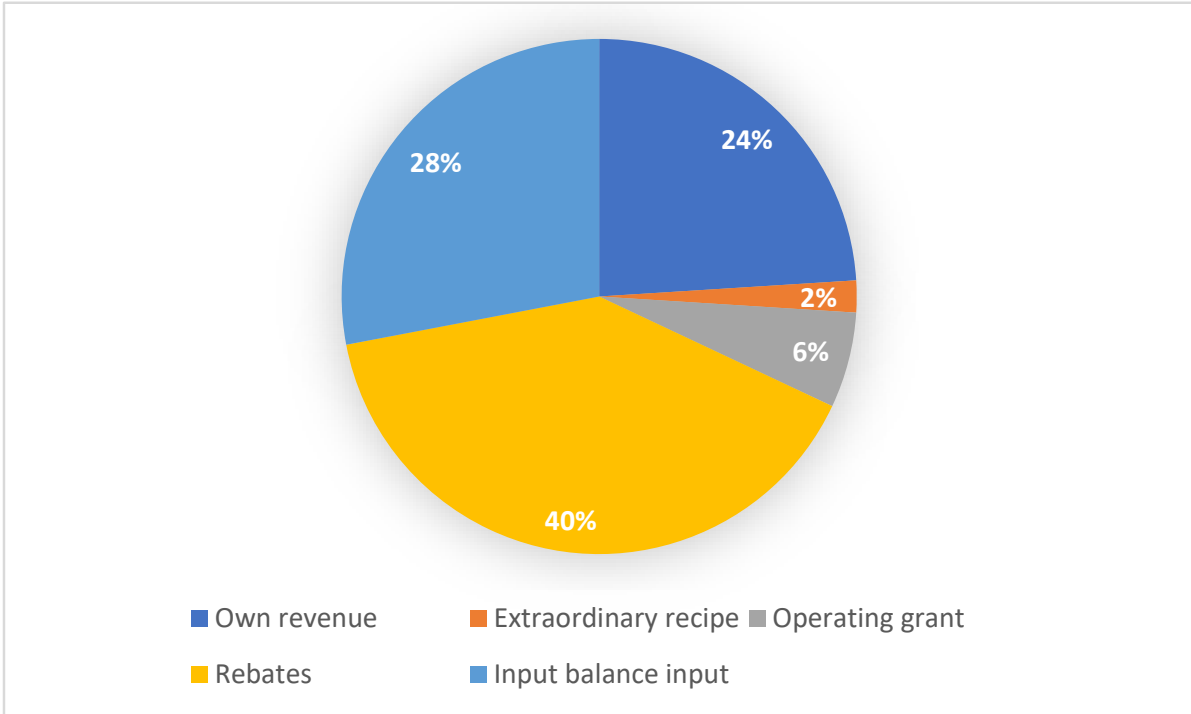
In M.FCFA (Million Franc CFA)	2018 (Execution)	2019 (Forecasts)	2020 (Vote)
Own revenue	5 245	5 800	6 158
Financial products	0	0	0
Operating Grants	0	2 921	1 593
Rebates	11 527	10 256	10 067
Input balance input contribution	0	9 000	7 000
Extraordinary recipes	0	3 010	370
<b>Total revenue</b>	<b>16 773</b>	<b>30 987</b>	<b>25 188</b>
Current operating expenditure	1 629	2 433	1 497
Staff and elected officials	14 154	17 847	20 383
Maintenance and repair of heritage	1 605	3 208	1 914
Subsidies, transfers and social actions	88	256	155
Other recurrent expenses	569	4 233	870
Extraordinary expenses	799	3 010	370
<b>Total expenditure</b>	<b>18 845</b>	<b>30 987</b>	<b>25 188</b>

# Libreville- Governance

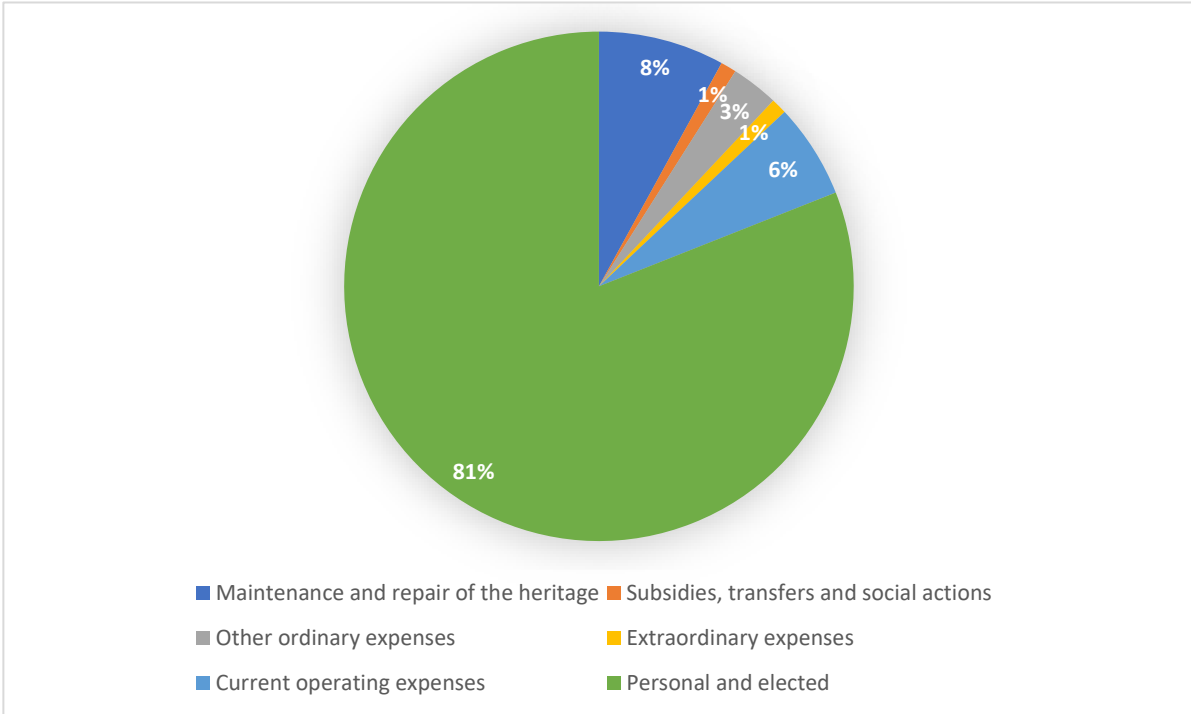
## Budgeting

### STRUCTURE OF THE 2020 BUDGET OF THE MUNICIPALITY OF LIBREVILLE

2020 budget recipe

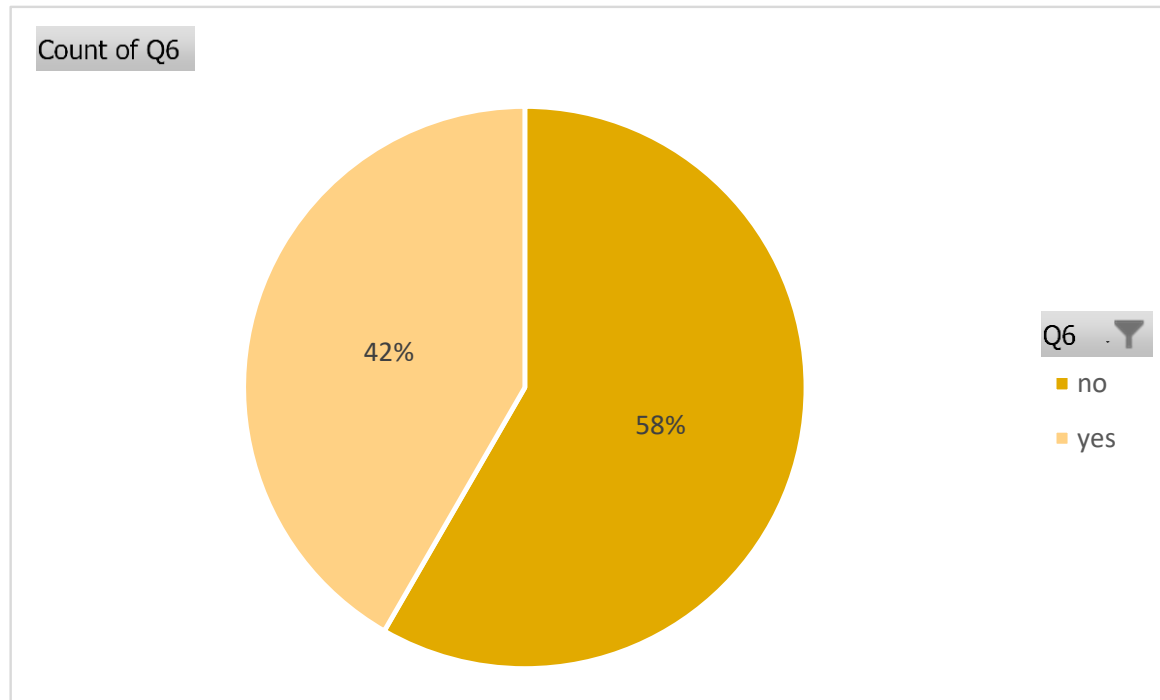


2020 budget expenditure



# Libreville- Governance

Do you feel involved in the decision-making processes to make Libreville a more resilient city adapted to climate change?



Field survey results in the under-integrated area  
9<sup>th</sup>-11 March 2022

**58% of the population in the districts, 1, 3 and 5 do not feel involved** in the decision-making process to make the city more resilient and adapted to climate change.

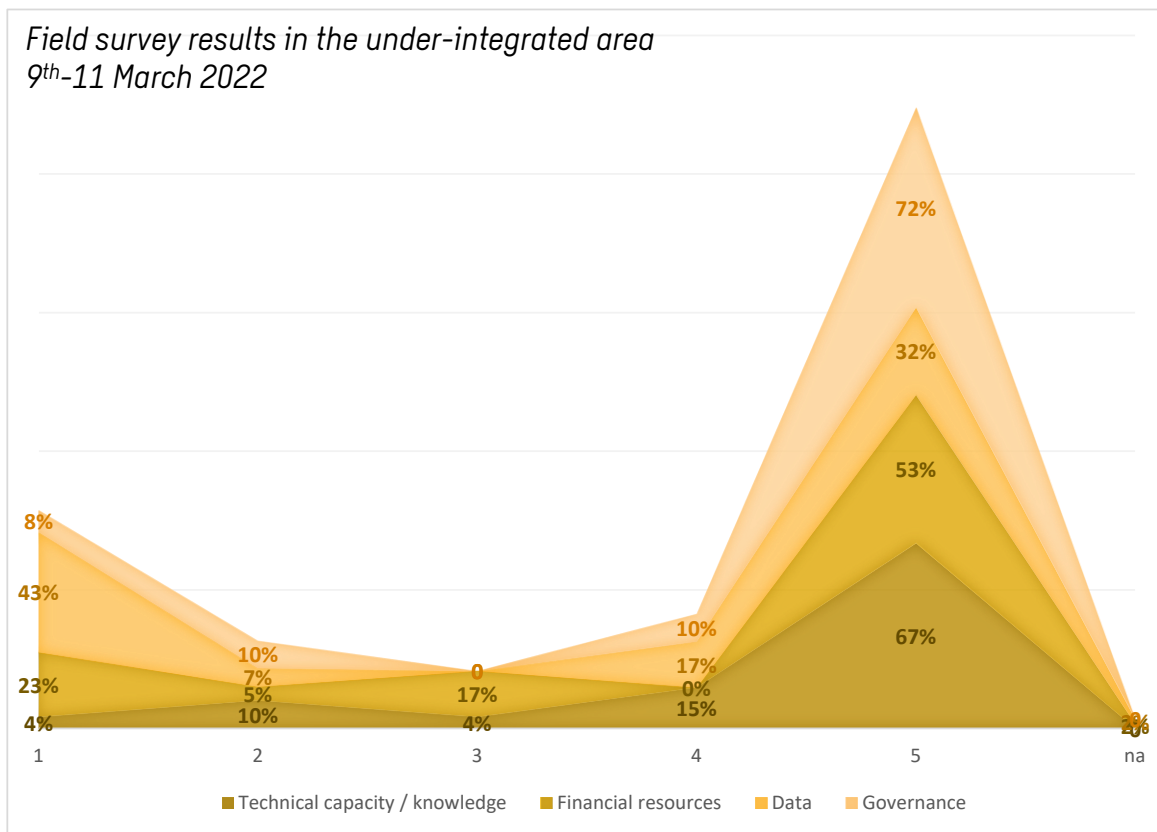
However, when we ask to the residents their opinion *on what should be the priority of Libreville* when it comes to making the city more resilient and adapted to climate change, we find that **all the people interviewed have an opinion** on the issue and wish to actively participate in the debate\*.

\*Cf. No regrets measure's part

# Libreville- Governance

Do you think the city has the capacity to make Libreville climate resilient?

Field survey results in the under-integrated area  
9<sup>th</sup>-11 March 2022



We asked residents to rank on a scale of 1 to 5\* what they perceived to be the city's capacity in terms of available technical capacity and knowledge, financial resources, data and governance available to make the city more resilient.

The results show that there are still **doubts about the availability of financial resources and access to data**, but residents are **confident about the technical capacity and governance**.

\*1 means that the city lacks capacity completely, and 5 means that there is 100% of the required capacity

# City Stakeholders

We conducted interviews with key people involved in climate change adaptation in the Libreville and Gabonese administrations.

The *interviews were held mainly in person* (mistrust is very present in this country) and *exchanges via WhatsApp* were frequent\*.

Name	Function	Organization
Key City Official		
<b>Lucien Obame Enengbe</b>	Cabinet Director	City of Libreville
Key City Stakeholder		
<b>Mme Sougou Latsiere Alix Bertille</b>	Director General of the Environment	City of Libreville
<b>Mr Ndong Essono Bienvenu</b>	Deputy Director of Risk	City of Libreville
<b>Ngonda Mouanga Arnaud</b>	Represents the Ministry in charge of Habitat Urban Planning and Housing	City of Libreville

Name	Function	Organization
Secondary stakeholders		
<b>Mr Davy Onomori Mboumba</b>	Adviser to the President of the Republic Deputy	Permanent Secretary of the National Climate Council.
<b>Ms. Anaëlle Raoumbe</b>	Chargée de Mission of the President in charge of climate finance	National Climate Council Presidency of the Gabonese Republic
<b>Mr Landry Izandji Owowa</b>	In charge of the meteorological station project	PNUD
<b>Mr IWANGOU Ghislain</b>	General Director	National Institute of Cartography

\*The minutes of the meetings are annexed to this report.  
Interview took place



**Hazard  
assessment**



**Impact  
assessment**



# Hazard & Impact Assessment

## Introduction

### Hazards & Impacts

Based on a literature study, stakeholder interviews and survey results, the hazard assessment determines the most important **climate hazards** for the themes heat, drought and floods & storms. These climate hazards are the **physical climate effects** that Libreville is exposed to. For each of the climate hazards, this assessment gives the current trends and future predictions.

Subsequently, the impact assessment focusses on the **impacts** of the climate hazards. These impacts were found in literature and were amplified by the citizens and scientific review.

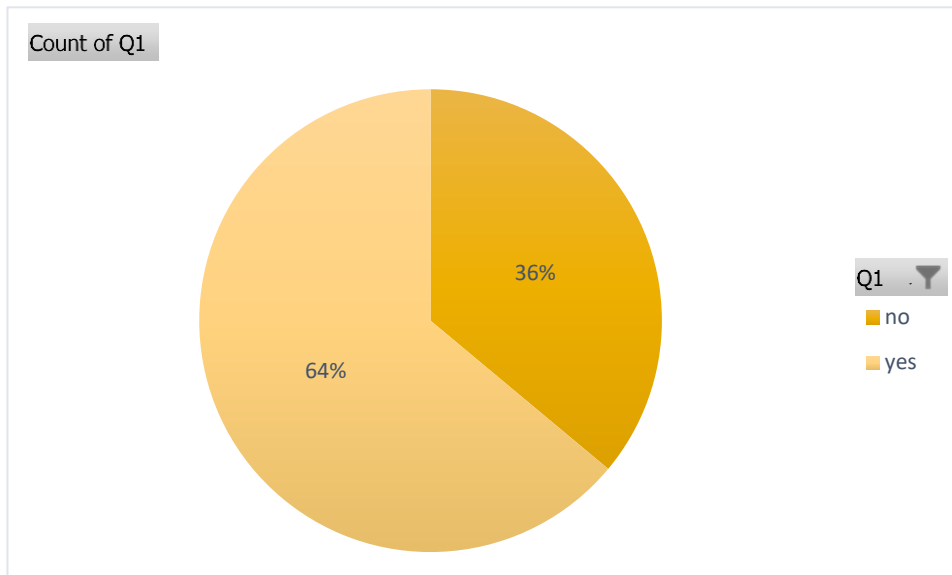


Picture © NGUEMA ELLANGMANE Aldrin Derrick

# Hazard: from the population perception

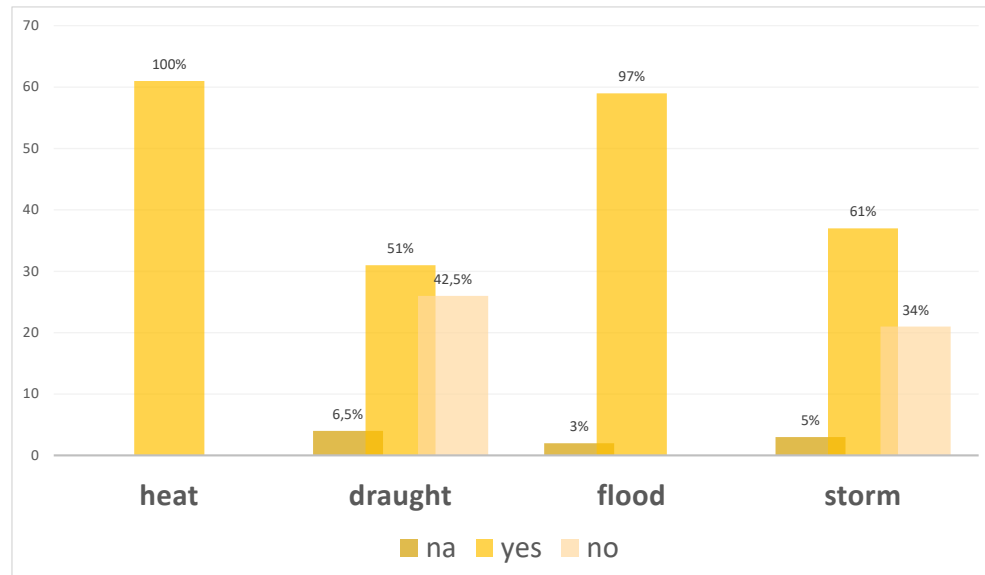
Test awareness

Do you know what the effects of climate change are in Libreville?



A 2/3 majority knows the effects of climate change.

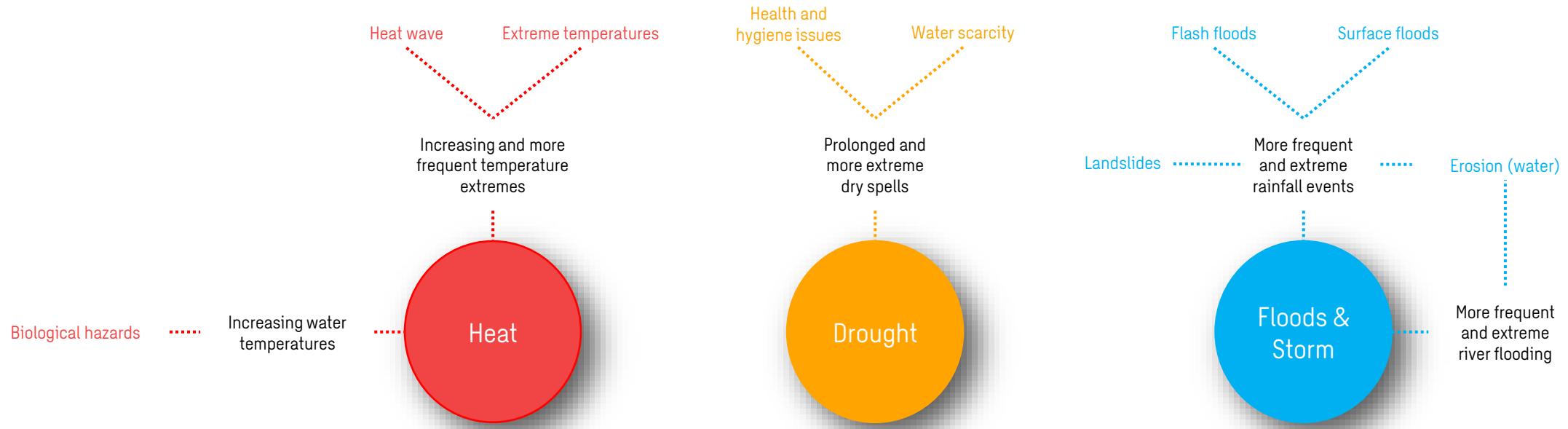
Do you feel affected by the impacts of



Almost all have been affected by **heat** and **flooding**. More than half have been affected by drought and storms as well.

Field survey results in the under-integrated area  
9th-11 March 2022

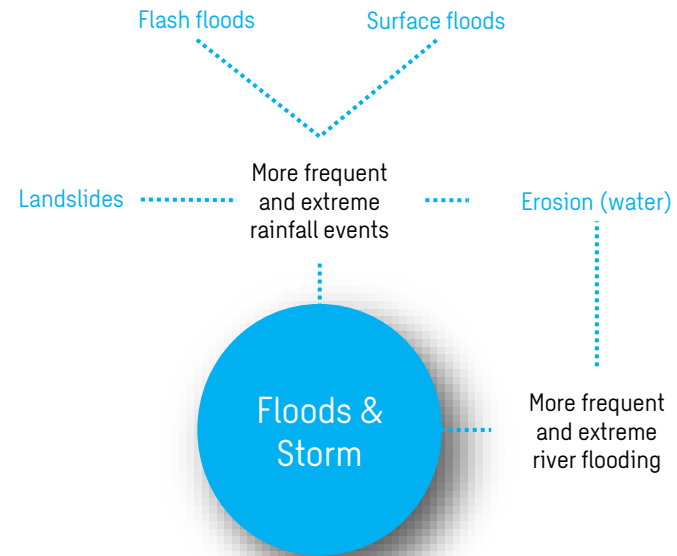
# Hazard Assessment



**LEGEND**

In black: Primary Climate Hazard  
 In colour: Secondary Climate Hazard

# Themes and main climate risks



## LEGEND

In black:

Primary Climate Hazard

In blue:

Secondary Climate Hazard

## What effects are visible now?

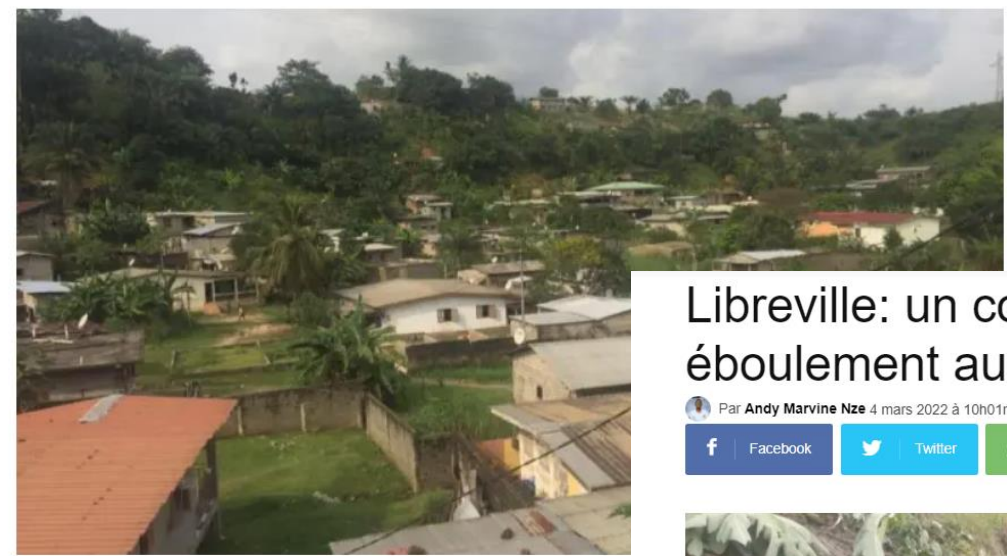
Extreme rainfall events leading to **flooding** are an established trend in Libreville.

In addition to flash floods and surface flooding, Libreville is also experiencing (river) flooding with overflow and deadly landslides with increasing frequency.

### Libreville: un mort dans un éboulement au quartier Malaba

Par Andy Marvine Nze 2 mars 2022 à 9h58min

[Facebook](#)
[Twitter](#)
[WhatsApp](#)
[Telegram](#)
[Pinterest](#)
[+](#)



Une vue du quartier Malaba © GMT

### Libreville: un couple périt dans un éboulement au PK9

Par Andy Marvine Nze 4 mars 2022 à 10h01min

[Facebook](#)
[Twitter](#)
[WhatsApp](#)
[Telegram](#)
[Pinterest](#)
[+](#)



Une vue de l'habitation © D.R.

# Themes and main climate risks

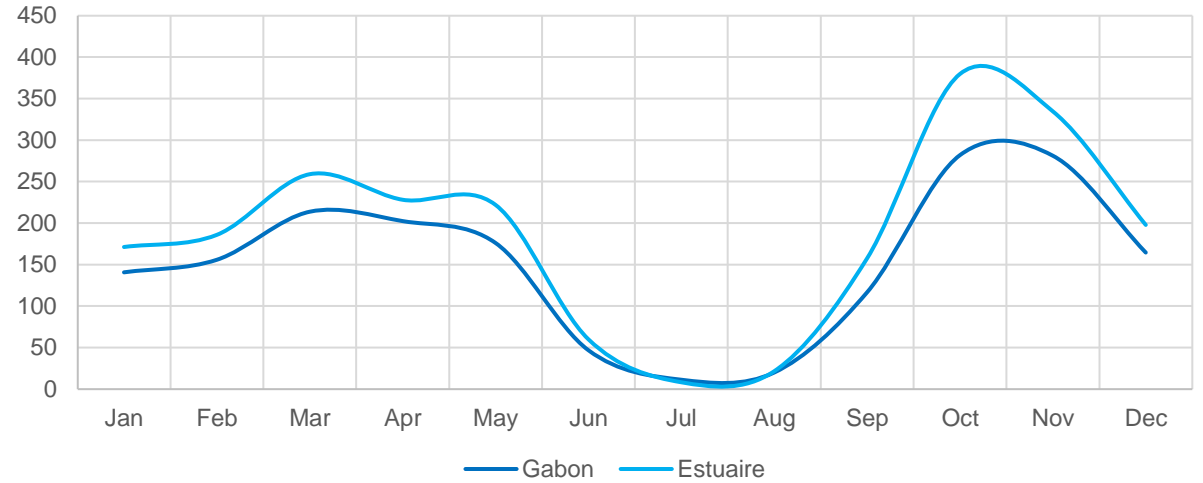
## Historical trends and future predictions

The current **yearly precipitation** in Province of the Estuaire is about 2000 mm. 85% of this amount falls between Jan- June and Sep-Dec.

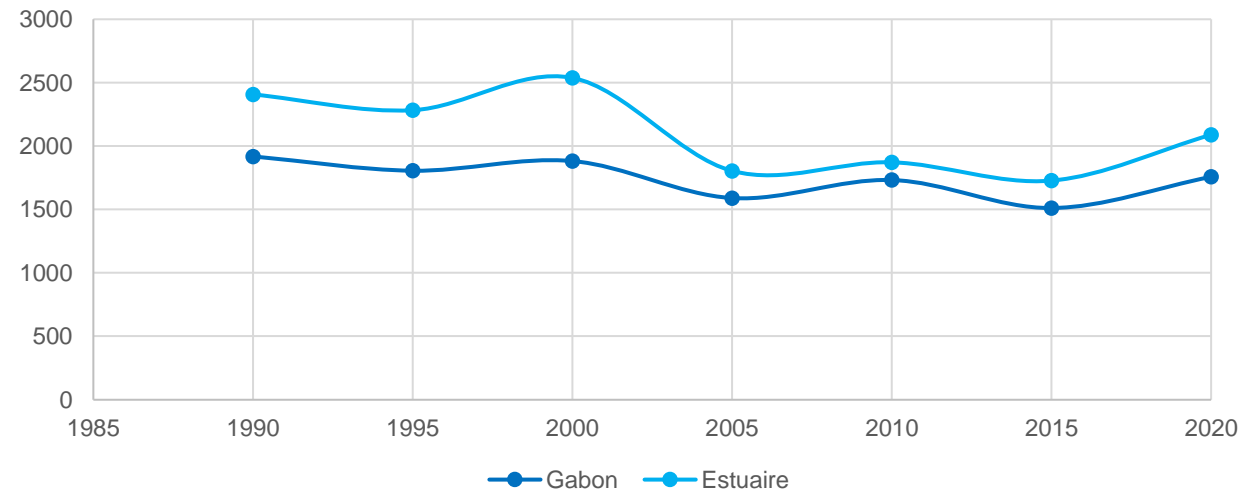
In recent decades, the total amount of precipitation has decreased, from **about 2500mm** of precipitation per year in the period 1990 - 2000.



Average monthly rainfall (mm) of Estuaire for 1991–2020



Average annual rainfall (mm) of Estuaire for 1991–2020



(World Bank Climate Change Knowledge Portal, 2022)

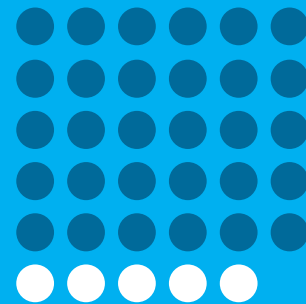
# Mean annual rainfall

Libreville

± 2020 = 1970,6 mm

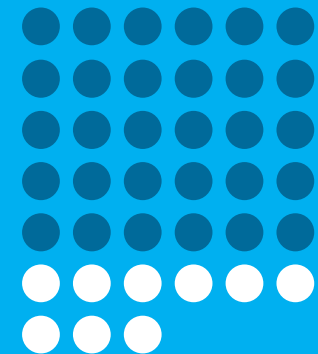
Gabon

2050



+10%

2095



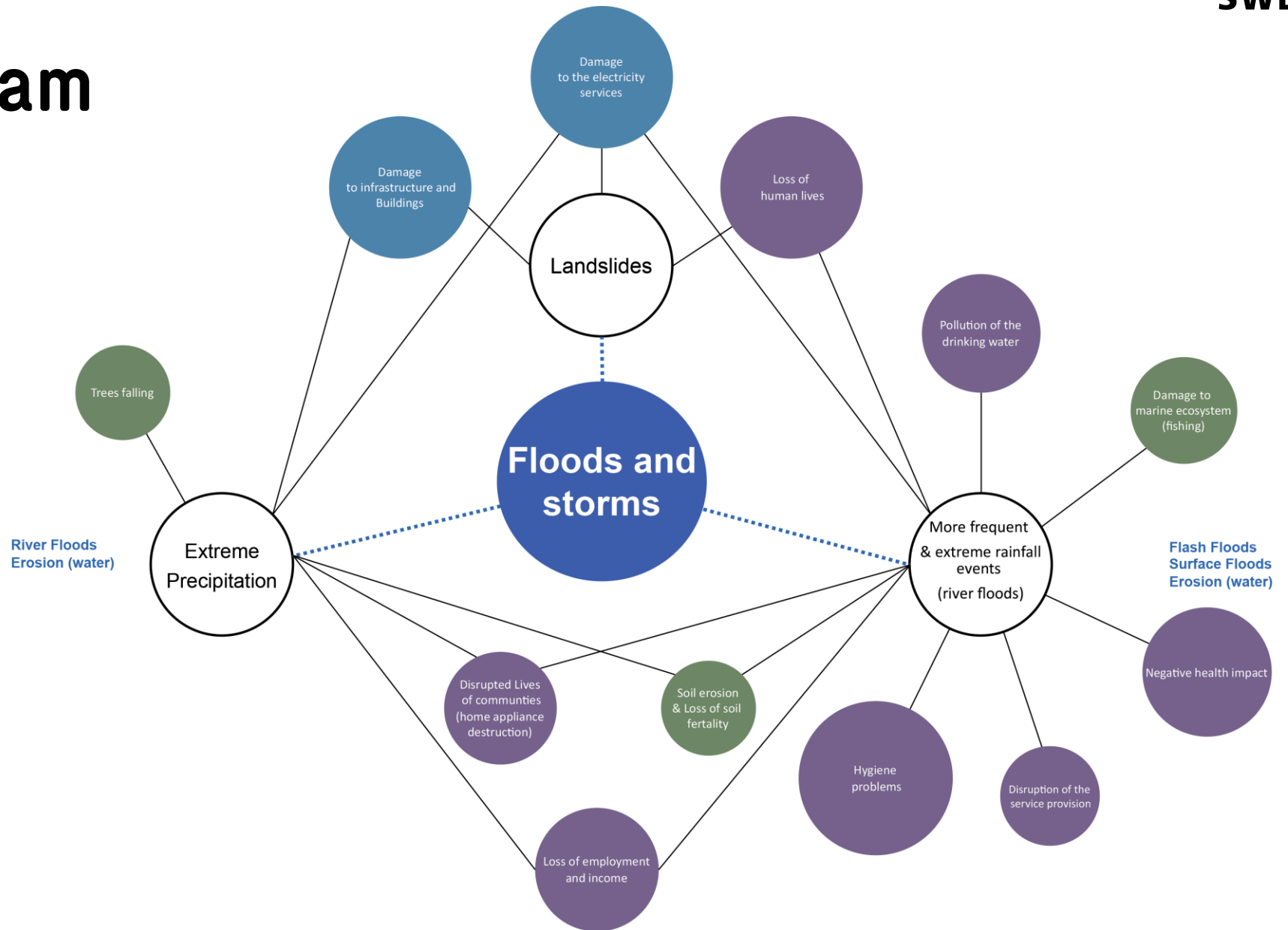
+14%



# Impact of Floods & Storms on relevant city sectors

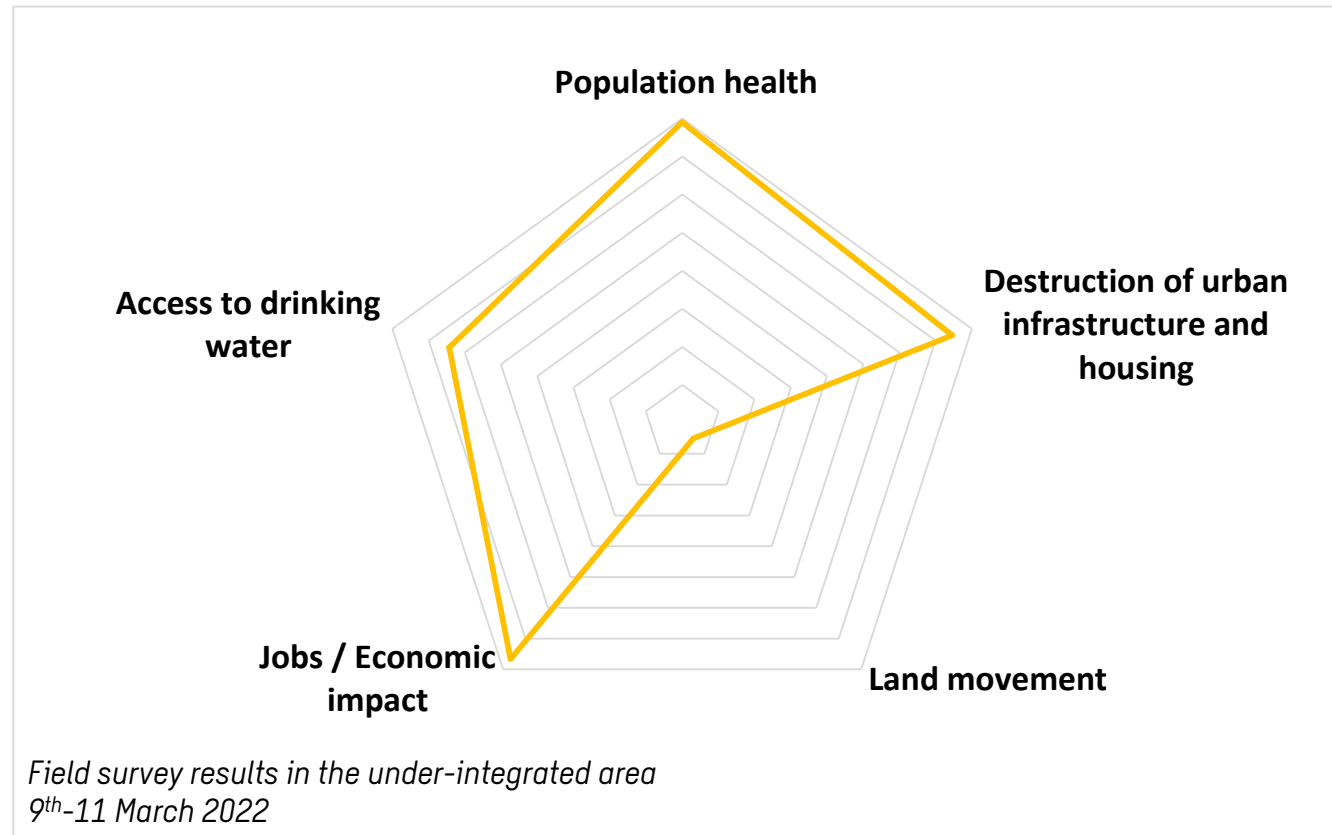
LIST OF SECTOR-BASED IMPACTS (FLOODS & STORMS)			
Hazard theme	Capital	Sector	Impacts
FLOODS & STORMS	SOCIAL	<i>Department of Community Development, Social Welfare, Gender and Youth</i>	Disruption of communities' lives, home appliances' destruction.
		<i>Department of Health / Department of Land and Town planning</i>	Displacement and loss of lives.
		<i>Department of Health</i>	Hygiene problems due to the contamination.
		<i>Department of Health</i>	Increased water-borne disease incidents due the pollution of drinking water.
		<i>Department of Works</i>	Loss of employment and income due to frequently severe floods and disruption.
	NATURAL	<i>Department of Cleaning and Environment / Department of Land and Town Planning / Department of Agriculture, Irrigation and Cooperative</i>	Unpredictable rains and flash floods leading to soil erosion, loss of soil fertility, and landscape disruption.
		<i>Department of Cleaning and Environment</i>	Damage to the marine ecosystem (fishing)
		<i>Department of Cleaning and Environment</i>	Trees falling due to extreme precipitation and floods- followed by landslides.
	ECONOMIC	<i>Department of Works / Department of Land and Town Planning - (Public services)</i>	Damage to and loss of transport, communications and buildings due to increased rainfall and corresponding increased flooding.
		<i>Department of Works - (Transport, storage, information &amp; communication services)</i>	Destruction or damaging of (transport, storage, and ICT) infrastructure.
		<i>Department of Works - (Transport, storage, information &amp; communication services)</i>	Disruption of traffic and transit systems
		<i>Department of Works - (Transport, storage, information &amp; communication services)</i>	Damage to electricity services

# Impact diagram



# Impact: from the population perception

What are the most important impacts of floods and storms?



Among the different diseases that were cited by the inhabitants, **skin-related diseases** emerged as a recurrent problem in these neighborhoods linked to flooding events and storms.

Similarly, for the destruction of infrastructure and houses, the **destruction of roofs** was a point raised by the residents as well as the **electrical issues** which followed a flooding or storm event and not always solved by the city.

In addition, the **destruction of appliances** during these recurrent weather events in the region has a strong **impact on the economic health** of households living in these neighborhoods.

Few residents concretely explain the **water access** problems they experience after floods or storms, but many identify it as **a major impact related to floods and storms**.

In addition, some residents made the link between this and the **economic impact**, citing the increased purchase of mineral water as an example. Some also link access to **water to illness in young children**.

# Ozangué district in the 5th district

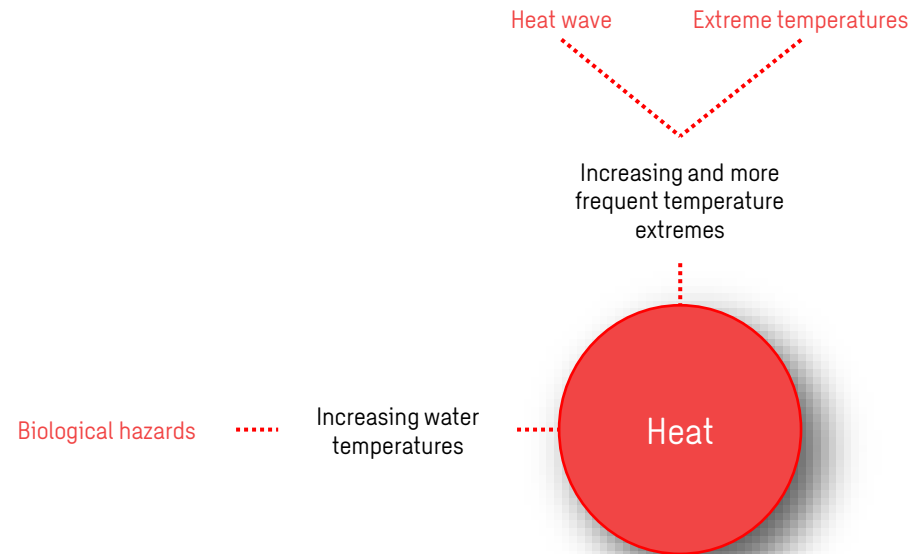


On this yellow house, the owner has built a wall to fight against the recurrent flooding that affects his house.

*Field survey results in the under-integrated area  
9<sup>th</sup>-11 March 2022*

Picture © NGUEMA ELLANGMANE Aldrin Derrick

# Themes and main climate risks



## LEGEND

In black:

Primary Climate Hazard

In red:

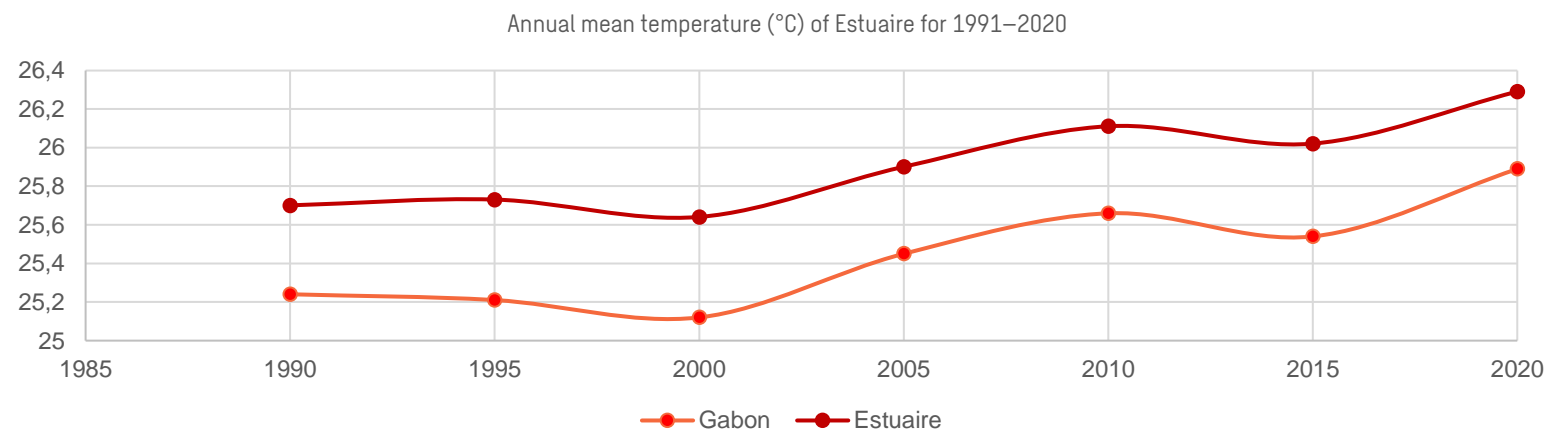
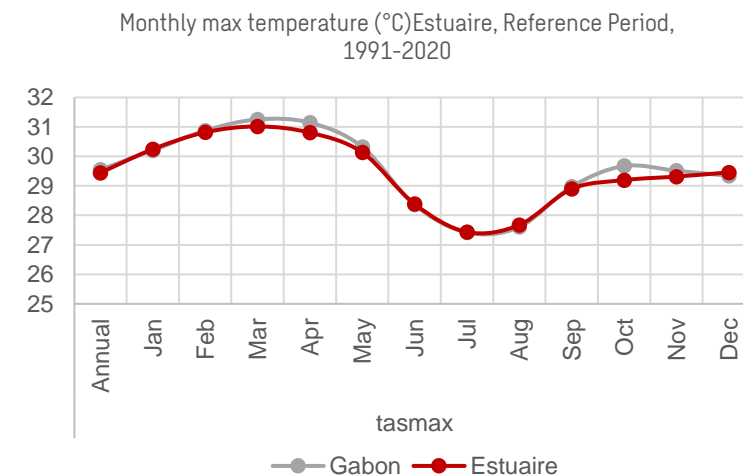
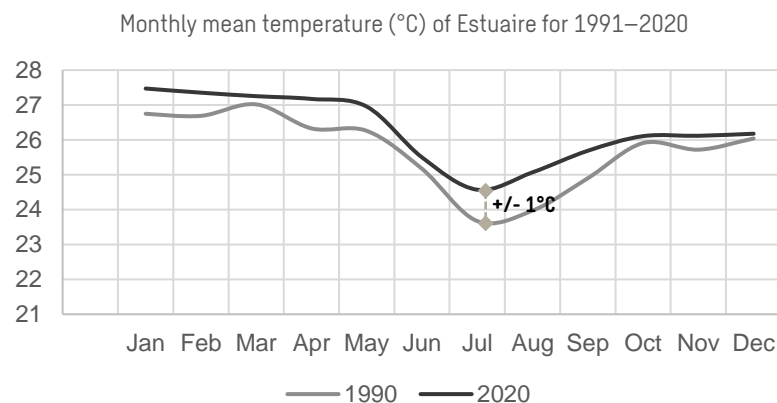
Secondary Climate Hazard

# Themes and main climate risks

## Historical trends and future predictions

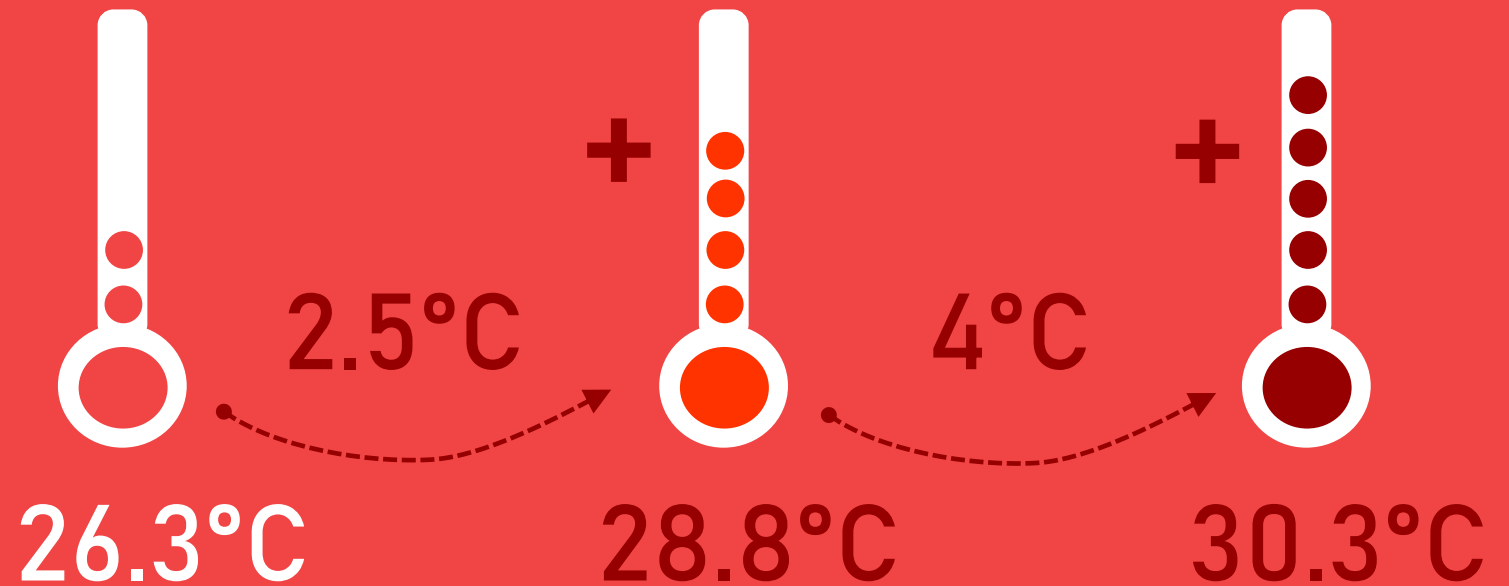
The current **annual temperature** in Estuaire is about 26.3 °C and the temperature is increasing considerably that it has increased by 1°C within 30 years (1990-2020). Comparing to the whole country, the max temperature in Estuaire province is relatively lower.

Current trajectories predict an **increase of 2.5 °C** (28.8 °C) in 2050 and increase by 4 °C (30.3 °C) by the end of the century. These predictions are visualized in the infographics on the next pages.



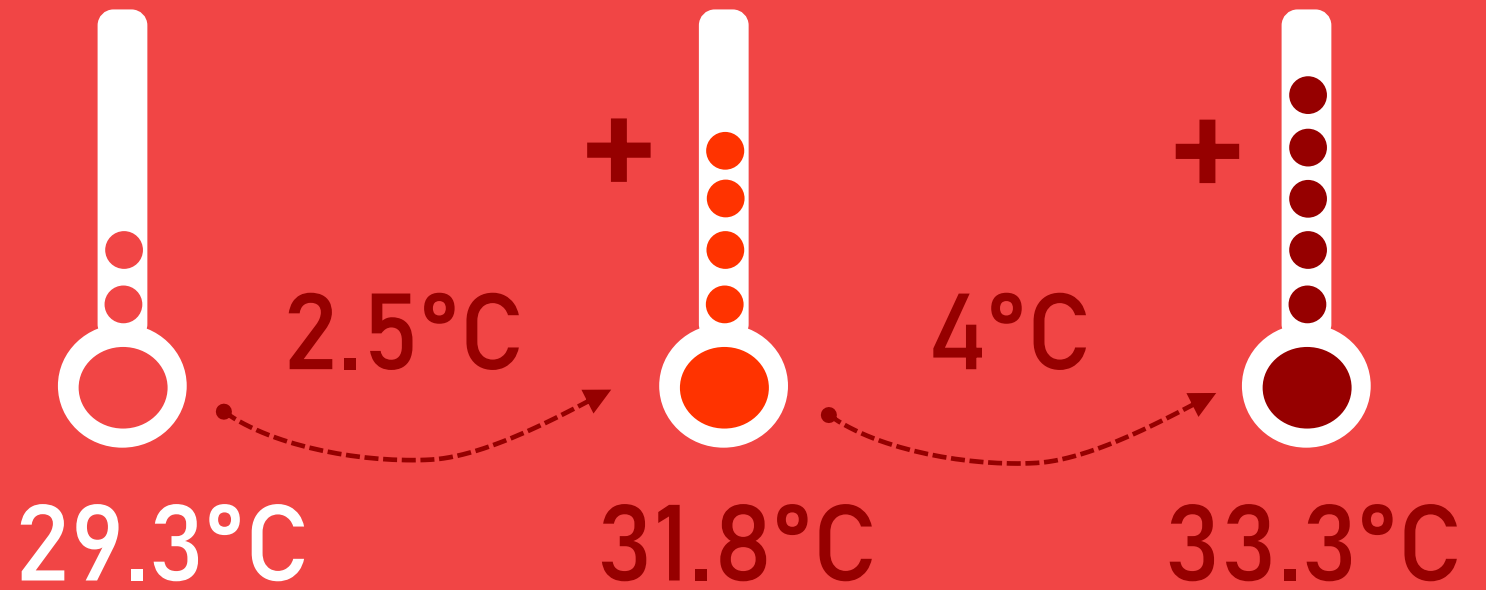
NOW 2050 2100

GABON  
Annual average  
temperature  
(RCP8.5)



NOW 2050 2100

GABON  
The maximum  
monthly average  
temperature  
(RCP8.5)

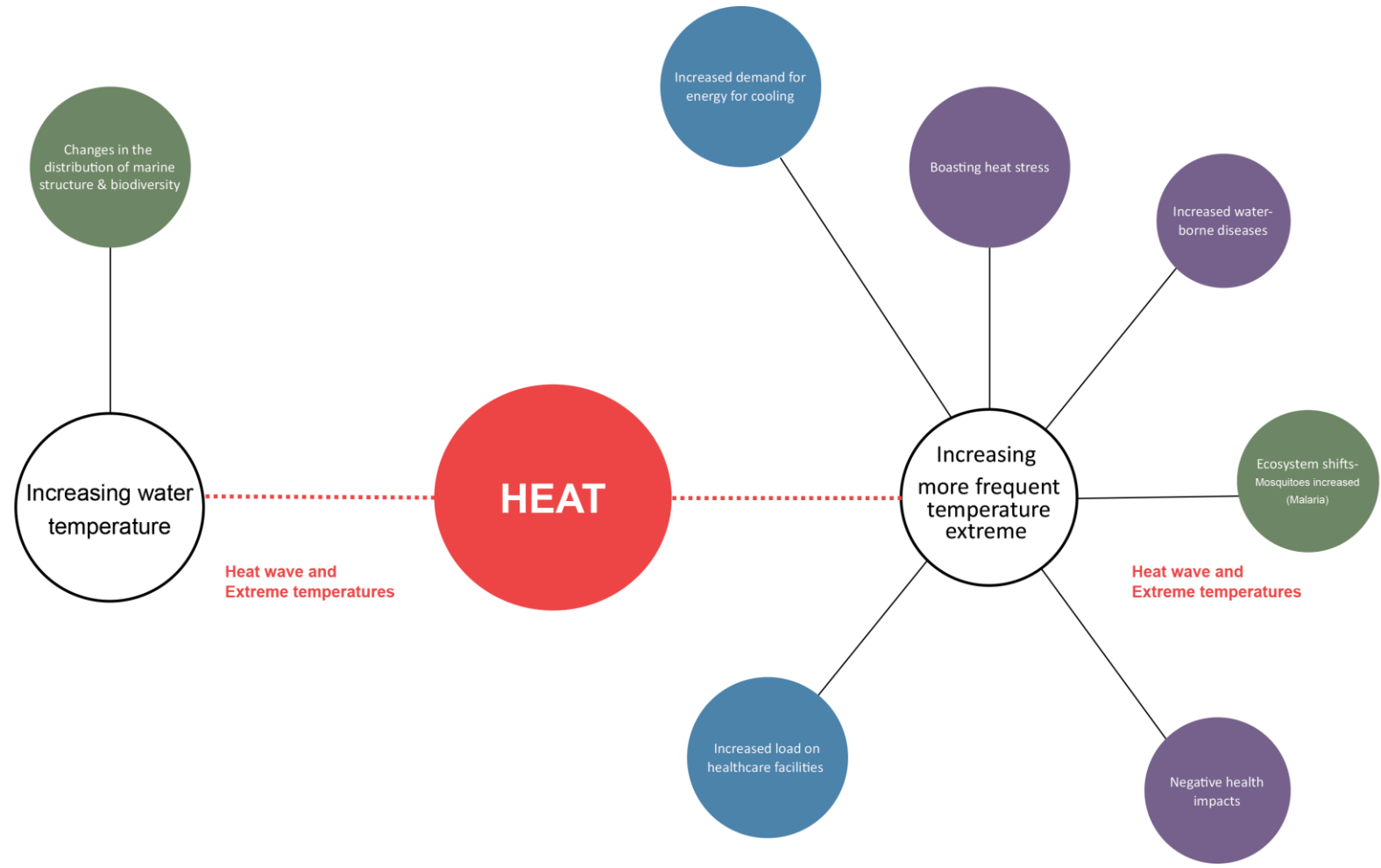









# Impact of heat

LIST OF SECTOR-BASED IMPACTS (HEAT)			
Hazard theme	Capital	Sector	Impacts
HEAT	SOCIAL	<i>Department of Health</i>	Increased and exacerbated heat stress to the population, and due to development and spread of insect nests, it leads to negative health issues.
		<i>Department of Cleaning and Environment / Department of Land and Town Planning</i>	ecosystem shifts and changes as a result of climate change (Mosquitoes increased).
	NATURAL	<i>Department of Cleaning and Environment / Department of Water</i>	I.e., shifts and changes in the distribution of marine structure and biodiversity.
		<i>Department of Health</i>	Increased load on healthcare facilities.
		<i>Department of Works</i>	Increased energy demand for cooling purposes.
ECONOMIC			

# Impact Diagram



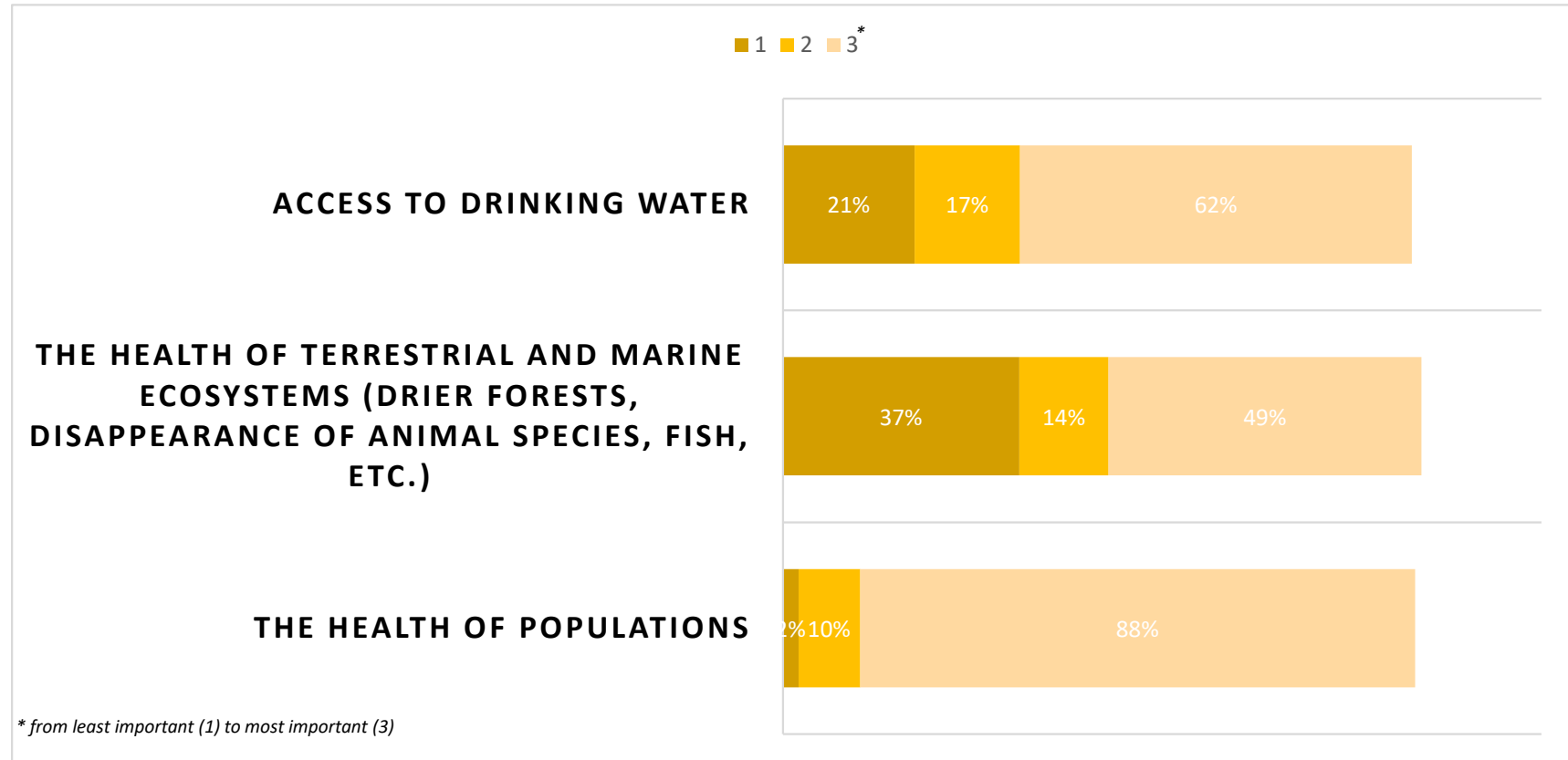
-  Climate hazards
-  Natural impacts
-  Social impacts
-  Economic impacts
-  Highly prioritized impacts

# Impact: from the population perception

What are the most important heat-related impacts?

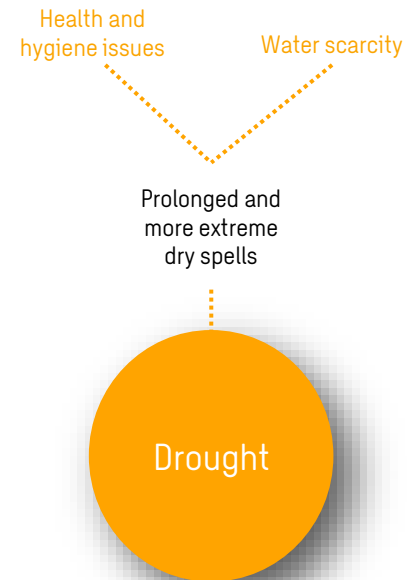
Among the changes observed after the heat wave, the **development and spread of insect nests** was regularly cited.

As with the effects of flooding and storms, the **impact on people's health** was ranked as the most important issue for residents in all three neighborhoods.



Field survey results in the under-integrated area 9<sup>th</sup>-11 March 2022

# Themes and main climate risks



## LEGEND

In black: Primary Climate Hazard

In orange: Secondary Climate Hazard

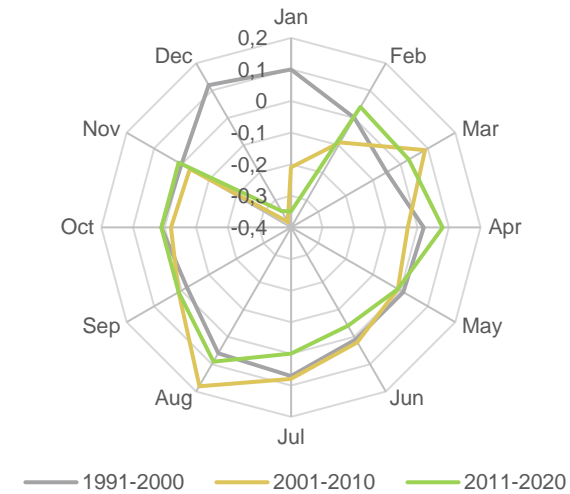
# Themes and main climate risks

Next to a decrease in precipitation during the rainy season, also the **length of dry spells during** the dry season increased over the past 30 years. Diagrams show that the maximum number of consecutive dry days has increased between 1991 and 2020 during the dry months.

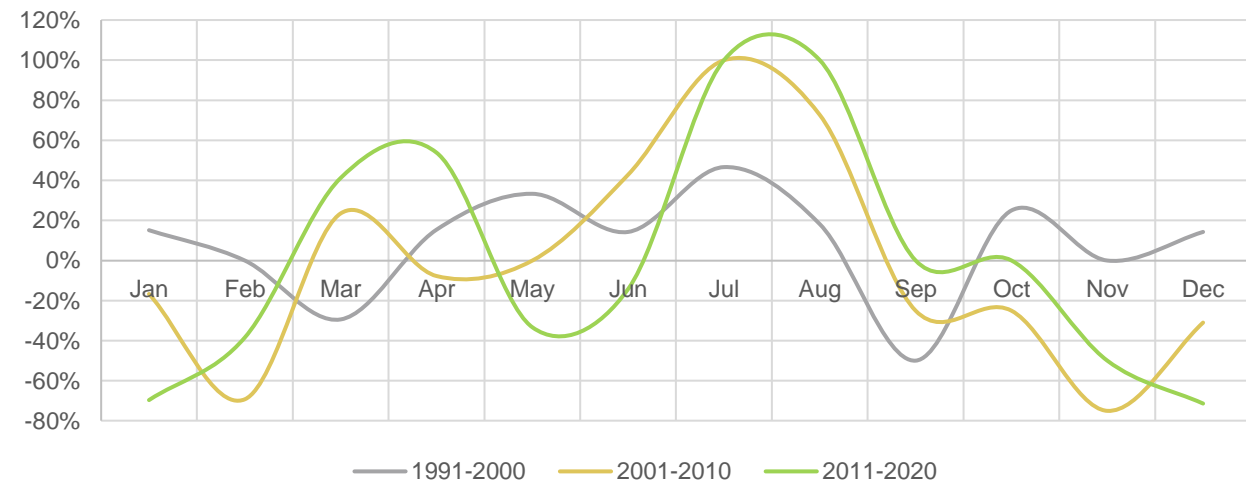
The dry day season is relatively short in Libreville and condense to months of June-August.



Max number of consecutive dry days (from reference period of 1986-2005)



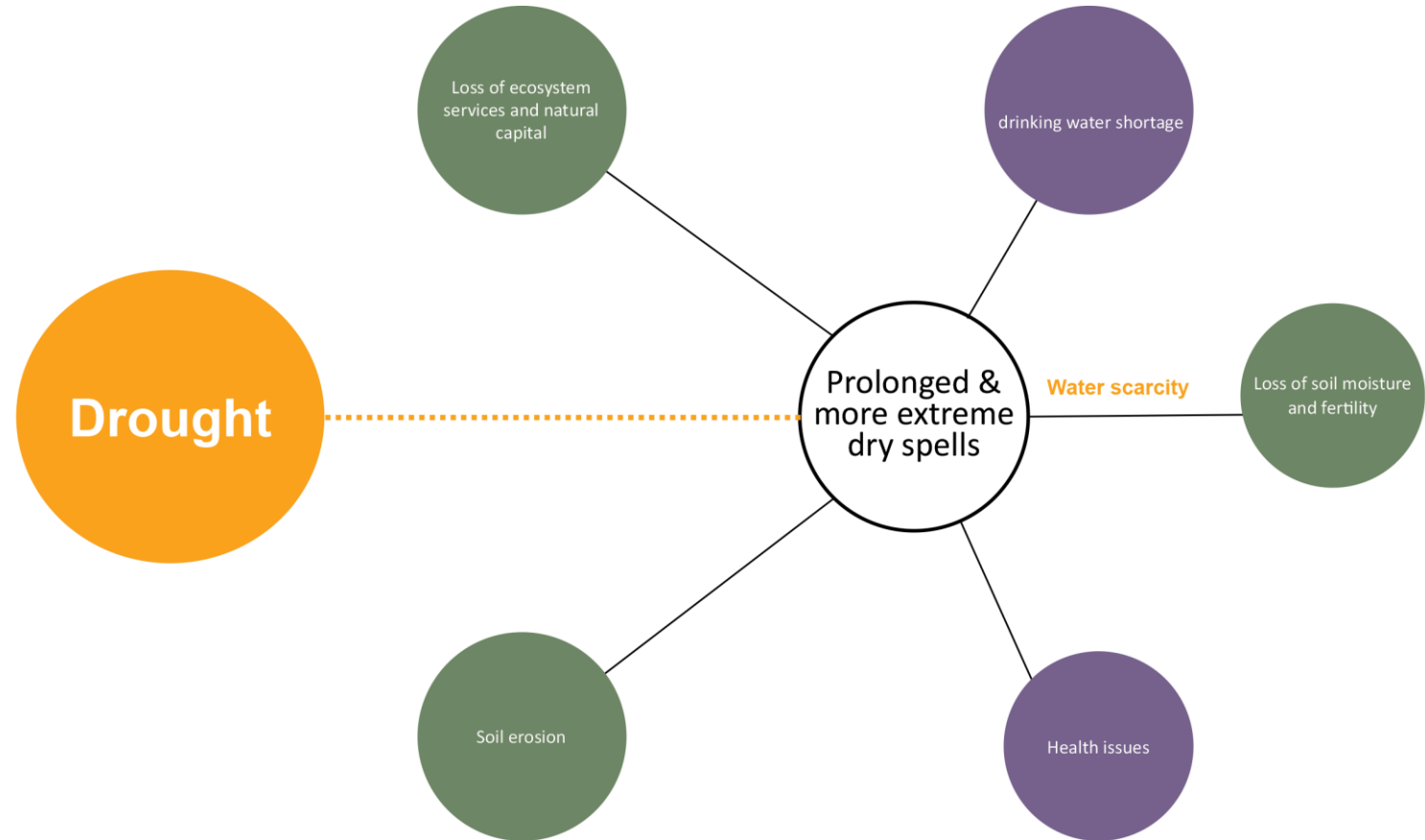
Max number of consecutive dry days (from reference period of 1986-2005)








# Impact of Drought

LIST OF SECTOR-BASED IMPACTS (DROUGHT)				
Hazard theme	Capital	Sector	Impacts	
<b>DROUGHT</b>	<b>SOCIAL</b>	<i>Department of Water</i>	An insignificant risk of domestic water shortages is probable.	
		<i>Department of Health</i>	An insignificant risk of Food shortage due to crop failure.	
		<i>Department of Health</i>	Increased risks of epidemic disease incidences, air quality, sanitation and hygiene.	
	<b>NATURAL</b>	<i>Department of Cleaning and Environment / Department of Land and Town Planning</i>		Loss of ecosystem services and natural capital in general.
		<i>Department of Cleaning and Environment</i>		Loss of biodiversity.
		<i>Department of Cleaning and Environment</i>		Loss of soil fertility and moisture leading to soil erosion.
	<b>ECONOMIC</b>	<i>Department of Works / Department of Land and Town Planning - (Industry)</i>		Disruption in constant water supply service for both domestic and industrial uses.

# Impact diagram



-  Climate hazards
-  Natural impacts
-  Social impacts
-  Economic impacts
-  Highly prioritized impacts

# Libreville

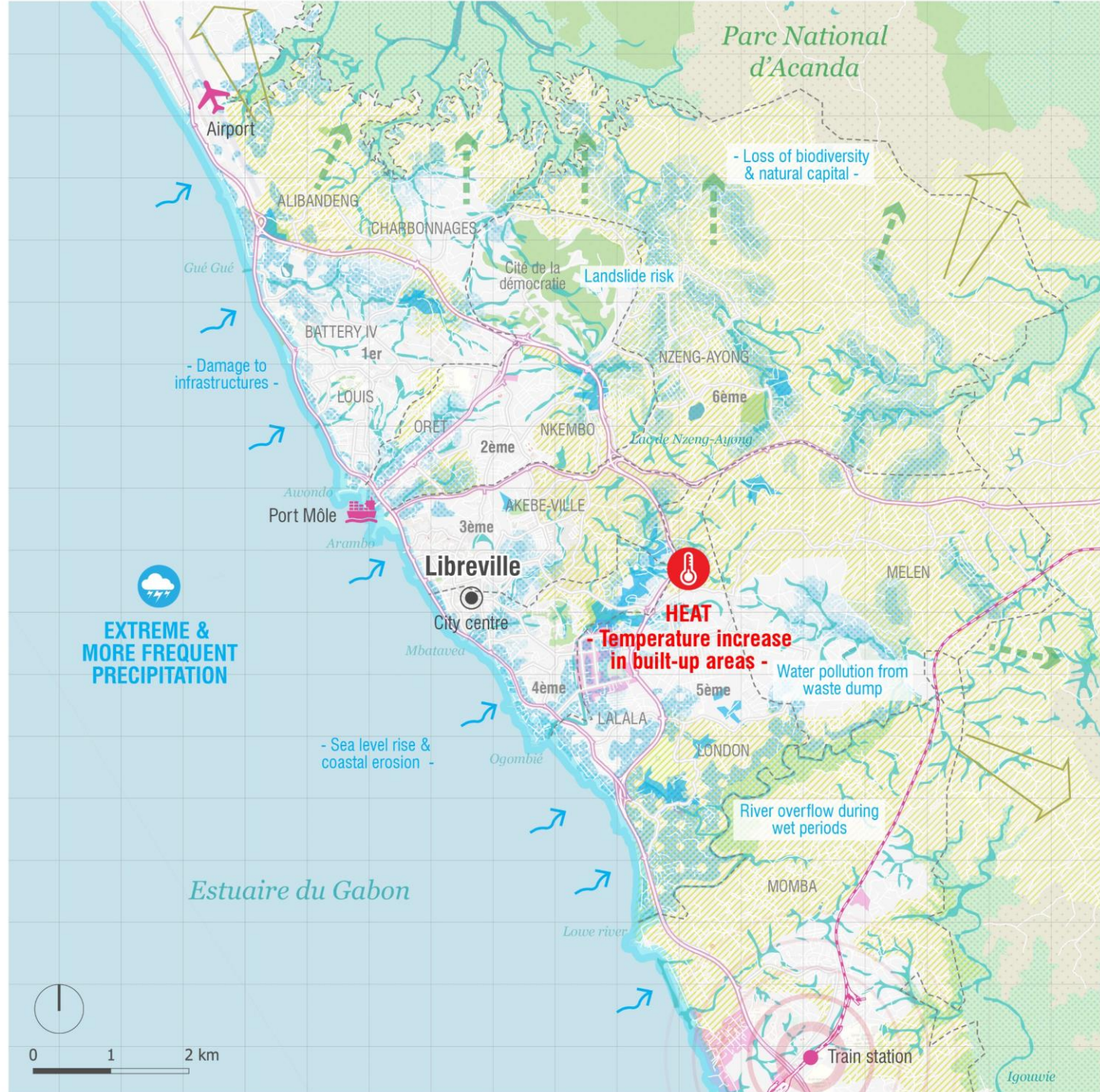
## Spatial Diagnostic

The location of the **hazard** icons gives a first impression of where this hazard mostly takes place.

Around 95% of the city land is **illegally occupied**. The anarchy of land use complicates stormwater runoff, river and watershed drainage, and encourages flooding in an urban site with a dense hydrographic network.

The areas have been identified based upon literature study and stakeholder interviews and would require more in-depth, follow-up investigation at a later stage.

-  Train station
-  Rail line
-  Main road
-  Secondary road
-  Airport
-  City centre
-  Administrative boundary
-  Floodable area
-  Green areas
-  Lake
-  River
-  Informal settlements
-  Built up areas
-  Economic zone
-  Drought
-  Deforestation
-  Urban growth direction





# Libreville

## Hotspots

	Affected areas - communes	Comment
<b>Flooding</b>	<p><b>the bottom of the watersheds</b> e.g., <b>Akébé</b> (3rd), most of the <b>Pk's#</b> (Pk5, Pk6, Pk7... etc), <b>Bellevue</b> (2nd), <b>Venez-Voir</b>(3rd), <b>Derrière La Prison</b> (1st), <b>Cocotiers</b>(1st), and <b>Kinguélé</b> (3rd).</p> <p>Flooding is also a direct result of <u>poor drainage in some areas of the city</u>. The example of the <b>seaside boulevard</b>, at the level of the Constitutional Court <b>or the city center</b>, should be highlighted. In the <b>working-class neighborhoods</b>, on the other hand, the situation is even more worrying than in the city center.</p>	<p>The map shows the fluvial flood hotspot. This sensitive area has a high concentration of informal settlements. The development of towns near watercourses, in unfavorable sites, without a development plan, the impermeabilization of the soil due to the concentration of housing, which increases the volume of water runoff, the destruction of the vegetation cover, the modification of the topography and the absence of a drainage system are at the origin of a series of important erosion and flooding phenomena.</p> <p>Additionally, the map shows the extreme rainfall events leading to a modification of coastal morphology accompanied by significant retreat of the coastline; occurrence of flooding of coastal wetlands. The map shows also the secondary risk link with extreme rainfall. The city is plagued by major landslides caused by deforestation resulting rapid urban expansion.</p>
<b>Heat</b>	<p><b>Nkembo, Akebe, Akebe ville, Derrière hôpital, Mont bouet, Sobonne, Veneez-voir, Hotel de ville, Derrière la prison, Oloumi, Lalala, Kinguele, Avea.</b></p>	<p>The most extreme temperatures occur in Libreville City Center. Especially during the night, these built-up suffer mostly from the urban heat island island effect. Especially poor people in informal settlements are affected by these hot nights as they have no financial resources available to buy cooling equipment for their houses. Finally, in the register of endogenous risks, the exposure of the inhabitants of Libreville to the bites of mosquitoes inoculating malaria or chikungunia. The proliferation of these bugs is due to the insalubrity and uncontrolled occupation.</p>

# Libreville

## Spatial Diagnostic – Hotspot areas

### Drought

The complete Libreville city is exposed in a similar way to the hazard **prolonged and more extreme dry spells**. However, this is not considered has a main risk for Libreville. Located in the tropical equatorial zone, Libreville benefits from a climate that provides regular rainfall: it rains 9 months out of 12.

### Further investigation

Please note that this spatial diagnostic map only gives a first impression of the hotspot areas. Further investigation is required to get a more extensive overview. More detailed hazard maps in combination with more specific maps of location with vulnerable people will lead to a more precise understanding of the hot spot areas.

# Risk assessment



# Risk assessment

## Introduction

### Adaptive capacity

For each of the key risks, 3 supporting and 3 challenging factors are identified in order to get a first impression of the adaptive capacity of the city in relation to the key risks.

### Priority impacts

The impacts on the next page were identified as ***priority impacts*** by the ***experts*** and the ***interviewees***.

Based on the input from the same experts, the impacts were plotted in a ***risk diagram***. The impacts in the right top corner can be seen as the ***key climate risks*** for the city of Libreville.



Picture © NGUEMA ELLANGMANE Aldrin Derrick

# Priority impacts

## Floods & Storms

1. Loss of soil fertility and erosion, landslides, trees falling
2. Damage to infrastructure and houses' electrical appliances
3. Displacement and loss of lives
4. Outbreak of diseases (e.g., Malaria, cholera) due to poor waste management, sanitation, and contamination of drinking water

## Heat

1. Health issues and increased loads on healthcare centers
2. Shifts into ecosystem and loss of natural capital
3. Increased energy demand for cooling purposes

## Drought

1. Loss of soil moisture leading to erosion
2. Increased risk of water shortages
3. Loss of ecosystem services (biodiversity) and natural capital in general
4. Health issues, air quality, sanitation, and hygiene.

# Risk Matrix

**Key climate risks**

## Probability

Likely to happen within this century

Likely to happen within decades

Likely to happen within years

**Severity**

Disruptive

Damage

Nuisance

**1** Health issues, air quality, sanitation, and hygiene

**1** Displacement and loss of lives

**1** Increased health issues

**2** Damage to infrastructure and houses' electrical appliances

**3** Post floods diseases outbreaks

**3** Shifts into ecosystem & loss of natural capital

**2** Increased risk of water shortages

**5** Loss of soil fertility and erosion

**2** Increased load on healthcare centers

**4** Increased landslides, trees falling

**3** Loss of ecosystem services (biodiversity)

**4** Loss of soil moisture leading to erosion

**4** Increased energy demand for cooling purposes

- Heat
- Drought
- Floods & Storm

# Key Climate Risks

## Air quality, sanitation, and hygiene

Extreme rainfall and floods accompanied by relative drought result in health issues, sanitation and hygiene problems, which disrupt the urban environment and adversely affect the health of citizens.



## Damage to infrastructure and houses' electrical appliances

Extreme rainfall and floods accompanied by thunders and storms disrupt infrastructures and damage the electrical appliances



## Displacement and loss of lives

Extreme rainfall and floods destroy houses, cause landslides, and threaten the lives of vulnerable citizens particularly.



## Post floods diseases outbreaks

Due to the poor waste management, natural landscape (valleys, Marshes, & Flat surfaces), illegal occupied land, and natural drainage blockage, flooding exacerbates the risk of contaminations and infections which results in many diseases outbreaks.



## Health problems





Extreme heat brings health risks related to sleeping problems, dehydration, and severe physiological stress, and heatwave facilitates the development and spread of insect nests.



# Adaptive Capacity

## Introduction

**Adaptive capacity:** According to the IPCC adaptive capacity is the potential or ability of a system, region, or community to adapt to the effects or impacts of climate change. Certain **factors support** or enhance this adaptive capacity providing practical means of coping with the impacts of climate hazards. While other **factors are challenges** that further diminish this adaptive capacity.

<b>Socio-economic</b> 	<b>Governmental</b> 	<b>Physical &amp; Environmental</b> 	<b>Services</b> 
Cost of living	Political stability	Rapid Urbanization	Access to basic services
Housing	Political engagement	Resource availability	Access to healthcare
Poverty	Government capacity	Environmental conditions	Access to education
Inequality	Budgetary capacity	Infrastructure condition	Public health
Unemployment	Safety and security	Infrastructure maintenance	
Migration	Land use planning	Infrastructure capacity	
Economic health	Access to quality / relevant data		
Economic diversity	Community engagement		



# Adaptive Capacity

In this exercise, the main supporting and challenging factors for the key climate risks are identified. This can be done either by voting in a workshop among the key stakeholders or as a weighing questionnaire spread among experts. In this practice, each **expert** is supposed to point out 3 challenging and 3 supporting factors. Afterward, the top-3 supporting, and the top-3 challenging factors will be (1) identified, (2) assessed to which degree it is supporting or challenging, and (3) described briefly.

## KEY RISK:

**1** Displacement of people and loss of lives



Top 3 Supporting factors

Factor	Short description	Supporting degree*
1. Natural Landscape	Libreville has grown organically along the coast; rational urban management and planning help natural drainages direct the rainwater properly- appreciating the existing natural slope.	High
2. Efficient waste management	Efficient waste management assist the city keeping the natural drainage open directing the water.	High
3. Reasonable urban planning.	Meaningful land-use and infrastructure planning establish a resilient urban environment.	High



Top 3 Challenging factors

Factor	Short description	Challenging degree*
1. Challenging Terrain	Libreville consists of valleys, marshes, and flat surfaces that are barriers against natural run-off	High
2. Poor waste management and urban culture	Intense illegal occupied land and irregular urban housing accompanied with poor urban culture resulted in waste dumps- blockage of natural drainage	High
3. Uncontrolled rapid urbanization	Rapid uncontrolled urbanization has contributed to in the creation of vulnerable urban environment which threatens lives	High

\* Supporting degree is the level (high, moderate or low) to which the supporting factor contributes to reduce the impacts of the respective key risk. A challenging degree is the level (high, moderate or low) to which the challenging factor obstructs the process of reducing impacts of the respective key risk. These degrees have been defined by the city stakeholder.

# Adaptive Capacity

## KEY RISK:

2 Damage to infrastructures and houses' electrical appliances



Top 3 Supporting factors

Factor	Short description	Supporting degree*
1. Investment in the Drainage system	Investments in the disposal of wastes and drainage system enables the city to act better in directing the rainstorm.	High
2. Data-driven planning and infrastructure designing	Considering the topography, urban structure, soil, density, construction materials and laws assist urban planning results into the creation of a safe and resilient living environment.	High
3. Urban rehabilitation and upgrading	Strengthening vulnerable urban areas throw urban rehabilitation and upgrading reinforce infrastructures and buildings against flood certainly.	Moderate



Top 3 Challenging factors

Factor	Short description	Challenging degree*
1. Unclear and centralized governance	Application of masterplan to define a clear vision on the development is challenging; likewise, there are governance issues and limited operational capacity	High
2. Poor solid waste management	Due natural drainage blockage, rainstorm disrupts infrastructures and buildings.	High
3. Rapid urbanization	Uncontrolled rapid urbanization, poor waste management and urban culture established a delicate setting prone to floods	Moderate

\* Supporting degree is the level (high, moderate or low) to which the supporting factor contributes to reduce the impacts of the respective key risk. A challenging degree is the level (high, moderate or low) to which the challenging factor obstructs the process of reducing impacts of the respective key risk. These degrees have been defined by the city stakeholder.

# Adaptive Capacity

## KEY RISK:

3 Post floods diseases outbreaks



Top 3 Supporting factors

Factor	Short description	Supporting degree*
1. Investment in wastewater and solid waste management	Investments in the disposal of wastes and drainage systems alleviate the probability of marshes and ditches' formation and diseases epidemics.	High
2. Investment in public health sectors and urban culture	Educating citizens about public health and the institutionalization of good urban culture, investment in health sector reduce disease epidemics.	High
3. Urban rehabilitation and upgrading	Strengthening the city in general but the vulnerable parts in specific makes it more resilient against diseases outbreaks and improves its sanitation.	Moderate



Top 3 Challenging factors

Factor	Short description	Challenging degree*
1. Challenging topography- Water stagnant	The topography is such that create marshes and ditches which promote water and vector born diseases	High
2. Contamination (chemical residues transmission)	Due to the transmission of chemical and industrial residues into residential areas and stagnating of water there, different disease spread e.g., skin related diseases	High
3. Unplanned and irregular areas	Uncontrolled rapid urbanization, poor waste management and sanitation, and hygiene issues that have established a fragile environment prone to different diseases outbreaks	High

\* Supporting degree is the level (high, moderate or low) to which the supporting factor contributes to reduce the impacts of the respective key risk. A challenging degree is the level (high, moderate or low) to which the challenging factor obstructs the process of reducing impacts of the respective key risk. These degrees have been defined by the city stakeholder.

# Adaptive Capacity

## KEY RISK:

**1** **1** Increased health, air quality, sanitation, and hygiene issues



Top 3 Supporting factors

Factor	Short description	Supporting degree*
1. Enough green space with tropical climate	It has enough green space, does not experience too extreme temperature and the dry season is comparatively short.	High
2. Participatory planning and public awareness	Involving citizens in the planning process and rising their awareness about the heat related diseases and probable risks contribute to the creation of more stable urban setting.	High
3. Sustainable building design and construction law amendment	Efficient buildings design (good ventilation) and use of sustainable materials (green) reduce the risk of heat-related diseases and decrease the cost of cooling.	Moderate



Top 3 Challenging factors

Factor	Short description	Challenging degree*
1. Unstable Socioeconomic status	Economically disadvantaged and socially isolated individuals who do not have access to enough resources for cooling, are at risk of heat-related burdens.	High
2. Contamination and stagnant of water	Stagnating of water and its commination with various chemical substances accompanied with extreme heat contributes to disease outbreaks e.g., exhaustion and respiratory, cerebral, and cardiovascular diseases	High
3. Irregular housing	Due to irregular housing, low quality construction material, and unstable roofing that have contributed to poor environmental margins, settlements are being affected by heat and its consequences considerably	High

\* Supporting degree is the level (high, moderate or low) to which the supporting factor contributes to reduce the impacts of the respective key risk. A challenging degree is the level (high, moderate or low) to which the challenging factor obstructs the process of reducing impacts of the respective key risk. These degrees have been defined by the city stakeholder.

# No regret measures



# No regret measures

## Introduction

**No regret measures** are measures worth implementing no matter which event actually happens whenever consequences are uncertain. Based on the results of the field interviews and key documents, the following no regret measures were identified for Libreville:

- Create awareness on climate change
- Flood prevention
- Waste management
- Drinking water management
- Climate resilient infrastructure
- Green and public space
- Law enforcement
- Communication and education program

These no regret measures are linked to the key climate risks for Libreville in the Risk diagram that are disruptive and likely to happen within years

### “Sainte Marie” watershed (Libreville T100 flood)



Without intervention



With intervention

© Local Infrastructure Development Project - Phase 2 (Gabon)  
Session - Critical infrastructure and urban resilience building:  
We need your voice!  
20 November 2019

# No Regret measures – Citizens

According to the citizens interviewed, the city of Libreville could do the following to enable the community to become more climate adaptive and resilient:

## +++ Waste management

raising the awareness of the population on waste management

awareness campaign, training

creation of place and infrastructure for waste collection and recycling near homes

improving and expanding city-wide waste collection systems

## +++ Land use planning

building roads in under-integrated areas

relocate the population living in flood-prone areas

destruction of houses built on riverbeds

construction of water protection walls

development of green areas

maintenance and removal of uncontrolled growth of weeds

## +++ Improving people's quality of life

installation of public fountains for affordable drinking water

improving the distribution of the water system

## +++ Flood prevention and mitigation

cleaning up the drainage system

expansion of drainage systems

cleaning the watercourse

remove waste dumps that lead to water clogging of drainage networks

develop catchment areas and nature-based solutions

# Past & planned investments





# Past and Planned Investments

## Introduction

In this section we have made a selection of most relevant past (since 2016) and planned investments relating to climate adaptation and resilience building that we were able to collect. We collect these information mainly with a research desk and interviews of key stakeholders.

**At the national level**, investments in:

- collection of meteorological data are a priority

**At the Libreville city level**, investments are mainly made in :

- infrastructure
- waste management
- drainage and watershed management

In Libreville, **resource needs in**

- Data acquisition, especially aerial data
- Mapping
- Flood forecasting

State of the environment before the work is carried out



State of the environment after the work is carried out



Roads and sewage works

Worksites completed in September 2019 : Libreville

Source: [https://understandrisk.org/wp-content/uploads/GABON\\_Pre%CC%81sentation\\_travaux\\_PDIL2\\_UR\\_Afr-1.pdf](https://understandrisk.org/wp-content/uploads/GABON_Pre%CC%81sentation_travaux_PDIL2_UR_Afr-1.pdf)

# Climate information services

Strengthen climate information services for resilient development and adaptation to climate change in Gabon\*

TARGET 13-2



INTEGRATE CLIMATE  
CHANGE MEASURES  
INTO POLICIES AND  
PLANNING

**Implementing Agency:** United Nations Development Programme Office in Gabon.

The project for which *the India-United Nations Development Partnership Fund and the UNDP Office in Gabon* are respectively the financier and the implementing agency, in close collaboration with *the National Climate Council*, and with the operational support of various stakeholders from different national institutions.

## Duration of the project

March 2020 to March 2021 (2 years)

No-cost extension granted until 28 February 2022

## Intervention areas

Provinces of the Estuary (Cocobeach, Kango, Nyoniè); Nyanga (Mayumba); and Ogooué-Maritime (Gamba, Ntchong'orove)

## Project budget

1,000,100 (one million one hundred US dollars)

## OBJECTIVES

1. **Develop an effective and targeted climate information dissemination system and the preparedness and response capacity of national warning institutions;**
2. **Improve the hydrometeorological and oceanic monitoring network and forecasting capacity;**
3. **Strengthen human resource capacity** to ensure ownership and sustainability of ocean and hydrometeorological services;
4. **Strengthen the capacity of stakeholders to identify climate risks and vulnerabilities** to support decision-making and planning in the sector.

\*Detail description of the project can be found in annexes. It has been provided by Dr. Landry Izandji Owowa, project leader for this project

# Integration of adaptation

TARGET 13-2



INTEGRATE CLIMATE  
CHANGE MEASURES  
INTO POLICIES AND  
PLANNING

Emergent Gabon Strategic Plan (PSGE) for 2025, drawn up in July 2012, constitutes *the general reference framework for sustainable development policies implemented in Gabon.*

In this context, **an investment plan in the water sector** has been defined: **The Integrated Program for Drinking Water Supply and Sanitation (PIAEPAL)**

République Gabonaise



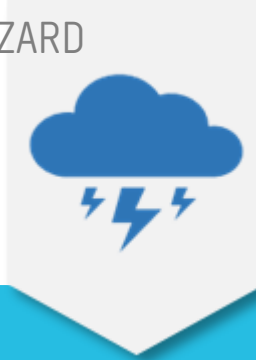
## PLAN STRATEGIQUE GABON EMERGENT

Vision 2025 et orientations  
stratégiques 2011-2016

Déclinaison en Programmes et Actions du  
Projet de Société de son Excellence Ali  
BONGO ONDIMBA, Président de la  
République: « l'Avenir en confiance »



Juillet 2012



6 CLEAN WATER AND SANITATION



## 1. CLEAN WATER AND SANITATION MANAGEMENT LIBREVILLE

Flood and drought risk management

ACTIONS	EXPECTED RESULT	BUDGET	YEAR
<b>PIAEPAL</b> – first under Program Integrated for food Drinking water and Sanitation of Libreville	Strengthen and improve drinking water services and sanitation of the great Libreville.  The rate of access to drinking water increases from 55% to 75% in Libreville	EUR 117,400,000 (75,40 Million AfDB + 42,00 Million Africa Growing Together Fund)	2018 - 2025



6 CLEAN WATER AND SANITATION



1. CLEAN WATER AND SANITATION MANAGEMENT LIBREVILLE

Flood and drought risk management

ACTORS INVOLVED & IMPLEMENTING AGENCIES	LESSONS LEARNED	COMMUNITY ENGAGEMENT	SUPPORT TO VULNERABLE GROUPS
<p>The Ministry of Water and Energy through its <b>Directorate General for Water</b> (DG-WATER) AfdB</p>	<p>Not clear</p>	<p>Not clear</p>	<p>The PIAEPAL, which aims to install 327 km of pipes and build 5 water towers, 2 pumping stations and 60 public fountains, will enable 349,000 residents to have access to drinking water by 2025</p>





13 CLIMATE ACTION



## 2. STORM WATER DRAINAGE CONSTRUCTION PROJECT - LIBREVILLE

Strengthened flood risk management in urban areas and at the basin-level

ACTIONS	EXPECTED RESULT	BUDGET	YEAR
Development of water drainage circuits in 3 watersheds in Libreville (Gué-Gué, Lowé-IAI and Terre-Nouvelle)	The project consists of the realization of the necessary works for the development of the rehousing site and the construction of houses and collective equipment useful for the daily life of the citizen	1 <sup>st</sup> phase 40 billions FCFA (amount borrowed by Gabon from the Development Bank of Central African States (BDEAC) + 2 <sup>nd</sup> phase 35 billions FCFA (20 billion, additional funding + 15 billion, relates to the financing of the national response plan to the coronavirus pandemic.)	2014 -



13 CLIMATE ACTION



## 2. STORM WATER DRAINAGE CONSTRUCTION PROJECT - LIBREVILLE

Strengthened flood risk management in urban areas and at the basin-level

ACTORS INVOLVED & IMPLEMENTING AGENCIES	LESSONS LEARNED	COMMUNITY ENGAGEMENT	SUPPORT TO VULNERABLE GROUPS
<p>BDEAC Gabonese Minister of the Economy Libreville city</p>	<p>BDEAC's intervention in the first phase has enabled the effective construction of social housing, school infrastructure and community facilities. However, new needs have arisen, particularly the development of the access road and the supply of water and electricity to the project site.</p>	<p>7,000 people living around the areas concerned by the project</p>	<p>relocation plan for people affected by the development of the Gué-Gué, Lowe, IAI and Terre Nouvelle watersheds</p>





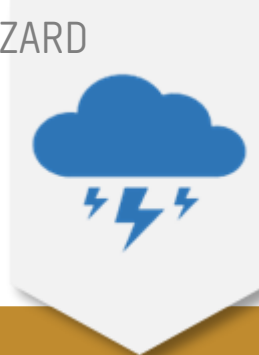
12 RESPONSIBLE  
CONSUMPTION  
AND PRODUCTION

### 3. WASTE MANAGEMENT LIBREVILLE

Enhanced quality of drinking water and solid waste management services

ACTIONS	EXPECTED RESULT	BUDGET	YEAR
Construction of a <b>treatment center</b> and valuation garbage household and assimilated for the Greater Libreville (CTDV)	The project will improve waste collection management in Libreville, leading to a clean and healthy environment and reducing amounts of plastic being washed into the Ocean.	€35,000,000 (amount indicative)	feasibility studies are in progress





12 RESPONSIBLE CONSUMPTION AND PRODUCTION



### 3. WASTE MANAGEMENT LIBREVILLE

Enhanced quality of drinking water and solid waste management services

ACTORS INVOLVED & IMPLEMENTING AGENCIES	LESSONS LEARNED	COMMUNITY ENGAGEMENT	SUPPORT TO VULNERABLE GROUPS
<p>The Tetra Tech COPIP Consortium is providing technical support for the preparation of a pre-feasibility study for the High Commission for the Environment and the Living Environment (HCECV).</p>	<p>Drainage clogged with waste, rubbish and plastic pollution of surface waters remains a major challenge. Waste recovery and disposal is poorly developed, and the current landfill is quite problematic from an environmental point of view and presents a danger to the local population (slope instability).</p>	<p>the citizens' day decreed in 2016 by the Head of State Ali BONGO ONDIMBA so that the populations can develop their living environment</p>	<p>LES GUERRIERS DU SOCIAL, is a Non Governmental Organisation which works a lot in the social field in Gabon (for the moment) in favour of underprivileged children who for the most part live in the most precarious conditions and particularly those residing in the area known as the mindoubé dump (a peripheral district of Libreville)</p>





13 CLIMATE ACTION



## 4. LOCAL INFRASTRUCTURE DEVELOPMENT PLAN- LIBREVILLE

### Strengthened flood risk management in urban areas

ACTIONS	EXPECTED RESULT	BUDGET	YEAR
Rainwater management and sanitation in the Great Libreville : Critical infrastructure and building urban urban resilience	Within this framework, there is a development of Master Plans for the various provincial capitals. The PDIL 2 should support municipalities in improving their operational capacity and governance, in order to better prepare them to play their role in the decentralisation process	The Government of Gabon is financing with the support of the World Bank (PDIL 2- 100 millions USD)	2006-2011 (first phase - PDIL1)  2016-2021 (Second phase – PDIL2)




13 CLIMATE ACTION



## 4. LOCAL INFRASTRUCTURE DEVELOPMENT PLAN- LIBREVILLE

Strengthened flood and drought risk management in urban areas and at the basin-level

ACTORS INVOLVED & IMPLEMENTING AGENCIES	LESSONS LEARNED	COMMUNITY ENGAGEMENT	SUPPORT TO VULNERABLE GROUPS
<p>The implementation of the project is based on city contracts signed between the state and the municipalities (9 cities, including Libreville)</p>	<p>Not clear</p>	<p>Public consultations</p> 	<p>Increase of quality of life in the vulnerable district</p>



# Past and planned investments – Citizens

Are you aware of any projects underway in Libreville to help reduce climate risks (water management, sanitation...)?

## 87% NO

Most of the respondents answered negatively when asked if they knew of any projects underway in the city to make it more climate resilient.

Among the projects mentioned by the **13% who have knowledge** of actions underway in the city, the **watershed and river projects** are the ones that are mentioned.

**Politics of Eviction** was also discussed in an interview.

- These results show the difficulty that the city has in communicating about these projects and involving the most vulnerable populations in the definition of these projects.

# Past and planned investments – Citizens

Are you aware of any citizen initiatives in Libreville to help reduce climate risks?

30% YES

“

*Introduction of the cleanest district award*

*The institution of a citizens' day (grass removal; cleaning of canals...)*

*AAG (Association to Act for Gabon)*

*CJK (community of young people of Kalisalk)*

”

# Waste management Libreville

A citizens' day dedicated to cleaning up the beaches

## Citizens' day

Libreville, 07 November 2021. Established on the first Saturday of each month by the highest authorities, **the citizens' day** of this November 06, was used by the ministry in charge of the environment, the Libreville city council and the European Union to clean up the capital's beaches.

## Gabon : La journée de nettoyage des plages célébrée ce week-end à Libreville

🕒 4 mois ago



<https://www.agencequateur.com/?p=6137>

# Cleaning of the canal Libreville

A citizens' day dedicated to the cleaning of the canal in the Mebiame quarter

## Citizens' day

Libreville, 07 March 2022. On the occasion of the "citizens' day", the members of the **REEL association** proceeded to clean up the canal in the Mebiame quarter (2<sup>nd</sup> district).



## INONDATIONS : LE "REEL" VEUT SOULAGER LES POPULATIONS DE LA CITÉ MEBIAME"

📅 07 Mar, 2022 👤 l'Union 💬 0 Commentaires 👥 2278 vues

<https://www.union.sonapresse.com/gabon-culture-societe/inondations-le-reel-veut-soulager-les-populations-de-la-cite-mebiame-24657>

# Acknowledge- ments





# Mr NGUEMA ELLANGMANE Aldrin Derrick

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For this mission we were accompanied by Mr NGUEMA ELLANGMANE Aldrin Derrick our local partner.

# Annexes



# Annexes

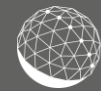
Annex 1: Libreville – Climate Hazard Identification.xlsx

Annex 2: Libreville – Climate Sector Impact Identification.xlsx

Annex 3: Libreville – Questionnaire results.xlsx

Annex 4: Libreville – Interview minutes

Annex 5: Libreville – Key documents



GLOBAL  
CENTER ON  
ADAPTATION

