



AFRICAN DEVELOPMENT BANK

# NATIONAL CLIMATE CHANGE PROFILE

**PRODUCED IN COLLABORATION WITH:**

African Climate & Development Initiative, University of Cape Town;  
Climate Systems Analysis Group, University of Cape Town;  
Energy Research Centre, University of Cape Town; Cirrus Group.

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## Disclaimer

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## 1. BACKGROUND

### 1.1 Geographic and socio-economic context

The Gabonese Republic (henceforth ‘Gabon’ and shown below in Figure 1-1) is a tropical, coastal country on the west coast of Africa. Located on the equator, Gabon is bordered by Equatorial Guinea to the northwest, Cameroon to the north, the Republic of the Congo on the east and south, and the Gulf of Guinea to the west. Gabon is one of the 10 least populated countries in Africa with a population ~1,800,000 people. The country also has a relatively low population density of ~7 people per km<sup>2</sup>. However, Gabon’s population is the most urbanised (~87% of population) country in Africa in terms of proportions. A large proportion (~89.5%) of Gabon’s population have access to electricity. As a result of the development of the country’s oil and mineral resources and abundant petroleum and foreign private

investment Gabon has become one of the most prosperous countries in Sub-Saharan Africa. Gabon’s GDP per capita is the 4th highest in Africa at USD ~7,200 per year, although it is estimated that ~8% of people live below the poverty line of USD 1.9 per day. Gabon has the 7th highest HDI in Africa (0.70) and the 11th highest ND-GAIN index (45.1) indicating it is less vulnerable and more resilient to climate change than most other African countries. However, the ND-GAIN vulnerability score are high and readiness scores are low, indicating that Gabon has both a great need for investment and innovations to improve readiness and a great urgency for action - Gabon’s relatively high ND GAIN index score may be partially attributable to the country’s large GDP per capita, contributing to a relatively high capacity to invest in adaptations. Key socio-economic and demographic indicators of Gabon are further presented and summarised in Table 1-1 below.



Figure 1-1: Map of Gabon

Table 1-1: Socio-Economic Context of Gabon (reference year ranges from 2014 - 2017)

VARIABLE	SCORE/TOTAL	UNIT	RANK (OUT OF 54)
<b>Geography, Socio-Economy and Demographics</b>			
Population <sup>1</sup> [1]	1,801,232	people	46
Population growth rate <sup>2</sup> [1]	2.2	% population .yr-1	38
Population density <sup>3</sup> [1]	7	People/km2	50
Land area <sup>4</sup> [1]	257,319	km2	31
% Urban population <sup>5</sup> [1]	86.9	% population	1
% Urbanisation rate <sup>6</sup> [2]	2.8	% population .yr-1	38
Economy: total GDP <sup>7</sup> [2]	14.2	USD billions .yr-1	21
Economy: GDP by PPP <sup>8</sup> [2]	36	billion international dollars .yr-1	22
Economy: GDP/capita <sup>9</sup> [2]	7,179	USD per capita/yr	4
Population below the poverty line <sup>10</sup> [3]	8.0	% below USD 1.90 per day	43
Gender Inequality Index <sup>11</sup> [4]	51.4		30
GINI co-efficient <sup>12</sup> [3]	42.2		30
HDI <sup>13</sup> [5]	0.70		7
Access to electricity <sup>14</sup> [6]	89.5	% population	9

1 Worldometers, 2017: <http://www.worldometers.info/population/countries-in-africa-by-population/>

2 Worldometers, 2017: <http://www.worldometers.info/population/countries-in-africa-by-population/>

3 Worldometers, 2017: <http://www.worldometers.info/population/countries-in-africa-by-population/>

4 Worldometers, 2017: <http://www.worldometers.info/population/countries-in-africa-by-population/>

5 Worldometers, 2017: <http://www.worldometers.info/population/countries-in-africa-by-population/>

6 World Bank, 2016: <http://databank.worldbank.org/data/home.aspx>

7 World Bank, 2016: <http://databank.worldbank.org/data/home.aspx>

8 World Bank, 2016: <http://databank.worldbank.org/data/home.aspx>

9 World Bank, 2016: <http://databank.worldbank.org/data/home.aspx>

10 African Economic Outlook, 2005: <http://www.africaneconomicoutlook.org/en/statistics>

11 African Economic Outlook, 2014: <http://www.africaneconomicoutlook.org/en/statistics>

12 African Economic Outlook, 2005: <http://www.africaneconomicoutlook.org/en/statistics>

13 Human Development Report 2016, 2015:  
[http://hdr.undp.org/sites/default/files/2016\\_human\\_development\\_report.pdf](http://hdr.undp.org/sites/default/files/2016_human_development_report.pdf)

14 World Bank, 2014: <http://databank.worldbank.org/data/home.aspx>



VARIABLE		SCORE/TOTAL	UNIT	RANK (OUT OF 54)
Summary indicators of climate change vulnerability				
Workforce in agriculture <sup>15</sup> [7]		24.2	% workforce	34
Population undernourished <sup>16</sup> [8]		5.0	% population	36
Number of people affected by flood events <sup>17</sup> [9]		77,845	people	39
Population living within 100 km of coast <sup>18</sup> [10]		894,068	people	31
Workforce in agriculture <sup>19</sup> [7]		24.2	% workforce	34
Population undernourished <sup>20</sup> [8]		5.0	% population	36
ND-Gain Vulnerability Index[10]	Total	52.6		5
	Readiness	0.45		9
	Vulnerability	0.39		51

<sup>15</sup> International Labour Organization, 2005:

<https://www.indexmundi.com/facts/indicators/SL.AGR.EMPL.ZS/rankings/africa>

<sup>16</sup> World Bank, 2015: <http://databank.worldbank.org/data/home.aspx>

<sup>17</sup> Emergency Events Database, 1996-2016: [http://emdat.be/emdat\\_db/](http://emdat.be/emdat_db/)

<sup>18</sup> Socioeconomic Data and Applications Center, 2010: <http://sedac.ciesin.columbia.edu/data/set/nagdc-population-landscape-climate-estimates-v3/data-download>

<sup>19</sup> International Labour Organization, 2005:

<https://www.indexmundi.com/facts/indicators/SL.AGR.EMPL.ZS/rankings/africa>

<sup>20</sup> World Bank, 2015: <http://databank.worldbank.org/data/home.aspx>

## 2. CLIMATE AND WEATHER

Gabon has a moist, hot tropical climate, with a slight bimodal rainy season. The first peak in rainfall occurs from March - May and the second in October - November with a relatively dry season during June - August.

Climate variations within Gabon are minor, and no sub-regions are distinguished here. The Gabon region is illustrated in Figures 2-1 and 2-2, below, and summary descriptions can be found in Table 2-1 below.

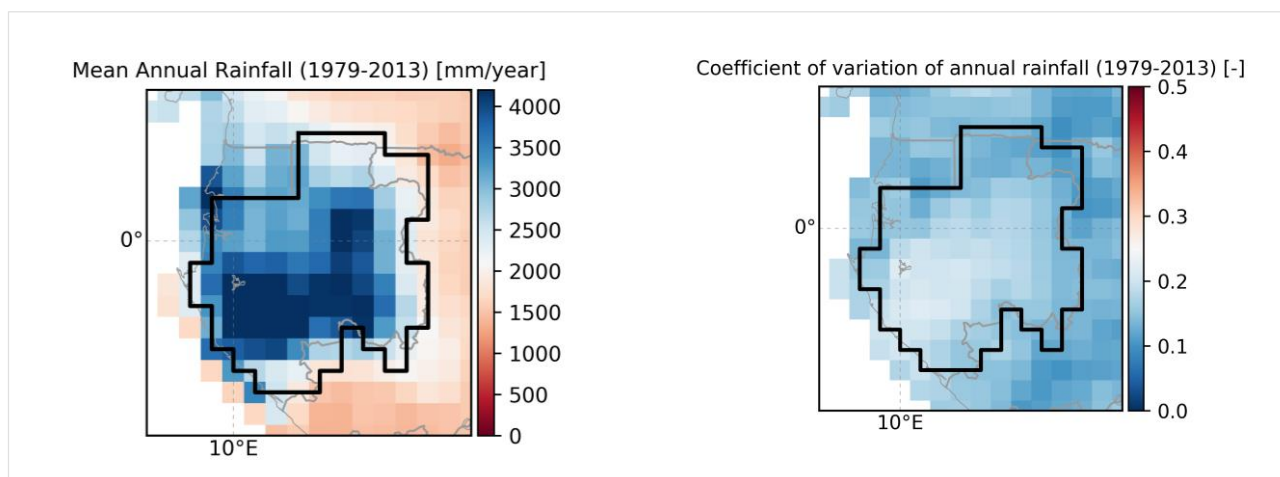
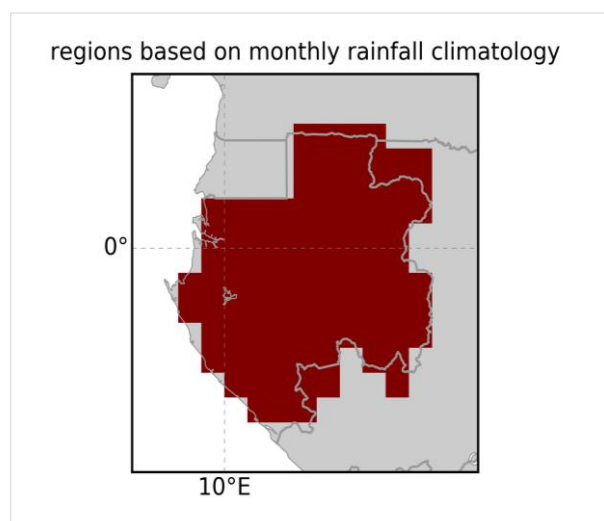


Figure 2-1: Main characteristics (magnitude and variability) of rainfall in Gabon and its region



Coloured regions on the map (above) correspond to the colours used in rainfall and temperature graphs (below)

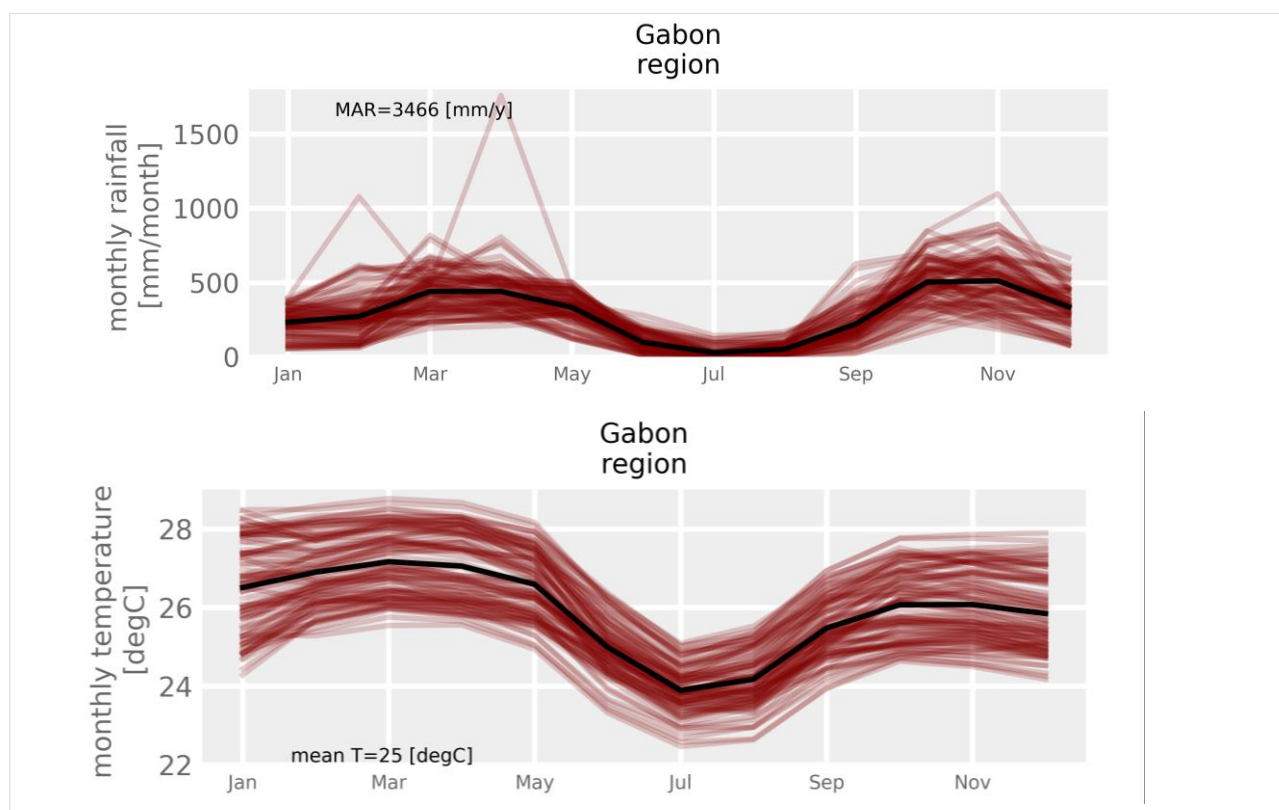


Figure 2-2: Rainfall regions of Gabon its rainfall and temperature climatologies

Table 2-1: Main characteristics of rainfall of Gabon region

<b>GABON REGION</b>	warm tropical climate where the daily mean temperature is 25° C and mean annual rainfall reaching 3470 mm/year with highest values and lowest interannual variability occurring over the central parts and lower values and higher interannual variability along the borders. A relatively dry period occurs between June to August and rainfall peaks around 500mm/month during March - May and October - November. The seasonal variation in temperature is very small (~3° C), with slightly warmer temperatures during February-April and coolest temperatures in July and August.
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## 2.1 Observed historical climate variations and climate trends

The majority of Gabon experiences **relatively low rainfall variability** on an inter-annual basis. On **decadal time scales** Gabon also experiences variability with some periods being relatively drier or wetter than others. This variability can be seen in the supporting evidence plots provided in the supplementary Appendix (**Figures A-1 to A-4**). Long term trends for the region show **increasing**

**temperatures** over the period 1979 - 2015. A long term trend in total annual rainfall is relatively strong although not statistically significant. The long-term increase in total rainfall is associated with the increase in rainfall frequency and extreme rainfall frequency, however this is not statistically significant. Long term trends and variability in the Gabon region are summarized in **Table 2-2** below and illustrated further in the supplementary Appendix (**Figures A-1 to A-4**).



Table 2-2: Summary of trends in rainfall and temperature attributes in Gabon (1979 - 2015)

REGION	MEAN T [DEG C/DECADE]	TOTAL RAINFALL [MM/DECADE]	EXTREME RAINY DAYS [DAYS/DECADE]	RAINY DAYS [DAYS/DECADE]
Gabon	+0.13	upward	+1.2	upward

## 2.2 Projected (future) climate change trends, including temperature, precipitation and seasonality

Projected changes in main attributes of climate for the Gabon region are summarized in Table 2-3, below, and described in Sections 2.2.1 and 2.2.1. Additional analysis and visualisation of projections be found in Figures A-5 to A-8 in the supplementary Appendix.

### 2.2.1 Projected changes in precipitation from present to 2100

Rainfall projections for the Gabon region show no consistent signal in the potential change in rainfall totals. There is a possibility for an **increase in high intensity rainfall events** but not in the frequency of

all rainy days. It must be noted that these results are derived from GCM projections which may not accurately represent changes in extreme rainfall dynamics. They are, however, consistent with the increased convective rainfall intensity (e.g. thunderstorm-related rainfall) expected in a warmer climate.

### 2.2.2 Projected changes in temperature from present to 2100

**Air temperature** is projected to be about 1 to 2.5°C warmer for the Gabon region by the 2050s. By 2100 the range of projected temperatures is greater showing projected increases of 3°C to 5°C.

Table 2-3: Summary of projected climate changes across regions of Gabon for key climate variables by 2050

REGION	AVERAGE TEMPERATURE [°C]	TOTAL ANNUAL RAINFALL [MM/YEAR]	NUMBER OF HEAVY RAINFALL [DAYS/YEAR]	RAINY DAYS [DAYS/YEAR]
Gabon region	Increasing +1°C to +2.5°C by 2050s but changes evident in next decades	No consistent signal in projections	Normal to Increasing, ranging from no change to an increase of up to 80%. Change could become evident in the 2050s	No consistent signal in projections

## 2.3 Expected climate vulnerabilities

NOTE: Determining vulnerability of different sectors to climate variations or change is extremely challenging as there are many factors involved in vulnerability and different approaches can yield different results. The vulnerabilities presented here are based on UNFCCC reporting documents such as national communications or national adaptation plans of action where available, and other literature where UNFCCC documents are not available. Additional detailed adaptation priorities and strategies can be found in Gabon's *Plan National*

*Climat* 'PLAN NATIONAL CLIMAT GABON'<sup>21</sup>.

Located on the equator at the Atlantic coast of central Africa, vast areas of Gabon are covered by extensive rainforests. Possible increase in extreme rainfall events, coupled with increasing temperatures, may stand to complicate access to safe drinking water as well as impact the agricultural sector, which engages just under a third of the Gabonese population. With a high GDP, owing largely to the oil and mining industries, earnings are unevenly distributed with a about a third of the population living in poverty. Such inequalities imply that people's capacity to adapt to

<sup>21</sup> <http://conseilnationalclimat.com/wp-content/uploads/2017/10/PLAN-CLIMAT.pdf>

increasing temperatures and more extreme rainfall varies widely, with a substantial amount of people with limited capacity to adapt. The large majority of the population lives in urban areas, of which around a third reside in informal settlements. People in the urban informal settlements lack proper access to

critical services such as health care, water supply and proper housing, deeming them particularly vulnerable to extreme temperatures and rainfall events, as well as to the slower knock-on effects that climate change may have on the economy.

Table 2-4: Broad scale sectoral vulnerabilities and potential climate change impacts in Gabon

SECTOR	IMPACTS
<b>Agriculture</b>	– None specified
<b>Fisheries</b>	<ul style="list-style-type: none"> <li>– Changes in fish location and numbers</li> <li>– Changes in fishing activities required</li> </ul>
<b>Water resources</b>	<ul style="list-style-type: none"> <li>– Increased salinization of the water table owing to increased flooding</li> <li>– Increased salinization leading to changes in the landscape and land uses in coastal areas</li> </ul>
<b>Built infrastructure and human settlements</b>	<ul style="list-style-type: none"> <li>– Loss of coastal land areas</li> <li>– Damage to or destruction of coastal infrastructure, including roads and businesses, due to flooding</li> <li>– Developments and expansion plans halted or cancelled</li> </ul>
<b>Human health</b>	<ul style="list-style-type: none"> <li>– Increased prevalence of vector-borne diseases, owing to Increased flood occurrence</li> <li>– Increased malnutrition and food insecurity, owing to reduced access to local food products</li> <li>– Increased prevalence of water-borne diseases owing to increased challenges to waste water management</li> </ul>

### 3. CLIMATE CHANGE MITIGATION, GREENHOUSE GAS EMISSIONS AND ENERGY USE

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The major carriers of Gabon's energy mix, and the energy demands of major economic sectors, are summarised in Section 3.1, below. The major sources of GHG emissions, described by fuel source and sector, are described in Section 3.2. The latter section also includes summarised statistics on Gabon's agriculture sector, historical land use change and vegetation cover.

#### 3.1 National energy production and consumption

The energy sector of Gabon is characterised by a split between the commercial fossil fuel industry that drives the formal economy and the domestic use of biofuels. Gabon, an OPEC member, is one of the largest oil-producing countries in sub-Saharan Africa and oil accounts for ~74% of the country's national energy production. Together, gas and hydropower contribute over 70% of Gabon's electricity supply, however, only contribute ~1.7% and ~0.4% respectively to national energy production, indicating that electricity only accounts for a small share of total national energy production. Despite the large contribution of oil exports to GDP, oil products contribute only ~17% to total national energy

consumption while the remaining majority of national energy consumption is provided by biofuels (~79%) in the domestic sector. This split between Gabon's formal and informal energy sectors is further reflected in the distribution of national energy consumption between sectors. Industry accounts for the largest proportion of energy consumption (67%), followed by the residential sector (25%). The total annual GHGs emitted by the abovementioned sectors and fuel carriers are described further in Section 3.2.

Unless stated otherwise, all energy figures are derived from UN Stats (2014) [10]; World Energy Council (2016); [11]; and the World Resources Institute (2013) [12]. Agriculture & forestry-related emissions are also reported from Food and Agriculture Organisation (2014-2017) [14] and Global Forest Watch. (2015-2017) [15].

##### 3.1.1 National energy production, primary energy supply and national energy consumption

The tables and figures below describe Gabon's energy sector, including total national energy production, primary energy supply and national energy consumption by fuel carrier and sector.

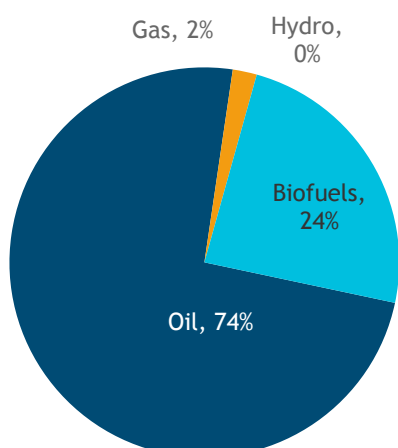


Figure 3-1: Distribution of Gabon's national energy consumption by major energy carriers (2014-2016)

Table 3-1: National energy and electricity production in Gabon (2014-2016)

NATIONAL ENERGY PRODUCTION		
Source	Total (MTOE) <sup>22</sup>	% of total energy production
Oil <sup>23</sup>	11.8	74.3
Gas <sup>24</sup>	0.3	1.7
Hydro <sup>25</sup>	0.1	0.4
Biofuels <sup>26</sup>	3.7	23.5
Total national energy production <sup>27</sup>	15.9	
Electricity <sup>28</sup> [6]	Hydro	33.6
	Non-Hydro renewable	0.51
	Oil	27.0
	Gas	38.9

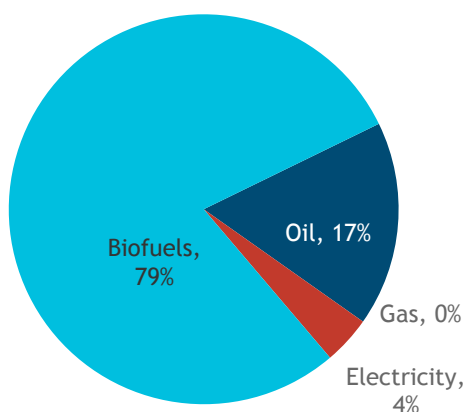


Figure 3-2: Distribution of Gabon's national energy consumption by major energy carriers (2014-2016)

Table 3-2: Gabon's national energy consumption by energy source

CONSUMPTION BY ENERGY SOURCE [11]	
Source	Total (MTOE)
Oil	0.8
Gas	0.0
Biofuels	3.7
Electricity	0.2
Total national energy consumption by source	4.7

<sup>22</sup> Energy is expressed in 'Megatonnes of Oil Equivalent', where 1 Tonne Oil Equivalent = 11,630 KiloWatt hours (KWh)

<sup>23</sup> IEA, 2014: [www.iea.org/statistics/statisticssearch/](http://www.iea.org/statistics/statisticssearch/)

<sup>24</sup> IEA, 2014: [www.iea.org/statistics/statisticssearch/](http://www.iea.org/statistics/statisticssearch/)

<sup>25</sup> IEA, 2014: [www.iea.org/statistics/statisticssearch/](http://www.iea.org/statistics/statisticssearch/)

<sup>26</sup> IEA, 2014: [www.iea.org/statistics/statisticssearch/](http://www.iea.org/statistics/statisticssearch/)

<sup>27</sup> IEA, 2014: [www.iea.org/statistics/statisticssearch/](http://www.iea.org/statistics/statisticssearch/)

<sup>28</sup> World Bank, 2014: <http://databank.worldbank.org/data/home.aspx>

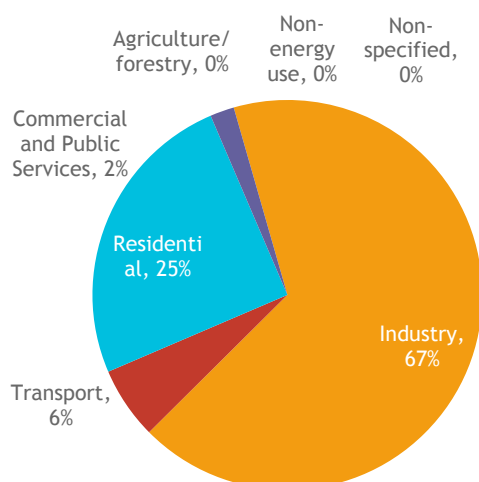


Figure 3-3: Distribution of Gabon's national energy consumption by sector (2014-2016)

Table 3-3: Gabon's national energy consumption by sector (2014-2016)

CONSUMPTION BY SECTOR <sup>29</sup>	
Sector	Total (MTOE)
Industry	3.1
Transport	0.3
Residential	1.2
Commercial and public services	0.1
Agriculture / forestry	0.0
Non-specified	0.0
Non-energy use	0.0
Total national energy consumption by sector	4.7

Table 3-4: Gabon's national total primary energy supply (estimated for 2014-2016)

TOTAL PRIMARY ENERGY SUPPLY <sup>30</sup>		
Source		Total (MTOE)
Oil	Crude Oil	0.8
	Oil Products	0.1
Gas		0.3
Hydro		0.1
Biofuels		3.7
Electricity		0.03
Total primary energy supply		5.1

### 3.2 National greenhouse gas emissions by source and sector

Oil is the largest contributor to Gabon's greenhouse

gas (GHG) emissions from fuel combustion (~2 MT CO<sub>2</sub>e), followed by gas (~0.8 MT CO<sub>2</sub>e) (IEA, 2013). The sector that accounts for the largest proportion of national GHG emissions is the energy sector (6.3 MT

<sup>29</sup> IEA, 2014: [www.iea.org/statistics/statisticssearch/](http://www.iea.org/statistics/statisticssearch/)

<sup>30</sup> IEA, 2014: [www.iea.org/statistics/statisticssearch/](http://www.iea.org/statistics/statisticssearch/)

CO<sub>2</sub>e), and within that sector, fugitive emissions (~2.5 MT CO<sub>2</sub>e), followed by manufacturing and construction (~1.2 MT CO<sub>2</sub>e), and electricity and heat (~1 MT CO<sub>2</sub>e). The land use change and forestry sector has negative emissions (-94 MT CO<sub>2</sub>e) - meaning that more emissions are absorbed by carbon sinks in the AFOLU sector than are released by land use change and biomass fuels. Because of this, Gabon has net negative GHG emissions (-86 MT CO<sub>2</sub>e) (CAIT, 2013).

Section 3.2.1, below, describes GHG emissions from fuel combustion - these figures include direct combustion of fuels as a primary energy carrier as well as conversion to other forms of energy (e.g. as electricity). The figures are based on statistics from the International Energy Agency (IEA). Section 3.2.2, further below, describes GHG emissions from all

sectors of national energy consumption, which therefore includes emissions from fuel combustion, industrial/manufacturing processes, household-level energy consumption and AFOLU (Agriculture, Forestry and Other Land Use). The latter figures are compiled by the World Resources Institute's Climate Access Indicator Tools (CAIT), which employs different methodologies and reporting standards to the IEA. Therefore, while there is some resultant duplication between the two datasets, each provides slightly different approaches to categorisation of major GHG emitting sectors and are both included for consideration. Section 3.2.3 provides additional details on Gabon's Land Use and Land Use Change sector, including detailed summaries of emissions from the agriculture sector and historical land use changes.

### 3.2.1 GHG emissions from fuel combustion, by source and sector

Table 3-5: Gabon's national greenhouse gas emissions from fuel combustion

NATIONAL GHG EMISSIONS FROM FUEL COMBUSTION BY FUEL SOURCE AND SECTOR <sup>31</sup>		
Source / Sector		Total emissions (MT CO <sub>2</sub> e)
Oil		2.0
Gas		0.8
Total fuel source emissions		2.8
Electricity and heat production		1.1
Other energy industry own use*		0.0
Manufacturing industries and construction		0.9
Road transport		0.6
Other	Residential	0.2
	Non-residential	0.1
	Total	0.3
Total sector emissions		2.8

\* Includes emissions from own use in petroleum refining, the manufacture of solid fuels, coal mining, oil and gas extraction and other energy-producing industries.

### 3.2.2 GHG emissions from primary energy consumption, by source and sector

Table 3-6: Gabon's national greenhouse gas emissions from primary energy consumption (estimated for 2014-2016)

<sup>31</sup> IEA, 2013: [www.iea.org/statistics/statisticssearch/](http://www.iea.org/statistics/statisticssearch/)



### NATIONAL GHG EMISSIONS FROM PRIMARY ENERGY CONSUMPTION BY SOURCE AND SECTOR<sup>32</sup>

Source / Sector		Total emissions (MT CO <sub>2</sub> e)
Energy	Electricity and heat	1.0
	Manufacturing and construction	1.2
	Transport	0.8
	Other fuel combustion	0.7
	Fugitive emissions	2.5
	Energy sub-total	6.2
Industrial processes		0.1
Agriculture		0.5
Waste		0.5
Land use change and forestry (LUCF)		-94.0
Total emissions (including LUCF)		-86.6

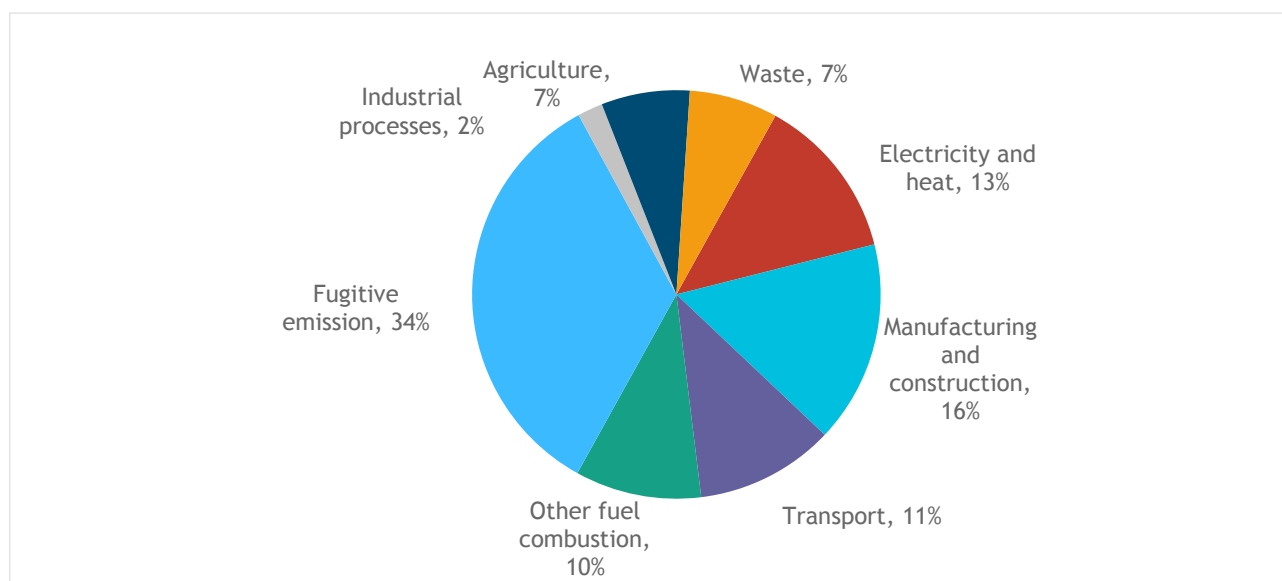


Figure 3-4: Distribution of Gabon's GHG emissions by major energy sectors (excluding LUCF which has negative emissions)

### 3.2.3 GHG emissions from agricultural practices

Table 3-7, below, summarises GHG emissions from Gabon's agriculture sector (derived from Food and

Agriculture Organisation statistics). Very few agricultural practices contribute to GHG emissions, except for burning savanna (0.2 MT CO<sub>2</sub>e), enteric fermentation (0.1 MT CO<sub>2</sub>e) and manure left on

<sup>32</sup> WRI CAIT, 2013: <http://cait.wri.org/>

pastures (0.1 MT CO<sub>2</sub>e), which all contribute very little.

Table 3-7: National annual greenhouse gas emissions from agricultural practices, forestry and other land use in Gabon (estimated for 2014-2017)

VARIABLE		ANNUAL EMISSIONS (MT CO <sub>2</sub> E)	YEAR AND REFERENCE
Annual GHG emission from agricultural practices <sup>33</sup>	Burning - crop residues	0.0	2014, Food and Agricultural Organisation
	Burning - savanna	0.2	
	Crop residues	0.0	
	Cultivation of organic soils	0.0	
	Enteric fermentation	0.1	
	Manure management	0.0	
	Manure applied to soils	0.0	
	Manure left on pasture	0.1	
	Rice cultivation	0.0	
	Synthetic fertilizers	0.0	
	Sub-total (Agricultural practices)	0.4	
	Grassland	0.0	
Annual GHG emission from land use change <sup>34</sup>	Cropland	0.4	
	Forest land	-94.6	
	Burning biomass	0.0	
	Sub-total (Land use change)	-94.2	
Total emissions		-93.7	

<sup>33</sup> FAO, 2014: <http://www.fao.org/faostat/en/#data>

<sup>34</sup> FAO, 2014: <http://www.fao.org/faostat/en/#data>

Table 3-8, below, summarises the recent historical changes in land use in Gabon through analysis of land use change. Statistics derived from the Global Forest Watch database were used to summarise the total area of wooded vegetation in various categories of canopy cover density (where 10-30% canopy cover can be considered as savanna, 30-50% cover can be

considered woodland and 50-100% cover can be considered dense forest), as well as the historical rates of change in each vegetation category. Global Forest Watch reports the total aboveground carbon stock of Gabon's forest biomass as ~2,966.2 million tonnes.

Table 3-8: Vegetation cover and land use change in Gabon (estimated for 2015)

VARIABLE		TOTAL (HECTARES)	TOTAL (% OF LAND AREA)	UNIT
Total tree cover [15]	10-30% canopy cover	1,210,162	4.52	% of total land area
	30-50% canopy cover	517,067	1.9	
	50-100% canopy cover	23,844,698	89.1	
	Total	25,571,926	95.5	
Land use change and agricultural expansion	Historical annual rate of deforestation <sup>35</sup>	10-30% canopy cover	0.0	% of previous year
		30-50% canopy cover	0.2	
		50-100% canopy cover	0.1	
	Area of agricultural land <sup>36</sup>	5,361,430	20.0	% of total land area

<sup>35</sup> Derived from Global Forest Watch Data, Mean 2001-2014: <http://www.globalforestwatch.org/>

<sup>36</sup> FAO, 2011: <http://www.fao.org/faostat/en/#data>

## 4. SUMMARISED NATIONAL PRIORITIES FOR CLIMATE CHANGE ADAPTATION AND MITIGATION

Gabon's main priority actions related to climate change are described in the country's submissions to the UNFCCC through the Intended Nationally Determined Contributions (NDC) document. The document includes detailed descriptions of the country's major commitments and priorities related to GHG mitigations (Table 4-2, below) as well as major priorities related to adaptation, derived from the draft National Adaptation Plan (NAP) (Table 4-3, further below).

Gabon commits to reduce GHG emissions by at least 50 percent from baseline scenario emissions in 2025. The commitment could be extended to 2030 and 2050 based on additional studies that will be carried out by COP21. The commitment is to be achieved excluding carbon stocks from forests from the target. Gabon also submitted annexes describing land-use change, flaring

from the oil industry, energy, other GHG emissions such as waste, adaptation, and financing.

The NDC of Gabon provides detailed 'baseline' and 'conditional' scenarios for GHG emissions from various activities within the energy, industrial and waste sectors. While Gabon notes the need to establish domestic and international financial mechanisms to support the adoption of the country's various objectives for adaptation and mitigation, no detailed cost estimates are provided. Table 4-1, below, gives details on Gabon's GHG reduction targets outlined in the country's NDC, with information on target gases and sectors, the use of international markets in achieving targets (e.g. the use of carbon credits), and accounting methods used to quantify GHG emissions (e.g. inclusion of land use and land use change).

Table 4-1: Summary of Gabon's NDC commitments for reduction of GHG emissions

GHG EMISSIONS REPORTED IN NDC (MT CO <sub>2</sub> E/YR)	BASE LEVEL	REDUCTION TARGET	TARGET YEAR	SECTORS AND GASES	USE OF INTERNATIONAL MARKETS	LAND-USE INCLUSION / ACCOUNTING METHOD
6.95	BAU	50 percent	2025	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O (HFC, PFC, SF <sub>6</sub> and NF <sub>3</sub> are covered later); All sectors excluding forest biomass	No	Land sector and biomass excluded

### 4.1 National priorities for climate change mitigation

The NDC of Gabon includes mitigation priorities for sectors including inter alia Energy, Transport, and AFOLU. Proposed activities and investments within each sector are further categorised according to 'Technology Type', based on the categories of technologies listed by the Green Climate Fund's (GCF) impact indicators for mitigation projects (key for technology types provided below Table 4-2). In the energy sector, the actions identified in Gabon's NDC include a focus on reducing emissions through reduced flaring of gas during petrochemical processing, promotion of renewable energy (including village-level solar electrification as well as increased use of

hydroelectricity to supply the national grid), and the development of a national-scale GHG inventory and monitoring tool. In the AFOLU sector, Gabon's mitigation priorities focus on inter alia enhanced forest protection and adoption of increased forestry rotational cycles (through policy measures such as the National Land Use Plan and the Code Forestiere), expansion of the protected area network (through establishment of 13 national parks) and the introduction of measures to protect estuary ecosystems. Gabon's priorities for the transport sector are relatively undetailed but are focused on reducing emissions from road transports and include measures to promote efficient urban transport and restrict the importation of older vehicles.

Table 4-2: Mitigation priorities in Gabon's NDC

PRIORITY SECTOR	SECTOR-SPECIFIC ACTION	TECHNOLOGY TYPE <sup>37</sup>
AFOLU	Adoption of a forestry code ("Code Forestier") to increase forestry rotation cycles from 15 to 25 years.	4, 9
	Creation of 13 national parks	
	Introduction of regulations on estuaries	
	Development of the National Land Use Plan to preserve forests	
	Prohibit export of wood logs	
Energy	Increased energy efficiency of the economy	1, 3, 5
	Develop low carbon production facilities	1, 6
	Ensure that by 2025 electricity supply is generated by 80% hydroelectricity and 20% gas	1, 6
	Develop a solar electrification plan for isolated villages to improve access to energy in rural areas without the use of fossil fuels	1, 6
	Reduce flaring through the Zero Routine Flaring by 2030 initiative	5
	Development of national carbon diagnostic tool	5
	Development of renewable energy	1, 3, 6
Transport	Ban on import of vehicles over 3 years old	2, 8
	Develop infrastructure, road networks and public transport to prevent congestion	1, 5, 8

<sup>37</sup> \*GCF Technology Type Key (derived from GCF's Results Framework for mitigation)

1. Reduced emissions through increased lower emission energy access and power generation.
2. Reduced emissions through increased access to low-emission transport.
3. Reduced emissions from buildings, cities, industries and appliances.
4. Reduced emissions from land use, deforestation, forest degradation, and through sustainable management of forests and conservation and enhancement of forest carbon stocks.
5. Strengthened institutional and regulatory systems for low-emission planning and development.
6. Increased number of small, medium and large low-emission power suppliers.
7. Lower energy intensity of buildings, cities, industries, and appliances.
8. Increased use of low-carbon transport.
9. Improved management of land or forest areas contributing to emissions reductions.

## 4.2 National priorities for climate change adaptation

Gabon's climate change adaptation priorities are strongly focused on increased protection and sustainable management of the coastal zone. Gabon's adaptation priorities for the coastal zone include inter alia the adoption of policy measures such as the National Strategy for Coastal Adaptation and the implementation of a management plan for coastal

urban environments; conservation and protection of coastal ecosystems such as mangroves and turtle-nesting sites; and promotion of sustainable income-generating activities for coastal communities. In addition, improved waste management is noted as an adaptation priority. These actions are categorised according to 'Technology Type', based on the categories of technologies listed by the Green Climate Fund's (GCF) impact indicators for adaptation projects (key for technology types provided below Table 4-3).

Table 4-3: Adaptation priorities in Gabon's NDC

PRIORITY SECTOR	SECTOR-SPECIFIC ACTION	TECHNOLOGY TYPE <sup>38</sup>
Coastal zone	Adoption of a National Strategy for Coastal Adaptation, through measures aimed at the integrated management of the coastal zone, establishment of an appropriate legal framework, and the acquisition of monitoring tools and training and information	4, 5, 7
	Implementation of a management plan for the coastal urban environment	5
	Promotion of income generating activities linked to marine and coastal ecosystems	1, 7
	Development of a scheme for mangrove conservation projects for coastal protection, protection of species, establishment of specific facilities for reception and management of waste, monitoring of nesting of turtles	1, 4
	Creation of a coastal and marine environment observatory	6, 8
	Create protection measures on the coast for areas particularly exposed by creating physical barriers and rehabilitation works on the banks	3, 7
Waste	Management of waste	2, 4

<sup>38</sup> \*GCF Technology Type Key (derived from GCF's Results Framework for adaptation)

1. Increased resilience and enhanced livelihoods of the most vulnerable people, communities, and regions.
2. Increased resilience of health and wellbeing, and food and water security
3. Increased resilience of infrastructure and the built environment to climate change threats
4. Improved resilience of ecosystems and ecosystem services
5. Strengthened institutional and regulatory systems for climate responsive planning and development
6. Increased generation and use of climate information in decision making
7. Strengthened adaptive capacity and reduced exposure to climate risks
8. Strengthened awareness of climate threats and risk reduction processes



## 5. ASSUMPTIONS, GAPS IN INFORMATION AND DATA, DISCLAIMERS

### *Additional National references and resources for information:*

Gabon's National Climate Plan (Plan National Climat) <http://conseilnationalclimat.com/wp-content/uploads/2017/10/PLAN-CLIMAT.pdf>

National Adaptation Programme of Action (NAPA) Programme d'action national d'adaptation (PANA) présenté à la CCNUCC. [http://unfccc.int/cooperation\\_support/least\\_developed\\_countries\\_portal/submitted\\_napas/items/4585.php](http://unfccc.int/cooperation_support/least_developed_countries_portal/submitted_napas/items/4585.php)

National Communications to the UNFCCC (Communication nationale présentée à la CCNUCC). [http://unfccc.int/national\\_reports/non-annex\\_i\\_natcom/items/2979.php](http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php)

The observed and projected climate trends described in Section 2 'Climate and Weather' are derived from a combination of publicly-available observational data and CMIP5 climate models. Detailed information is included in Section 6. Appendix 1, including '6.1.b. Historical Trends and Variability Analysis' and '6.1.c. Climate Projections Visualisations'.

Unless stated otherwise, all statistics reported in Section 1 ('Geographic and Socio-Economic Context' and Section 3 'Climate change mitigation, greenhouse gas emissions and energy use') are derived from databases of publicly available datasets managed by international or multilateral agencies including inter alia The World Bank Group, the United Nations, World Resources Institute and International Energy Agency.

Unless stated otherwise, all energy and greenhouse gas emission figures are derived from UN Stats (2014); World Energy Council (2016); the World Resources Institute (2013), and the International Energy Agency (2016). Agriculture & forestry-related emissions are also reported from Food and Agriculture Organisation (2014-2017) and Global Forest Watch. (2015-2017).

Full references are provided as a supplementary appendix.

As a result of the use of standardised methodologies and data sources across the 25 countries included in this AfDB Climate Change Profile, statistics and estimates reported herein may differ from other publicly available datasets or national estimates. Readers are advised to always check for updated publications and newly released national datasets.

This AfDB Climate Change Profile series is intended to provide a brief touch-stone reference for climate change practitioners, project managers and researchers working in African countries. The figures and estimates provided herein are intended to inform the reader of the main climate-related challenges and priorities, however these should be used to inform a process of additional research and in-country consultations. The University of Cape Town, the African Development Bank and its Boards of Directors do not guarantee the accuracy of figures and statements included in this work and accept no responsibility for any consequences of its use.

## 6. APPENDIX 1

### 1.a Supporting evidence

The climate projections detailed in Chapter 2 (above) are supported by rigorous analysis of observed and model projections data. More details of this analysis and supporting figures can be found below.

### 1.b Historical trends and variability analysis

The analysis of historical trends and variability of key climate variables is presented below. This analysis uses the WATCH Climate Forcing dataset which has been selected as the most broadly representative of station observations across Gabon. Long term (1979 to 2013) trends as well as inter-annual variability (decade to decade) has been analysed for total annual rainfall, number of rainfall days, number of extreme

rainfall days, and daily mean temperatures for the climate region of Gabon. The plots below detail inter-annual variability (dotted lines), decadal variability (smooth bold solid curves) and long term trends (thin straight lines) for each region and statistic. This allows for comparison of different types of variability against the long term trend. It can be seen that for rainfall statistics, inter-annual and decadal variability are typically fairly large compared to long term trends. For example, for total annual rainfall, the region has very high inter-annual (2500mm in some years to 4200mm in other years) and moderate decadal variability (3200mm in some decades to 3700mm in other decades). Long term trends are not statistically significant but could be around 210mm over the 30 year period.

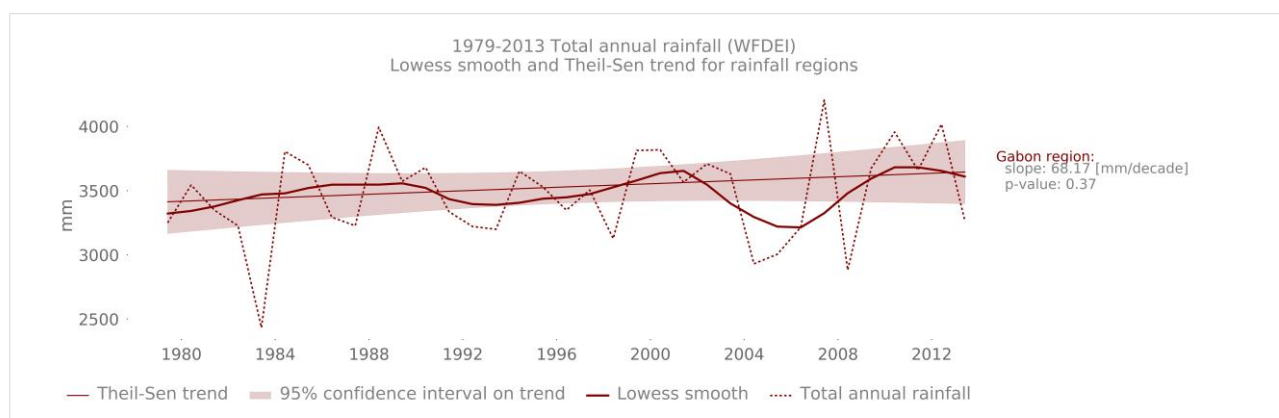


Figure A-1: Long term trends and variability in total annual rainfall for rainfall regions

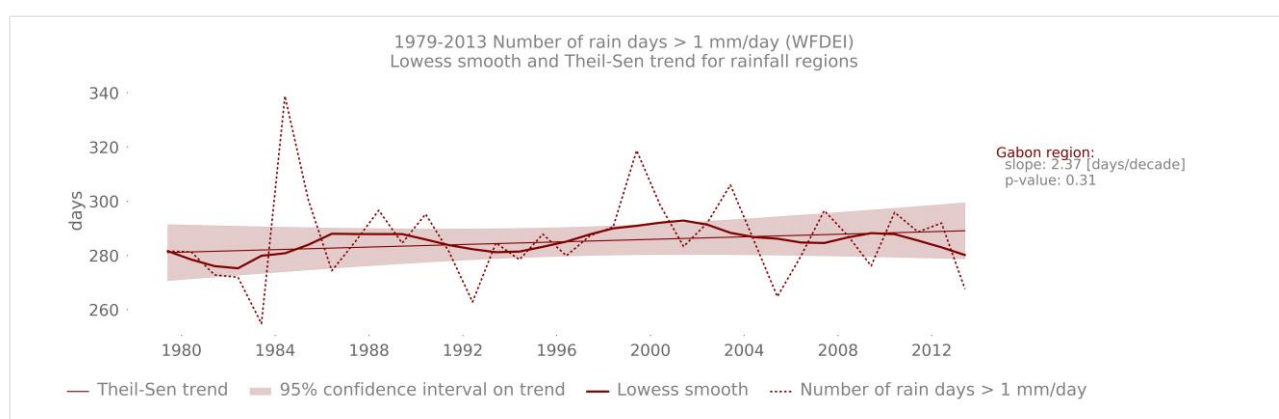


Figure A-2: Long term trends and variability in frequency of rainfall events for rainfall regions

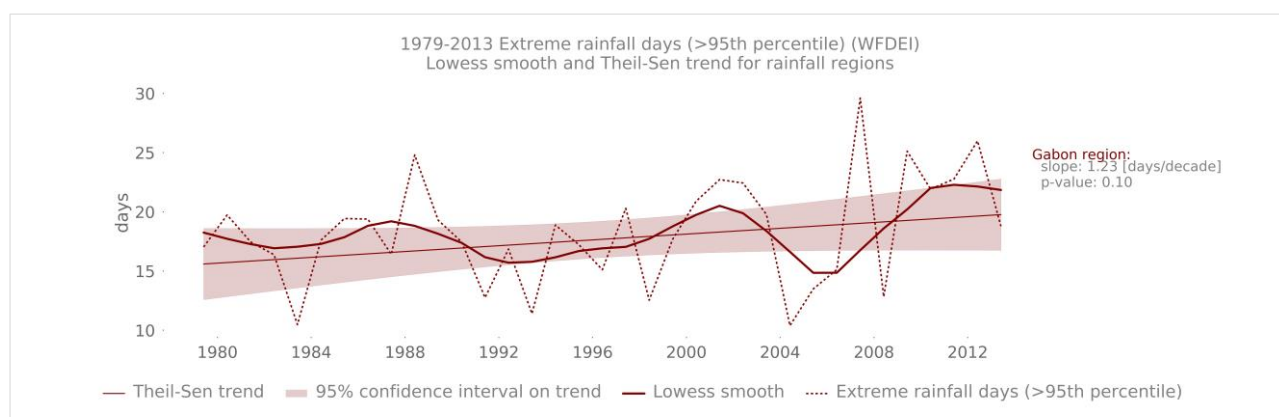


Figure A-3: Long term trends and variability in extreme rainfall events for rainfall regions

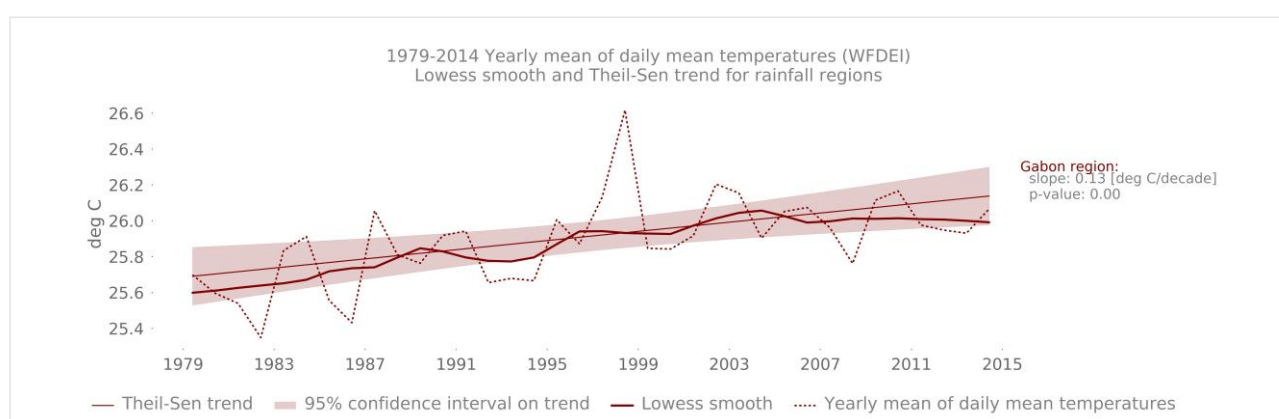


Figure A-4: Long term trends and variability in daily mean air temperatures for rainfall regions

### 1.c Climate projections visualizations

The plots below (Figures A-5 - A-8) are called plume plots and they are used to represent the different long term projections across the multiple climate models in the CMIP5 model archive used to inform the IPCC AR5 report. The plots show projected variations in different variables averaged over the climate regions. The blue colours indicate variations that would be considered within the range of natural variability, so in other words, not necessarily the result of climate change. The orange colours indicate projection time series where the changes would be considered outside

of the range of natural variability and so likely a response to climate change. It is important to note that these are global climate model projections and so likely do not capture local scale features such as topography and land ocean boundary dynamics. They also may not capture small scale features such as severe thunderstorms that can have important societal impacts. Finally, these projections are averages over relatively large spatial areas and it is possible that different messages would be obtained at small spatial scales and if various forms of downscaling are performed.

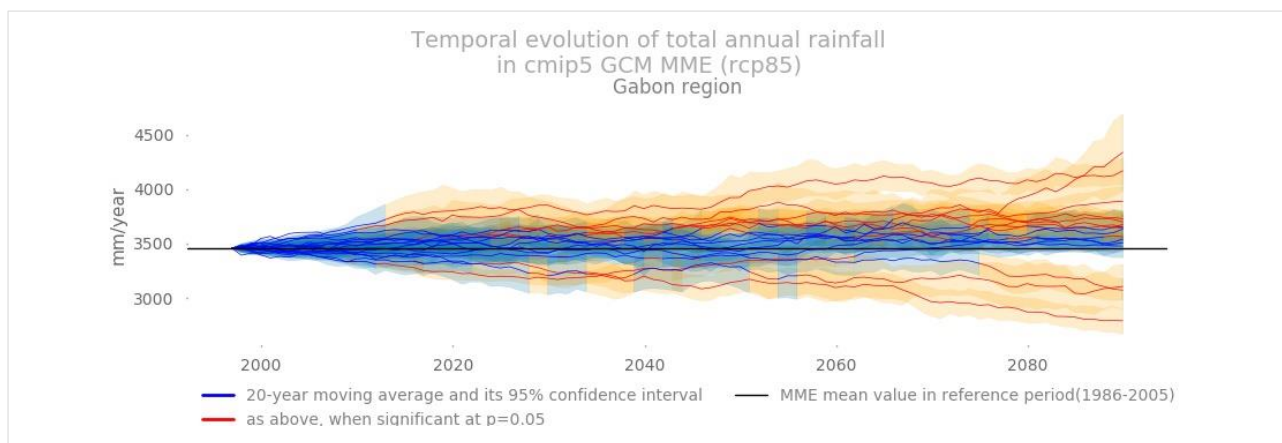


Figure A-5: Projected changes and emergence of changes in total annual rainfall

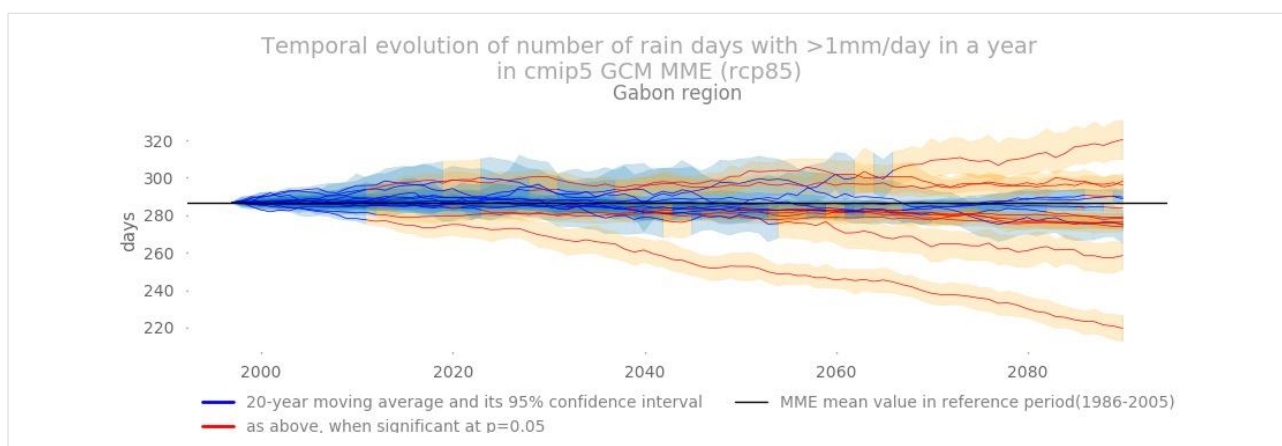


Figure A-6: Projected changes and emergence of changes in number of rain days per year

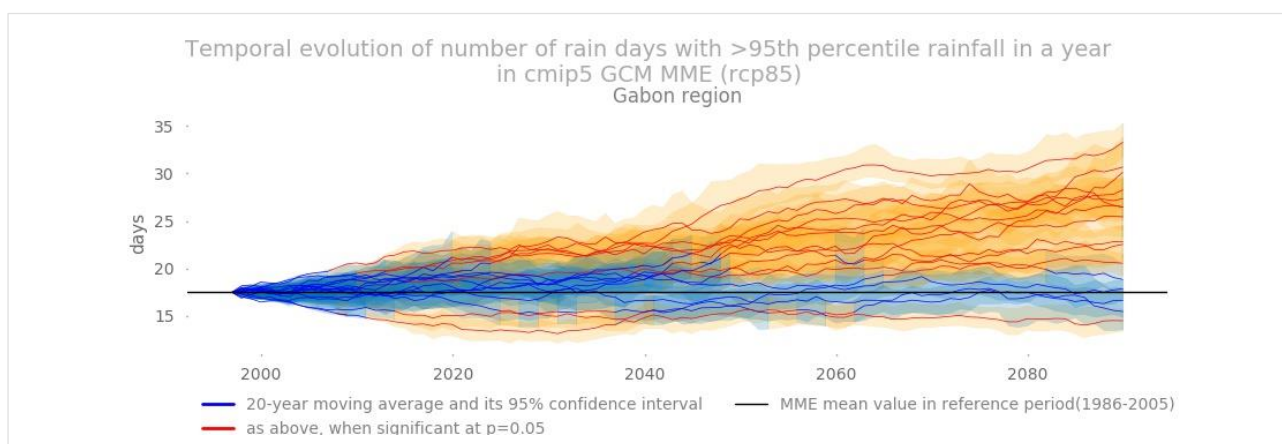


Figure A-7: Projected changes and emergence of changes in number of very heavy rainfall days (greater than 95<sup>th</sup> percentile) per year

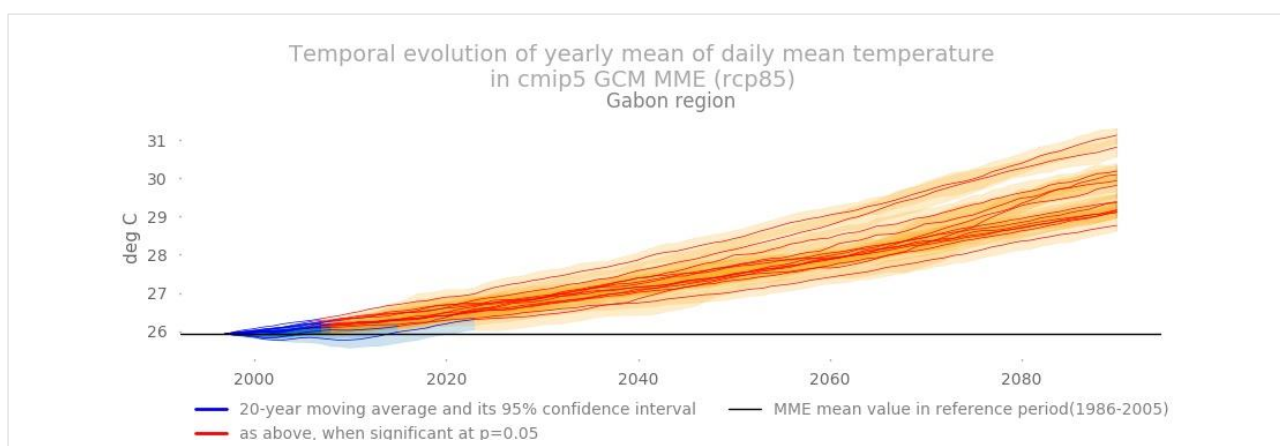


Figure A-8: Projected changes and emergence of changes in annual mean daily mean temperatures