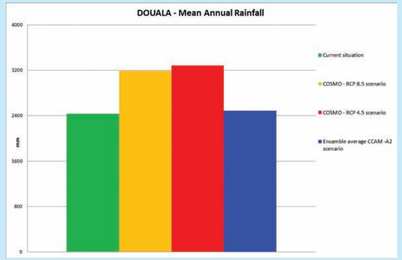
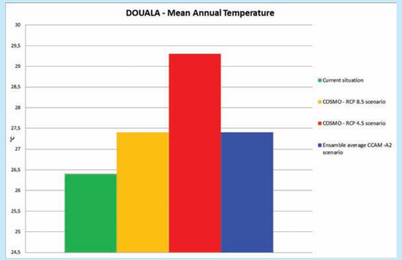
DOUALA
Cameroon

CLIMATE CHARACTERISTICS

Douala experiences a wet, tropical monsoonal climate, with the average total annual rainfall exceeding 3000 mm. Rainfall peaks during the boreal summer and autumn (June-November) when the monsoonal circulation dynamics are best developed. Average monthly temperatures are in the mid to high 20s throughout the year.
The results of climate simulations for the period 2010-2050 suggest that:
– mean annual rainfall could increase by 35% with respect to the current situation;
– an increase of mean annual temperature up to 2°C could occur.

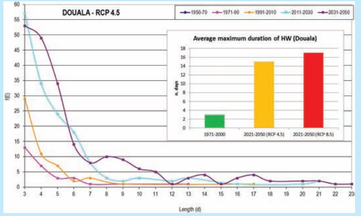




CLIMATE RELATED HAZARDS

Heat waves

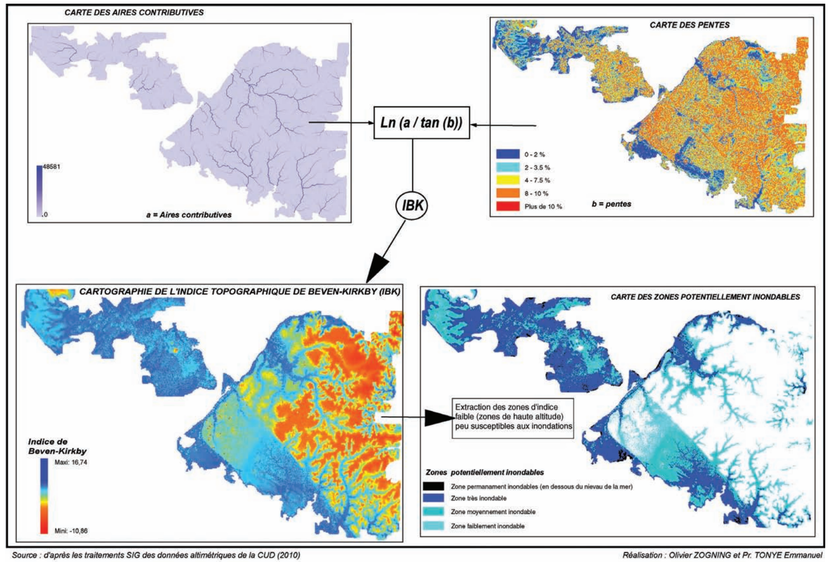
Analysis of climate projections for Douala reveals a strict correlation between heat wave duration and hot days number. The length of heat wave episodes shows a mean value increasing from 3 to 15 (RCP4.5)-17(RCP8.5) days.
The frequency distribution plot of hot days duration for four separate bi-decadal periods, according to the legend (see figure), shows the temporal change of heat wave characteristics. For example the number of events with maximum length lasting 5 days could increase from 3 to 34 (42 for RCP8.5) over 100 years (from 1950-70 to 2030-2050).
The expected persistence of long-lived heat waves lasting approximately 1.5-2 weeks is clearly longer with respect to the climatological period (1961-1990). During 100 years, short lived but more intense waves are more than doubled in duration. It is evident the needs for the national health services to develop strategies for the mitigation of the heat wave effects, to enhance the resilience of the population, particularly the elder people.



Average maximum duration of Heat Wave phenomena and frequency distribution plot of hot days duration for four separate bi-decadal periods.

Floods

The analysis of Extreme Rainfall Events, based on climate projections data until 2050, suggests that the intensity of the Extreme Rainfall Events is expected to decrease, although an increase of the frequency of Extreme Rainfall Events is envisioned.



Delineation of flood prone areas in Douala based on a geomorphological criterion.

Floods in Douala.

Drought

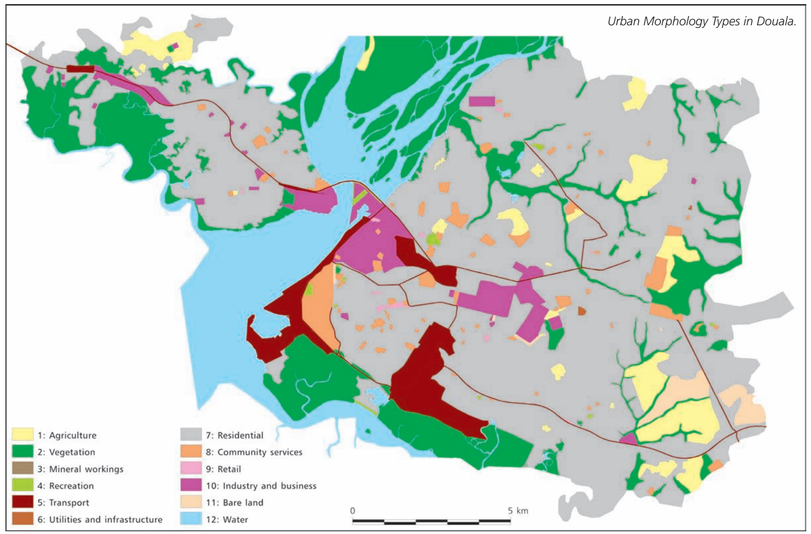
The analysis of the monthly average rainfall clearly shows that the current condition is extremely dry. Analysis based on climate projections reveals that this condition is expected to continue in the next 40 years with an increase of the duration of dry periods.

URBAN CHARACTERIZATION AND GREEN STRUCTURE MAPPING

Douala has a coastal nature, with the presence of *water* and *mangroves*, especially the River Wouri estuary. It is common to find dwellings surrounded by scanty or permanent water. Much of the city is less planned and is not built sustainably: less than 8% of the total area is occupied by *condominium*, *multi-storey*, *villa* and *single storey*, whereas *mixed construction* has a surface area of 23.5% and *mud/wood construction*, 20.4%. This indicates a very poor population and hence a high pressure on natural resources and vegetation. *Plantations*, *parks*, and *agriculture* cover only a little part of the area.

Dwellings surrounded by 'scanty water' in Mambana, Douala (photo by Rodrigue Aimé Feumba).

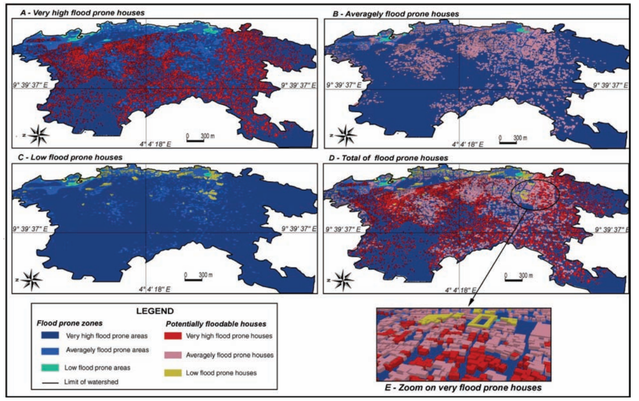
A decrease in evapo-transpiring surfaces from the city centre to the periphery is ongoing, as urbanisation generally comes at the expense of vegetated surfaces. However, there are exceptions within the downtown areas where there is more than 50% evapo-transpiring cover. In many cases, this green space is left to cool the city, which is very warm.



FINDINGS ON SOCIAL VULNERABILITY ASSESSMENT

Findings on social vulnerability for the communities of Manbanda and Météo for Douala have been grouped according to four main vulnerability dimensions:

Asset vulnerability	
Mabanda	Small business activities characterize the household economy communities like retail shop, “call-box” (local payphone), “bayam-salam” (selling rural crops). The dominating ethnic group is represented by Anglophone from north and south-west.
Météo	Being a residential area, house renting is the main income source. People are from different regions and employed in various sector.
Physical vulnerability	
Mabanda	Ethnic networks influence continue inflow of occupants from rural areas in search of livelihoods. Destructions of ecosystems due to searching for land. Houses are mostly built in wood. In 2009, 7039 houses were built in very high flood prone areas.
Météo	The fast population growth leads to anarchic occupation of the river bed and surrounding areas by settlements, reducing the sections of these natural waterways and consequently increasing the flood risk.
Institutional vulnerability	
Mabanda	No local institutions identified. Douala City Council IV supports the local communities with drainage works and road repairs, sometimes in cooperation with local community organisation like AJEM.
Météo	The Douala city council supports local communities with drainage works because the Douala City Council II cannot properly face the frequent flooding event during the rainy season due to very little financial capacities.
Attitudinal vulnerability	
Mabanda	Some NGOs working in the field of environmental protection. Some participatory activities at community level are organized to improve the quality of environment, such as cleaning compounds and road repairing.
Météo	The community is well integrated in the city. There are some social associations promoting participatory works which aims to improve the quality of environment (e.g. gutters cleaning and holes filling on tertiary roads)



3D map of flood vulnerable settlements in Mabanda watershed.

Prevention against floods in Manbanda using heavy embankment © Tchangang 21/02/2012.

Flood in Manbanda, Douala 09/2009 © www.bonaberi.com.

GENERAL PRESENTATION

Douala is the economic capital and the largest city of Cameroon with a population of about 2.1 million people (20% of Cameroon’s urban population, 11% of the country’s population) and an annual growth rate of 5% compared to the national average of 2.3%. The city is divided into six communes with a headquarter: Douala 1 (Bonandjo), Douala 2 (Newbell), Douala 3 (Logbaba), Douala 4 (Bonassama), Douala 5 (Kotto), Douala 6 (Monako). The first five communes are urban areas while the sixth one is a rural zone. The city is led by a community council of 37 members and two government representatives.
Douala is a major port and industrial centre, but there is also a significant urban agricultural activity within the metropolitan area. Children’s access to primary school is universal. Self-medication and recourse to traditional practitioners are frequent because of the difficulties in reaching healthcare facilities.

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