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Dakar, Touba and the Senegalese cities network produced by climate change

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In this paper we analyse the manner in which the degradation of climatic conditions has stimulated mobility in Senegal and contributed to rapid urbanization of Dakar, Touba and other Senegalese cities. The determining factors of migration are always multifaceted and complex. Overwhelmed by drought, conflict and territorial pressure, rural residents are attracted to the cities. The urban primacy of Dakar and the stagnation of secondary cities were two dominant characteristics of the Senegalese urban network until the 1970s. With the volunteer-based politics of urbanization initiated by the State, the process of decentralization of 1996, and the changes in the economic structure of the country, many small and secondary cities have subsequently been consolidated. The birth of numerous religious cities outside of the administrative or communal systems contributes to a disturbance of previously established schemas of urban creation. Touba, Mbour, Richard Toll, and Ourossogui are key examples of this new urbanization. However, all the components of the urban network are experiencing new dynamics, thus continuously renewing the urban network in both its typology and configuration.

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Introduction

In this paper, we analyse the manner in which the degradation of climatic conditions has stimulated the mobility of many Senegalese and contributed to a rapid process of urbanization for Dakar, Touba and other Senegalese cities. The interest is that most studies about cities and climate change have tended to focus more on urban adaptation and internal impacts [1,2]. Senegal's urbanization level is 45.2% from the 2013 census, with 49.6% of the urban population concentrated in Greater Dakar. After integrating Touba's inhabitants into the national urban population, over 50% of Senegal's population is urban.[1]

Like the majority of West African nations, particularly in the Sahelian region, Senegal has experienced a complete upheaval of its climactic norms since the mid-1960s, when a long period (1950–1967) of surplus rainfall caused the rapid growth of the overall population and an augmentation of rural population density. The climatic variable is certainly a significant catalyst for migration towards urban centers. However, other possible responses exist that might reduce the influence of this factor in the mind of the potential migrant. The same is true with respect to the significance of the return of the heavy rains vis-à-vis the safety of recent constructions. Factors linked to urban ecology and to construction techniques are also important but their impact on the environment has been increased by the climactic variable. In both cases, the climactic variable is the trigger, but there is no mechanical link between periods of drought and the rhythm of departures, nor of the rhythm of depreciation of the urban environment. In general, the link between climate variability and migration to cities is a complex one and it is important to integrate other vulnerability factors [3] (e.g. liberalization of agricultural and trade policies, lack of bank credits, post crop losses, and limited resources diversity).

Drought disrupts rural communities

Le Borgne [4] identifies three distinct periods of pluviometric deficit (1970–1973, 1976–1977, 1983–1984) that punctuate the long period of drought in the Sahelian region between 1970 and 1990. Senegal's climate is regulated by a rainy season (3–4 months) and a dry season (8–9 months), and the natural environment is extremely vulnerable to climatic variations. Because the Senegalese economy was largely based on agriculture (e.g. peanuts, millet, rice, cotton, niébe, manioc, sugar cane, etc.), the chronic drought that began in the 1970s had an extremely traumatic effect on popular spirit, influenced landscape

[1] Touba has been always considered as a village meaning that its population is rural meanwhile it has become the second largest human settlement in Senegal. This paradox is explained by the fact that it is a religious city and a private property with an extraterritorial status. Since the last decentralization reform, Touba is considered as a 'commune', which is the administrative status of the cities.

and overall activity; it also caused a lasting perturbation of rural societies in Senegal, pushing them into exodus. The crisis of the agricultural economic motor thus inspired a massive migration towards the cities and, more and more, to foreign countries.

The period of drought in the Sahel began in the 1970s (Figure 1). 1973 is embedded in the mentality of the Senegalese peasant as the year of the great drought and of the subsequent loss of crops, the extensive drying up of water sources, the difficulty in procuring water, the death of livestock, the food shortages in most households and, consequently, of migration. Since the 1970s, a cycle of drought has broken the economic and social equilibrium of the Senegalese rural regions and migration towards cities has become the most common adaptive solution [3].

Figure 1 illustrates that the irregularity of rainfall has a long history but became more pronounced from the 1970s. In the mid 1980s, a new extreme drought hit rural regions so dependent on rainfall and already impacted by new state liberalization policies.

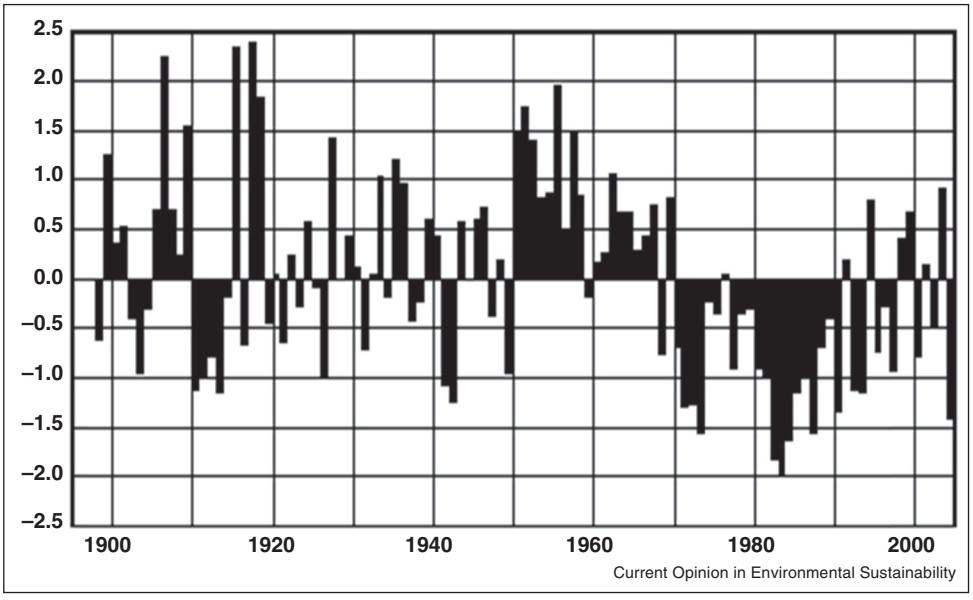
The long and intense periods of pluviometric deficit that marked the Sahelian region between 1970 and 1980 also affected Senegal, particularly in its northern regions. During that period, certain years were particularly catastrophic with respect to the limited rainfall: 1970 (653.6 mm) and 1972 (504.9 mm) because they were preceded by relatively rainy seasons (962.8 mm in 1969, 825 mm in 1971, 460 mm in 1977) (Figure 1). The year 1983 (411 mm) showed even more of a deficit. Dagana in the delta of the Senegal River (in the North) only saw 68 mm of rainfall during the entirety of 1983.

We noticed the shifting of the 400 mm isohyet from the latitude of Ferlo, a consistently dry area, to that of Kaolack in the center of the country, a region that constituted the capital of peanut production throughout the twentieth century. This 150–200 km shift to the south in less than two decades is dramatic. It obliged hundreds of thousands of rural citizens to adapt their calendar of activities and their cultural practices to the rigor of climatic conditions. The shifting of the 1000 mm isohyet from the latitude of Gambia to that of Ziguinchor, Sédhiou (in the South) or Kédougou (in the east) is also an important factor. It reveals a lesser-known type of 'drought' that is almost as destabilizing for populations known for their technical nature and their dependence on the cultivation of rice.

Reduction of cultivated land and stagnation of tonnages of agricultural production

One of the direct consequences of the drought is the reduction of cultivated land due to an insufficient replenishment of seed funds as is the case with peanut crops, or due to the loss of fields that have become uncultivable because of wind erosion. According to the PANAUDIT cabinet, '*the total surface of cultivated land annually is 2.29 million hectares in Senegal, that is, about 60% of arable land.*' Furthermore, according to the same study, '*the*

Figure 1



Rainfall irregularity 1900–2005.*Source*: Ahmadou Thierno Gaye, UCAD.