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## **Desert cities landscapes: at the crossroad of urbanization, agricultural intensification and trans-Saharan connections**

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### **Abstract**

The Sahara is not a desert wasteland but a location of thriving historical and contemporary towns and cities. Their recent development reflects both revitalization of commerce along traditional trans-Saharan trade routes as well as state-planned interventions such as agricultural development depending of contemporary cities and routes localization. The variable successes and failures of such recent interventions shows the fragility of Saharan towns and cities to resource exploitation, but also their resilience to sustain certain types of economic activities despite external intervention. These factors result in the making of paradoxical landscapes in the today Central Sahara.

### **Introduction: the urban Sahara**

The Sahara has undergone considerable changes in the past decades. The desert has long been regarded as a peripheral area because it is sparsely populated, marginalized after the decline of trans-Saharan trade in the second half of the nineteenth century, and situated far from the economic and political dynamics that have involved the region since independence.

The Sahara has always been an open space where many religious or ethnic minorities have found refuge over the centuries. In the Middle Ages, trans-Saharan trade routes crossed the entire desert, from North to South between the Mediterranean and the Sahel but also from West to East where long routes were used by traders and pilgrims to Port Sudan and Mecca on the Red Sea.

Theodore Monod (1968) distinguishes four meridian axes (1, 3, 5, 7) that bypass the most inhospitable regions (2, 4 and 6). They serve to propose a "geographical division of the Saharan world", identified by their main population, that of the great Saharan peoples: the western, Moorish zone, from Morocco to Senegal; the central, Tuareg zone, from the Algerian Sahara to the loop of the Niger River; and the eastern, Tubu zone, from Libya to Lake Chad and the Waddāi in present-day Chad. The Nile Valley is generally excluded from the "intra-Saharan" model, where roads and tracks cross vast empty areas to reach the oases

and towns that lie along the way. These traffic routes may disappear and then be reborn on the same route depending on political and economic circumstances.

This organization is no longer conspicuous today, after colonization and competition from maritime traffic damaged it during the 19th and 20th centuries, but it is still partly topical since it has determined the location of many cities and roads in the Central Sahara up to the present day.

Nevertheless the desert is a key space for North African states because of its vastness, its geopolitical and strategic importance, and the richness of its subsoil in minerals, hydrocarbons and deeply-located but non-renewable aquifers.

One of the most significant properties of desert regions is that the Sahara is urban.

Until recently, cities were considered anomalies in desert landscapes, even if one often distinguishes the 'old Saharan city' which is part of the history of the desert, from the 'city in the Sahara', which is the product of the deliberate design and plan of the public authorities (Côte, 2002). It is considered that the 'old Saharan city' has been able to evolve in concert with the surrounding environment, whereas designed and planned cities have been stigmatized as an unsustainable model, imposed by actors outside the desert, such as traders, industrialists or the state (Pliez, 2011). The distinction, however, has become less valid, since desert cities irrespective of their origin are now facing a lack of governance in urban planning and environmental problems that can also be found in other areas globally (Bendjelid et al., 2018). These problems include silting up of water courses, deficiencies or excess water, pollution, and waste management.

The vast majority of Saharan populations now live in conurbations, that can be defined as groups of cities (or agglomerations) close to each other, each city remaining individualized. The situation is paradoxical since during the first half of the 20th century, the desert was essentially a space without cities: the prestigious names of Agadez, Ghadames or Ghardaïa refer to a trans-Saharan trade then in full decline.

The population stagnated until the 1960s, rising from 1.7 to 2 million inhabitants between 1948 and 1966, then increasing rapidly during the following decades: around 1995, the Sahara had 5 million inhabitants, excluding the desert margins (Bisson, 2003). Over the same period, the Saharan portions of the Sahelian states, from Mauritania to Sudan, experienced at best a stagnation of population and more frequently a decline in urbanization processes. The contributors to this change are multiple and not unique to the Sahara: relocation of land-demanding installations (new cities), development of mining and power engineering facilities,

development of transport infrastructure, development of means of pumping fresh water, and desalination technologies that provide water in areas where it was previously not available (Ezcurra, 2006). These changes have resulted, over the last 40 years in particular, in a process of urbanization unprecedented in its magnitude, particularly in the Saharan regions of Morocco and Egypt, with less impact in those of Mauritania and Sudan (OECD, 2014). In the mid-1990s, there were 53 cities in the Saharan Maghreb for only 8 in the Sahelian Sahara. In Morocco, Algeria and Libya, several agglomerations now exceed 100,000 inhabitants and urbanization rates in the desert are higher than national averages, at 70% in the Algerian Sahara, 80% in Libya, and 92% in Western Sahara (Côte, 2012).

Saharan urbanization adopts two dominant spatial forms: on the one hand, administrative cities with 50,000 to 150,000 inhabitants and, on the other, numerous towns of 5000 to 15,000 inhabitants. Both of these forms are produced by either sedentarization of pastoral people since the 1960's (Bataillon et al. 1963) or more recently by urban demographic expansion along oasis valleys, often influenced by two main factors that sometimes combine: exploitation of mineral or hydrocarbon wealth, and territorial control, where the city is a strong marker of boundaries of the national territory.

### **Urban landscapes: from the oasis to the city**

It would be difficult to describe a 'typical landscape' of the urbanized Sahara, as its landscapes are not uniform. At a small scale the Sahara is a vast desert covering some 8 million km<sup>2</sup> and dominated by very low annual rainfall (less than 100 mm/year) (Ezcurra, 2006). However, this viewpoint of a monotonous desert does not describe its many nuances. For example, the Sahara contains a diversity of biomes, including a northern Mediterranean fringe, tropical, continental environments in the south, a central arid core, and variability determined by altitude, latitude, and proximity to ocean water sources (Le Houérou, 1990).

Despite the diversity of situations, each city or town urban centre provides a burst of vegetation, which is linked to the presence of oases, as vividly described in the novel *Cities of Salt* by Abdulrahman Munif (1984): "It is Wadi Al-Oyoune. Suddenly, in the midst of the hard and stubborn desert, this green spot springs out, as if it had sprung from the belly of the earth or fallen from the sky. It is different from all that surrounds it, or, more exactly, there is no connection between it and the rest..." (translated from the original French by O. Pliez). However, when entering the city, the disenchantment is quickly noticeable: "The vast agglomeration of camel-skin tents... has given way to precarious constructions, topped with

white domes... There are straight avenues, sidewalks, a few meagre gardens. The mystical city has become a military garrison and a trading centre...” (Le Clézio and Le Clézio, 1997, translated from the original French by O. Pliez).

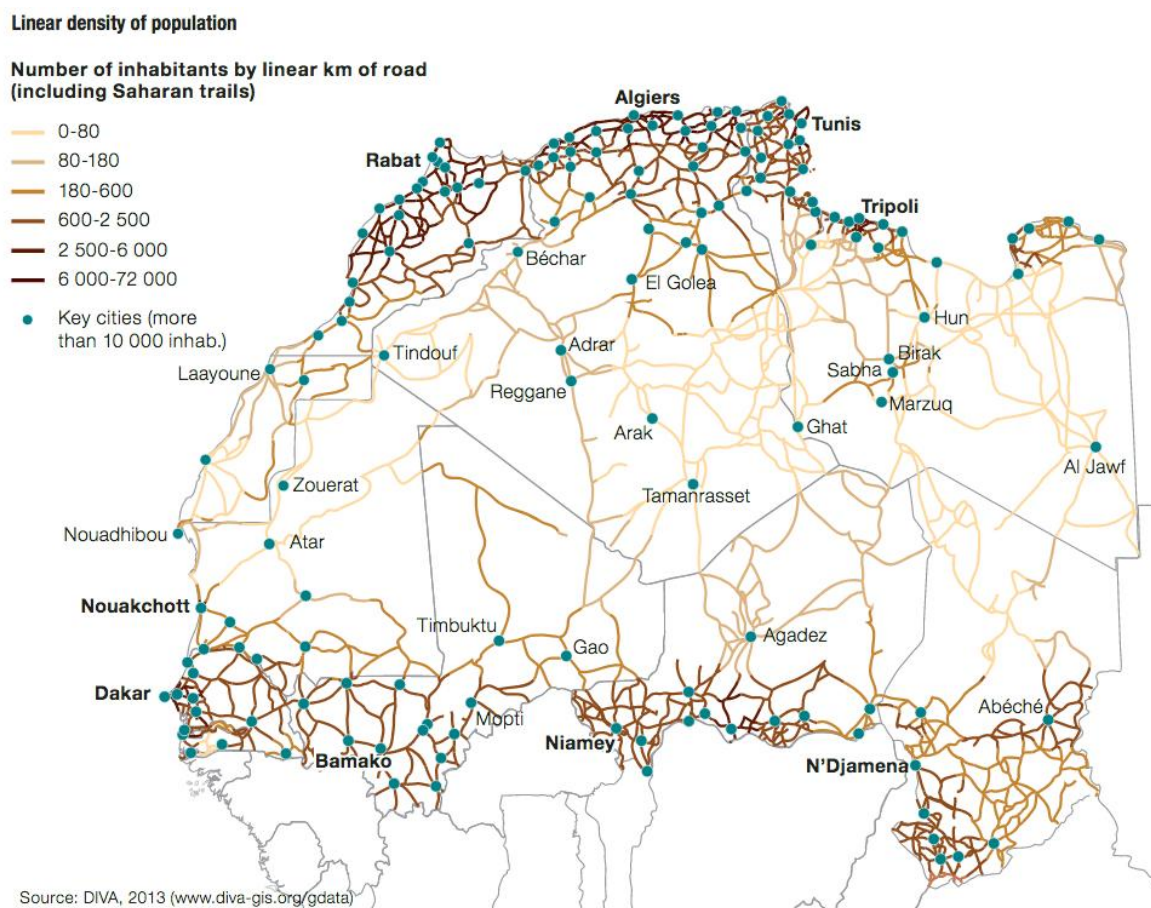
Urbanization in the oasis environment remained ‘invisible’ for a long time (Popp, 1993). It materialised through the expansion of villages as a result of demographic growth and nomadic settlement, in particular in the latter part of the twentieth century. The standardization of urban landscapes, generally led by the state as a function of centralized urban planning, resulted in a break with traditional growth patterns, through the imposition of modern urban design and development of infrastructure, and the introduction of urban models designed for other environments. However, other less visible ancient functions of Saharan settlements are still present, in particular those representing the transit of people, goods, knowledge and culture, since an oasis is still a place of passage in the trans-Saharan road network.

### **Cities embedded in scale levels and historical links**

Whilst at a local scale a settlement is dependent on the proximity of water, this is rarely a determinant factor for population settlement. In fact, Despois (1946) asserted that settlements have developed their own water sources through wells and springs, rather than making use of the distribution of pre-existing water sources in determining settlement locations. Thus, water sources and agricultural fields have been deliberately created close to settlements. The viewpoint that villages serve merely a productive role and that the oasis is merely an island in the midst of the sand sea is an erroneous perception.

At a smaller scale, the presence of oases is explained by their role in a circulation network of people, goods, knowledge and culture. Despois (1946) pointed out the need to change the scale of analysis in order to understand Saharan urbanisation. In studying the Fezzan region (Algeria) after the Second World War, one of the most important regions of the Central Sahara, he pointed out that it represents both a crossroads of historic trade routes, and also of modern aviation routes. It remains a rural area but also a nodal point. But the circulatory function and inhabited places of the central Sahara are part of a spatial organization that arises from the varied actors who traverse these roads, whether Saharan or not. The locations of settlements on the axes of the trans-Saharan trade routes can help explain why certain regions are in crisis or can be revitalized.

It is therefore useful to reason at two scales to understand the variations of the human Sahara. The local scale corresponds to the place, in this case the oasis, which allows for a description of the landscape and the practices of those who live there. At the scale of the Sahara itself, the location of places and cities within the homogeneous desert can allow one to understand why and how places are linked to one another and found in regions more or less hostile to human life. As a result, although population densities of the Sahara are very low (on average less than 5 inhabitants per km<sup>2</sup>; Fig. 1), an increasing part of the Saharan landscape is affected by multiple factors (natural, economic, political) for which urban landscapes, built over a long period of time, are the most visible expression.



**Figure 1.** Number of inhabitants by linear km of road (including Saharan trails) (source: OECD, 2014).

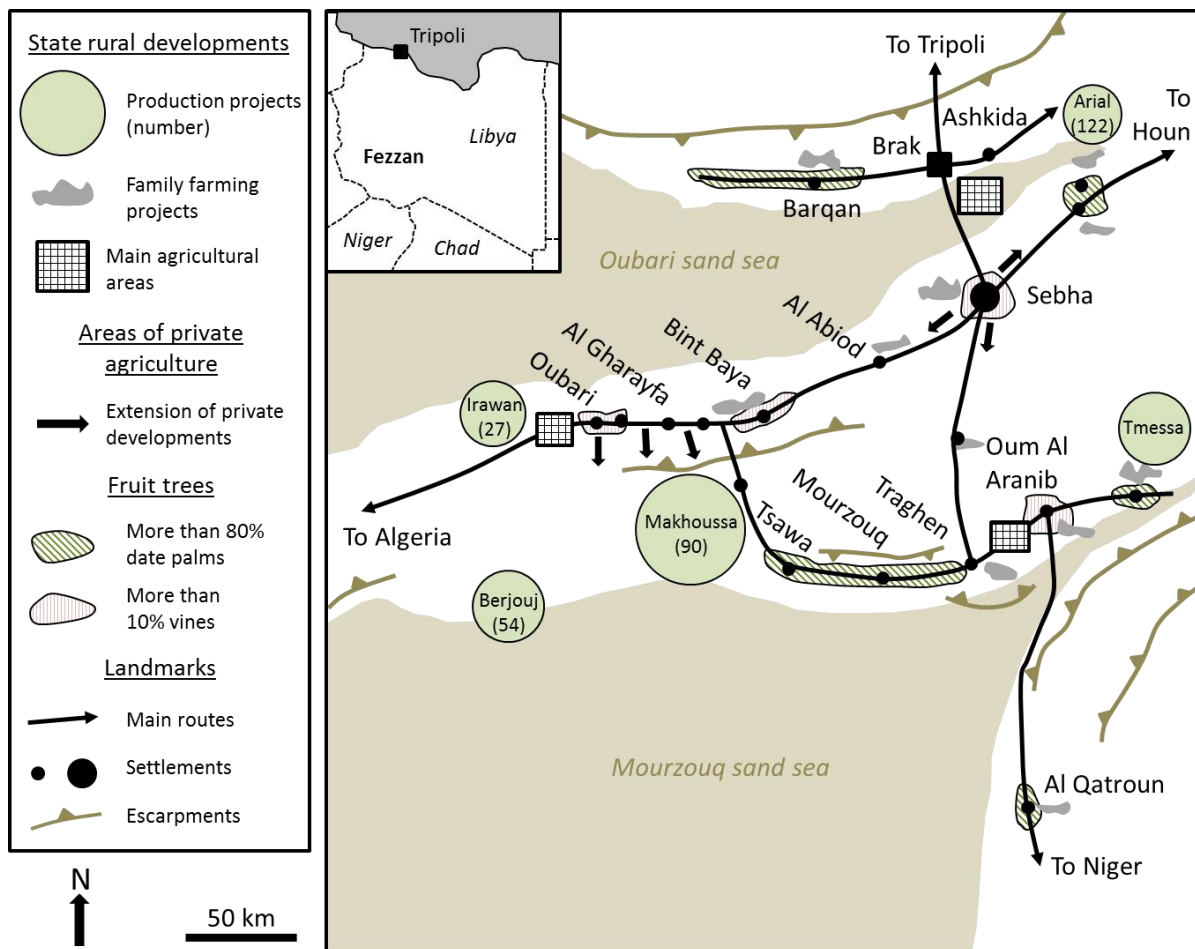
### **Agricultural revitalization driven by cities: the example of Fezzan (Libya)**

The rural crisis is one of the most emblematic elements of the decline of Fezzan after the Second World War. Jean Despois (1946) insists on the "miserable aspect" of the farms

although land development is the main activity of the inhabitants of this region of Central Sahara.

Half a century later, in the 1990s, agriculture in the Libyan Sahara has been experiencing a revival, linked to a number of favourable conditions including off-season agricultural production, privatization, urbanization and development of the service sector that have contributed to a rapid increase in the demand for fruit, vegetables and meat (Pliez, 2003). Governments have played a key role in improving the quality of road networks, increasing incentives (drilling, subsidies, etc.) and sometimes subsidizing the price of gasoline. These incentives contrast with a chronic shortage of labour. Thus, the goal of 're-greening' the desert is often accompanied by the need to attract agricultural workers from abroad where, half a century earlier, rural emigration seemed an unstoppable trend.

Everywhere, there is evidence for a profound remodelling of landscapes (Côte, 2012), with the juxtaposition of state fenced areas and private plots planted with orchards, grass and vegetable crops, which are sold on the national market. It is around major cities that changes are most dramatic, for example in Sebha (Libya), an agglomeration of 150,000 inhabitants whose peri-urban area is the subject of speculative investments in and development of agricultural land. New farms are generally located along roads, to produce crops geared to local demand and for larger coastal settlements (Fig. 2). The gap between the area occupied by the palm groves and that of the new gardens is large, commensurate with the vast consumer market constituted by the city. These are dozens of individual farms producing fruit and vegetables for Libya as a whole, which operate thanks to the presence of migrants, transient or seasonal. This shows the role of sub-Saharan, Egyptians and Asians participating in the rural revitalization of the Sahara. Their presence is both important in the context of the city and also diffuse in the context of the Sahara, and provides a contested viewpoint of the meaning of the 'the city of natives'. The participation of migrants in the preservation of the oasis heritage is therefore very real: they invest and renovate villages (*ksour*) and provide cheap labour necessary for the maintenance of gardens and irrigation systems.



**Figure 2.** Agricultural development near Sebha, Libya (adapted from Pliez, 2004).

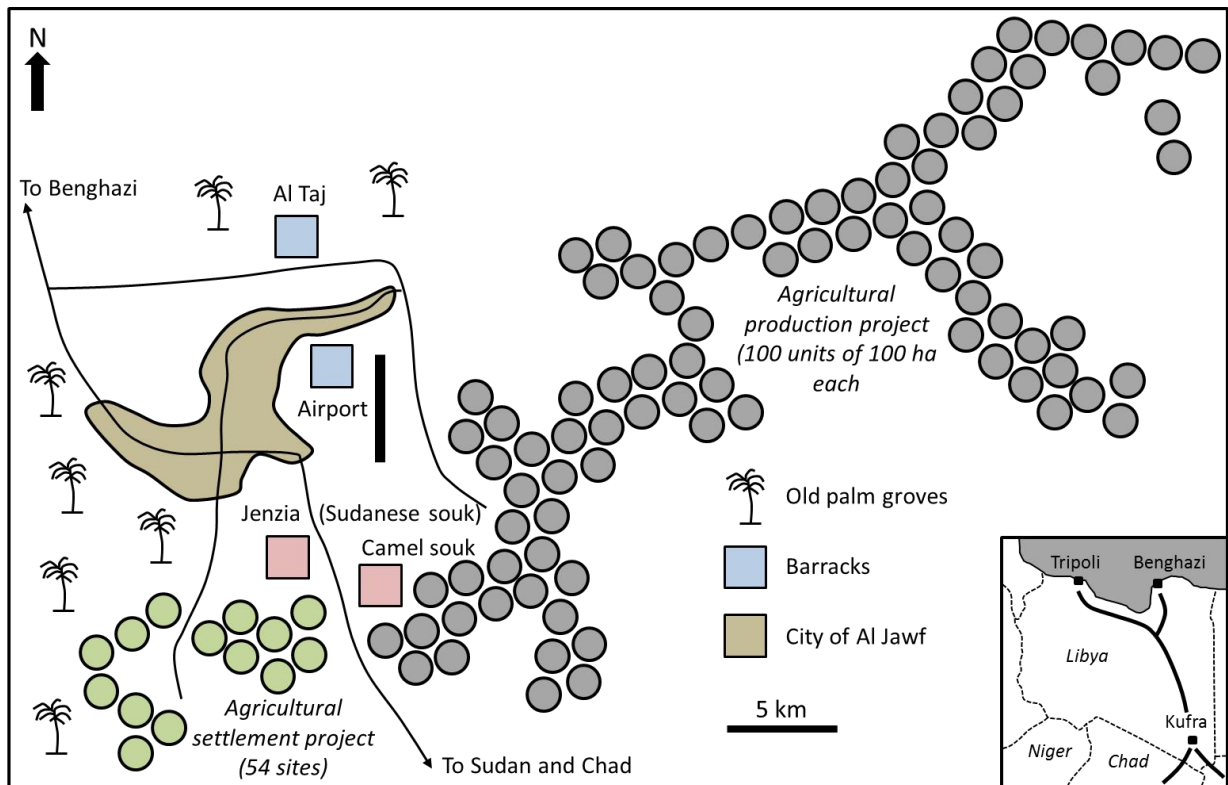
### **Kufra (Libya): a crossroad or an oasis without agriculture?**

Kufra's profile is rather unusual compared to the common perceptions of the Saharan oases as green havens dotting the desert. Located in the heart of the Libyan Sahara, the town has a hyperarid climate, with a rainfall of less than 50 mm per year. The nearest settlement is hundreds of kilometers away. Downslope, Kufra has access to abundant water resources, and water management and equity of access has never been an issue in this oasis community. Likewise, the gap between oasis gardeners and nomad cattle herders has lost its relevance, since Kufra's gardens have seldom been improved, while pastoralism is almost extinct, due to the lack of availability of pasture land. On the other hand, Kufra is the epitome of the stopover town, well described by John Davis (1983; 1987). Isolated from both the Sahel and the Mediterranean, the oasis has thrived from strong relations with these outer regions, whilst other towns in the desert have declined. Here, economic activities have focused on its role as a key trading post, historically of both goods and people. During the second half of the



nineteenth century, in times of intensified colonization in north Africa, trading in goods and slaves reached its peak in this area along the trans-Saharan road towards the Mediterranean coast at Benghazi (Libya). This meant the Wadi Kufra was an important stop between both sides of the desert. It remained a crossroads until 1932, when Italian colonists settled in the oasis and precipitated the town's economic decline.

Kufra's renaissance came after Libyan independence (1951) when the oasis town became the emblem of a green, modern desert city that was developed based on a drive by the new state to develop national food self-sufficiency. Two 'modern oases' were developed (Fig. 3). The first was made up of 100 circular irrigation units of 100 hectares each, where wheat, barley and berseem (Egyptian clover) were grown. The second, known as the 'population project', was based on development of 54 hamlets of 16 farms built around a main square. The 16 farms were arranged in a hexagonal pattern totalling 5600 hectares, and focused around water production plants, whose resources were used at home and in the fields. The project was initially meant to house the whole population of the Kufra oasis, of between 5000 and 7000 inhabitants. However, only 14 hamlets out of 54 were granted with farmlands. After the failure of the artificial oasis, a more ambitious scheme was designed in order to pump and transfer fossil water (groundwater) to the coast. The government plan was that a united Libya would emerge from this great artificial river, with the country fertilized in its entirety from subsoil groundwater. This plan never materialised. Thus, by the 2000s, Kufra looked like an oasis without farms, where dilapidated gardens and palm groves were in stark contrast to other similar regions in the Sahara. The town also looked like a military wasteland, in which many barracks closed down after the end of the war against Chad. Today, through its landscapes, population and economy, Kufra presents itself as a town built by the state, albeit shaped by those involved in trans-Saharan exchanges more than from local agricultural activities.



**Figure 3.** Map of the Kufra region, Libya (adapted after Pliez, 2004).

## Conclusions

The Sahara is not merely a place where either migrants on their way to Europe or terrorist groups may roam free. It also underwent considerable changes within the last half-century, such as massive urbanization (Pliez, 2011). Many built-up areas, which were created or developed by the central state at the crossroads of major trans-Saharan routes, have experienced spectacular growth rates for decades, as they received at different times farmers fleeing from their oases, nomads, refugees and economic migrants. In all cases, the increase in urbanization and migrant flows has been a significant factor in bringing about social and spatial change. In the 1990s to the 2000s, declining state subsidies and expanding mobility in the Sahara characteristically created ambivalent settlements which are at the same time marginal towns (according to the state) and connected towns (according to transnational mobility operators). These towns are now in crisis following the demise of centralised state power across many different Saharan countries and the wars that have shaken the Sahara since the early 2000s. Yet the survival of individual towns and cities may lie in the long term resilience of trans-Saharan mobility networks.

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