

## Agricultural land facing the urban spatial dynamics of the city of Sarh in Chad

Terrenos agrícolas frente a la dinámica espacial urbana de la ciudad de Sarh en el Chad

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**Abstract:** The spatial growth of cities in Africa in general and in Chad in particular has occurred quickly and dramatically. This is caused by several factors with numerous consequences and raises enormous challenges, including the expansion of cities into nearby countryside. The town of Sarh located in the southeast of the Middle Chari region in Chad has experienced rapid urbanization which has led to its expansion. This gave rise to a phenomenon of land transactions on the outskirts of the city. This article, which opens a new vision in the in-depth study of urban dynamics, aims to provide a good analysis of the governance of agricultural land in the urban and peripheral areas of Sarh and ends with a certain number of proposals for a sustainable agricultural land release. This research is the result of a direct geo-political fieldwork observation of a problem which is not specific to Sarh, but which is growing. For this, the materials used are, among others: field trips, observation, field surveys, consultation of works that deal with the theme and the laboratory. They approach the work from a descriptive angle by describing the facts that we then observed to establish a relationship and by carrying out a retrospective analysis on the problem that the subject deals with. As part of this work, our methodology is essentially structured in stages, of which we have therefore used the hypothetical-deductive approach. This is based on methods aimed at verifying our hypotheses and achieving our objectives. This is already what has allowed us to affirm that Chadian agriculture contributes to the economy, especially its large share in the formation of (GDP) Gross Domestic Product estimated at 43%, of which 40% comes from food production, and 3% from cash crops, including urban crops. This is why it is a major provider of employment which occupies around 80% of the country's active population, more than half of which is made up of women. Urbanization has been recognized not only as a major challenge, but also as an opportunity to be seized to make urban land accessible and transparent with a view to promoting agricultural development, social integration and environmental sustainability in the context of cities of the future. In our observation, we realize that the environmental

threat in Sarh is real. This is why it is essential to make the most of this urban spatial growth of our cities.

**Keywords:** Land, Agricultural, Dynamic, Spatial, Urban, City

**Resumen:** El crecimiento espacial de las ciudades en África en general, y en Chad en particular, se ha producido de forma rápida y drástica. Esto se debe a diversos factores con numerosas consecuencias y plantea enormes desafíos, incluyendo la expansión de las ciudades hacia las zonas rurales cercanas. La ciudad de Sarh, ubicada al sureste de la región de Chari Medio en Chad, ha experimentado una rápida urbanización que ha propiciado su expansión. Esto ha dado lugar a un fenómeno de transacciones de tierras en las afueras de la ciudad. Este artículo, que abre una nueva perspectiva en el estudio profundo de las dinámicas urbanas, busca proporcionar un análisis exhaustivo de la gobernanza del suelo agrícola en las zonas urbanas y periféricas de Sarh y concluye con una serie de propuestas para una disponibilidad sostenible del suelo agrícola. Esta investigación es el resultado de una observación geopolítica directa sobre el terreno de un problema que no es específico de Sarh, pero que está en auge. Para ello, se utilizaron, entre otros, visitas de campo, observación, encuestas de campo, consulta de trabajos que abordan el tema y prácticas de laboratorio. Abordan el trabajo desde una perspectiva descriptiva, describiendo los hechos observados para establecer una relación y realizando un análisis retrospectivo del problema que aborda el tema. Como parte de este trabajo, nuestra metodología se estructura esencialmente en etapas, por lo que hemos utilizado el enfoque hipotético-deductivo. Este se basa en métodos destinados a verificar nuestras hipótesis y alcanzar nuestros objetivos. Esto nos ha permitido afirmar que la agricultura chadiana contribuye a la economía, especialmente por su importante participación en la formación del PIB, estimado en un 43%, del cual el 40% proviene de la producción alimentaria y el 3% de cultivos comerciales, incluidos los urbanos. Por ello, es una importante fuente de empleo, ocupando a alrededor del 80% de la población activa del país, más de la mitad de la cual son mujeres. La urbanización se ha reconocido no solo como un gran desafío, sino también como una oportunidad que debe aprovecharse para hacer accesible y transparente el suelo urbano con miras a promover el desarrollo agrícola, la integración social y la sostenibilidad ambiental en el contexto de las ciudades del futuro. En nuestra observación, nos damos cuenta de que la amenaza ambiental en Sarh es real. Por eso es esencial aprovechar este crecimiento espacial urbano de nuestras ciudades.

**Palabras clave:** Tierra, Agrícola, Dinámica, Espacial, Urbana, Ciudad

## Introduction

Urban population growth combined with suboptimal urban planning exacerbates challenges for African cities in adapting to climate change impacts. Global climate projections indicate increasing frequencies and intensities of extreme meteorological phenomena such as temperature anomalies, rising sea levels, floods, and droughts. In conclusion, ensuring successful adaptation of African cities to ongoing climate shifts requires establishment of robust systems for monitoring and controlling climate risks complemented by science-driven urban planning frameworks and informed decision-making at administrative levels (Cobbinah et al., 2017). The transformation of agricultural lands represents one of the principal challenges of the twenty-first century, resulting from extensive anthropogenic activities over the preceding half-century. To mitigate these challenges, rigorous legislative measures aimed at preventing agricultural land fragmentation, enhancement of financial capacities among rural populations, and formulation of strategic policies regulating rural-to-urban migration are essential components of comprehensive land management strategies (Ghasemnejad et al., 2025). Rapid urbanization and constrained land availability constitute substantial challenges within numerous metropolitan areas worldwide. As demographic pressures lead to excessive concentrations of inhabitants exceeding city infrastructural capacities alongside expansive peripheral sprawl, municipal institutions and finite land resources experience considerable strain, precipitating inefficient competition across diverse land-use sectors (Li et al., 2021; Petio, 2023). Prolonged and accelerated urbanization has catalyzed the intensification of land-use conflicts, subsequently exacerbating associated environmental hazards. Despite this trend, contemporary understanding remains deficient regarding the detrimental ecological ramifications stemming from these conflicts, thereby impeding their timely detection and efficient administration. Characterized by intricate features inherent to complex socio-economic systems, land-use conflicts manifest themselves through multi-faceted attributes, encompassing competitive stressors among divergent land-use categories, ecological dangers induced by disorganized terrestrial ecosystem arrangements, and interactions between disparate functional roles attributed to land utilization (Zou et al., 2021; Jiang et al., 2021; Chen & Zhang, 2024).

Agricultural productivity plays a pivotal role in addressing multiple challenges, serving as a cornerstone for securing food stability, alleviating poverty, and sustaining long-term economic progression. Nevertheless, the dual constraints of diminishing arable land reserves and its intrinsic non-renewability foster fierce competition over land usage, predominantly pitting agricultural endeavors against non-agricultural demands. Such transformations in land allocation represent one of the foremost drivers influencing ecosystem integrity, concomitantly generating formidable obstacles to sustained agricultural output and overall human welfare (Ghasemnejad et al., 2025).

During the course of urbanization, the expansion of urban development land and rural housing has exhibited a markedly swift pace. However, the developmental and utilitarian efficiencies associated with constructed land use remain notably constrained in both urban and rural contexts (Long et al., 2018). Peri-urban territories emerge as critical components within broader urbanization dynamics. Specifically, in rapidly urbanizing African nations characterized by elevated rates of urban expansion, peri-urban zones often exist as disjointed administrative, political, or statistical entities lacking formal legal standing. Predominantly rural in character, these regions assume equal significance in driving peri-urbanization processes comparable to urban sprawl itself (Carrilho et al., 2025). Investigation into the sustainability of suburban regions

continues to be hampered by the lingering ontological dilemma concerning precise delineation of what constitutes suburban spaces. This conundrum has garnered considerable attention and scholarly debate throughout extant academic discourse (Dodman et al., 2017; McGill, 2020; Burchi & Zapata Roman, 2022; Sakketa, 2023; Sahana et al., 2023). Occupied predominantly by dispersed village-like settlements, peri-urban areas epitomize “the most commonly neglected category of locales” when examining peri-urban settings (Sakketa, 2023).

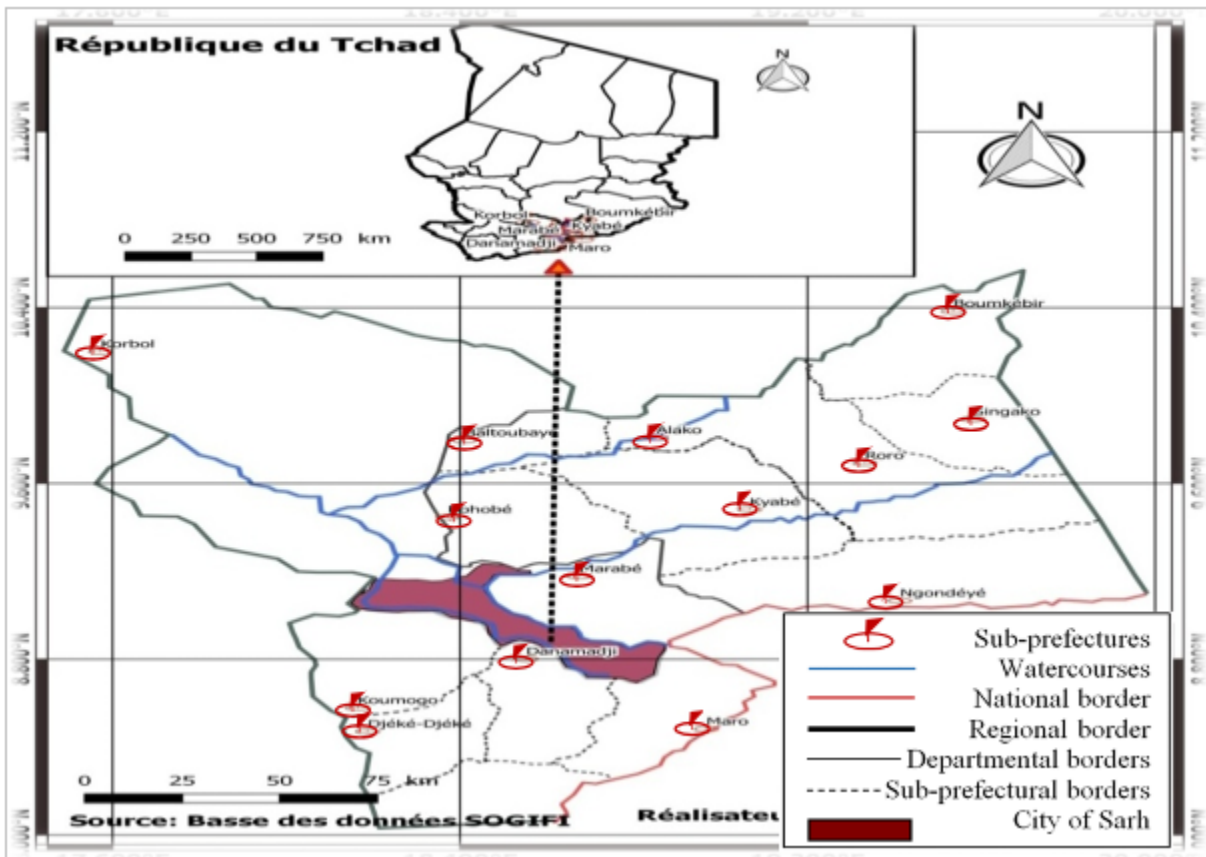
Sustainable land use plays a pivotal role in ensuring food security, mitigating environmental stresses, and addressing climate change challenges (La Rosa & Privitera, 2013; Shen et al., 2025). Promoting synergistic development of agricultural land use, economic production, and ecological benefits emerges as a core task in efforts to achieve urban-rural integration and rejuvenate rural areas. While studies investigating agricultural land use efficiency and urban-rural inequality have multiplied, less emphasis has been placed on exploring their nonlinear interactions, intermediary mechanisms connecting them, and potential spatial effects. It is recommended that policymakers strive for balanced urban-rural development, avoid both excessive concentration and over-homogenization of resources, and facilitate interregional dissemination of environmentally friendly agricultural technologies to ensure sustainable improvements in agricultural land use efficiency (Sun et al., 2025). Much scholarship in African urban studies focuses on horizontal expansion (such as urban sprawl) and informal settlements, yet investigations into vertical dimensions of urban growth remain comparatively restricted (Prieto-Curiel et al., 2023).

The African continent is presently undergoing a period of substantial industrial and urban transformation, frequently referred to as the 'next industrial frontier' and 'frontier of urbanization'. Over recent decades, Africa has experienced rapid processes of urbanization and industrialization. By 2050, it is anticipated that Africa's urban population will triple, reaching nearly 60% of the total population. In response to this transformation, African nations are exploring pathways to industrialization aimed at diversifying their economies and enhancing international competitiveness (Carrilho et al., 2025; Gao & Wang, 2025; Wietzke, 2025). Urbanization in African countries is predominantly informal, unplanned, and characterized by sprawling expansion, particularly along urban fringe areas (Granda et al., 2025). Thus, our initial question is: what are the characteristics of agricultural land and spatial urban dynamics in Sarh?

## **Material and Method**

In the framework of this work, the methodology was essentially structured in stages, of which we thus used the hypothetico-deductive approach. This is based on the methods and tools aimed at verifying the hypotheses and achieving the set objectives. Above all, the field method and the laboratory method allowed us to approach this work from a descriptive angle by describing the facts that we then observed to establish a relationship and by making a retrospective analysis on the problem that this article deals with. For the field survey, the type of survey chosen is the survey by reasoned sampling since it is simple and allows us to generalize information collected from a representative sample to the entire population without a large margin of error.

Figure 1  
Schematic representation of the study area (Republic of Chad)



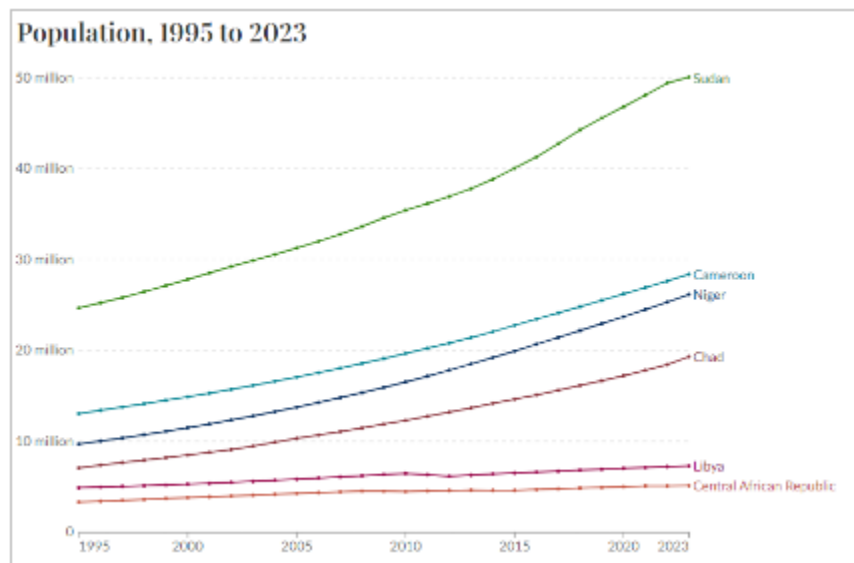
Source: SOGIFI database.

The support for carrying out our survey is the questionnaire and the interview whose main objective is to propose sustainable and effective strategies in terms of sustainable soil production policies in Sarh. This objective underlies the consideration of sections relating to low reinforcement factors to encourage expert groups engaged in the theme of urban production. For our interviews, we then carried out with the source persons by uncovering the key aspects of our subject. These interviews were carried out using questionnaires and based on an interview guide which took place in October 2022. We therefore spoke with several people, including the heads of MATUH Services for the city of Sarh, the head of the Urban Planning Department of the municipality of Sarh, the head of the Planning Department of the General Directorate of MATUH, the Director of Roads, the heads of the districts of the city of Sarh, as well as the agricultural stakeholders of the city. Located in the South-East of Chad, 800 km (by road) and 650 km (by plane) from N'Djamena, the Moyen-Chari region is bordered to the south by the Central African Republic (CAR), to the west by the Mandoul and Tandjilé regions, to the north by the Chari Baguirmi and Guerra regions and to the east by the Salamat region. The region covers an area of 50,250 km<sup>2</sup> with a population of 598,284 inhabitants (5.4% of the national population) of which 302,344 are women and 295,940 men for a density of 11.9 (according to the 2nd RGPH, 2009). The city of Sarh is the regional capital of Moyen-Chari. It is located between 9°13 North latitude and 18°23 East longitude and is situated 20 km upstream from the confluence of the Chari, Bahr-Kôh and Bahr Sara (Figure 1).

## Results and Discussions

National governments in African countries frequently disregard the concerns of urban residents, whereas municipal authorities continually encounter deficiencies in political, administrative, and fiscal resources essential for effective urban planning. Consequently, the necessity arises to acquire dependable data, conduct thorough analysis, and accumulate scientific knowledge in the domain of urbanization, thus establishing a solid foundation for crafting African urban development policies and implementing corresponding monitoring mechanisms. A key challenge arising in the context of growing urbanization in Africa is the development of adequately structured and targeted urban development policies and their implementation. Given the high degree of centralization of power characteristic of African countries, local actors, using the policy instruments at their disposal, exhibit various resistance to decisions imposed from above that fail to take their interests into account. This often results from divergent understandings of priority issues at different levels of government, creating conflicting interests and needs that shape the aspirations and actions of the state and citizens.

Figure 2  
Population of the Republic of Chad and adjacent countries



Source: UN, World Population Prospects (2024) – processed by Our World in Data.

The Republic of Chad is a large country located in the north-central part of Africa, spanning between 8° and 24° N latitude and 14° and 24° E longitude. Three major ecological zones can be distinguished across Chad's territory: the Sahelian zone, the Sudanese zone, and the Sub-Saharan zone. As of July 1, 2025, the estimated population of Chad was 21,003,705 individuals, representing a 3.47% increase compared to the previous year when it stood at 20,299,123 people (Figure 2). This marks the 75th consecutive annual rise since records began being maintained by the United Nations Department of Economic and Social Affairs in 1950. Over this period, the country's population has grown 8.32-fold. The highest recorded figure occurred in 2025 with 21,003,705 inhabitants, while the lowest value was noted in 1950 at 2,525,454 residents. These data are derived from the UN's World Population Prospects report published in 2024, where figures for both 2024 and 2025 are projections rather than actual counts.

The age pyramid of Chad exhibits a progressive or growing type, which is typically observed in developing nations characterized by relatively short life expectancy due to high mortality rates alongside elevated birth rates. In terms of gender distribution, there exists near parity between males and females in Chad, reflected by a sex ratio of approximately 1.01:1. The median ages stand at 16.49 years for men and 16.95 years for women. Within the adult segment under 75 years old, peak concentration occurs among those aged 18 and 19, whereas the minimum representation falls within the cohorts aged 73 and 74. As of July 1, 2025, the population density of Chad amounted to 16.68 individuals per km<sup>2</sup>, marking a 3.47% increase relative to the preceding year's figure of 16.12 persons per km<sup>2</sup> (Figure 3). This represents the 75th successive year of continuous growth in population density since recordkeeping commenced through the United Nations' Department of Economic and Social Affairs in 1950. Throughout this span, the metric has augmented by a factor of 8.32 times. The maximum recorded population density reached its apex in 2025 at 16.68 inhabitants per km<sup>2</sup>, contrasting sharply with the minimal value documented in 1950 at merely 2.01 individuals per km<sup>2</sup>. These statistics originate from the UN publication titled World Population Prospects, issued in 2024, wherein values corresponding to 2024 and 2025 are projected estimates rather than empirical measurements.

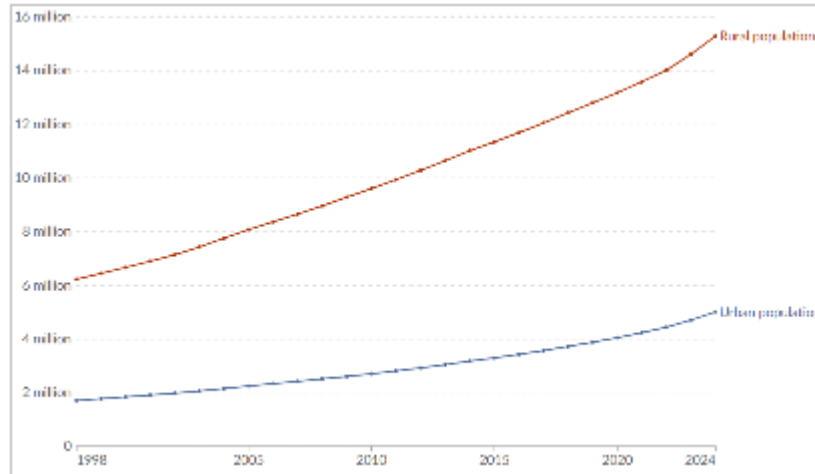
Figure 3  
Population density of the Republic of Chad, people/km<sup>2</sup>



Source: World Population Prospects UN Percentage of urban population, Chad.

In 2024, the proportion of urban dwellers in Chad constituted 24.69% of the national population, reflecting a slight increment from the prior year's share of 24.37%. Urbanization trends have been consistently upward over the past six decades, beginning from 1960 onwards. Since then, the percentage of city-dwelling citizens has expanded threefold —specifically increasing by a factor of 3.69. Historically, the smallest fraction of urbanized inhabitants occurred in 1960, accounting for only 6.70% of the total populace.

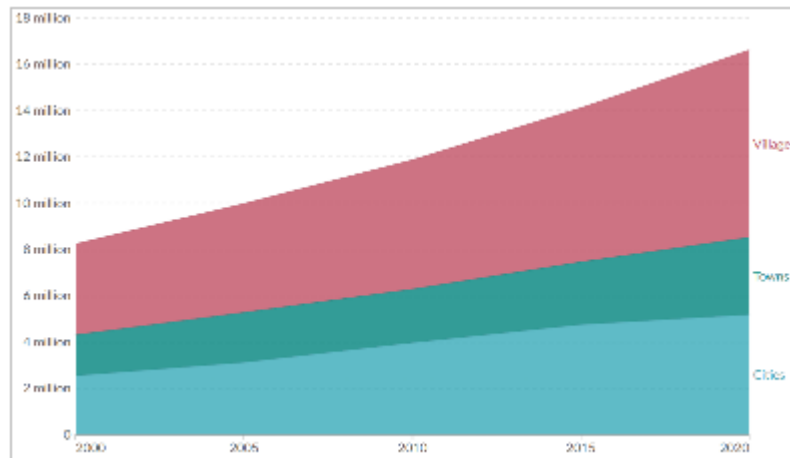
**Figure 4**  
 Number of people living in urban and rural areas, Chad



Source: World Bank based on data from the UN Population Division

The definition of 'urban population' adheres to the criteria established by each nation's respective statistical authorities, leading to variations in classification methods across different countries. Estimates provided by the World Bank for 2024 rely on demographic data sourced from the United Nations' Department of Economic and Social Affairs concerning global urbanization prospects (Figure 4-6).

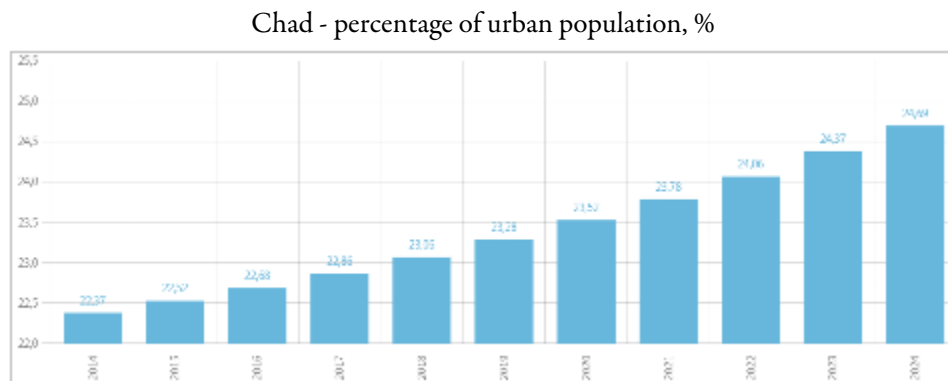
**Figure 5**  
 Population of cities, towns and villages, Chad



Data source: European Commission, Joint Research Centre.

As of 2024, the rural population of Chad numbered 15,287,067 individuals, signifying a 4.62% augmentation compared to the preceding year when it stood at 14,611,781. This marked the 43rd consecutive year of sustained growth in rural demography since observations initiated in 1960. Over this period, the size of the rural community escalated fivefold, reaching a multiplier effect of 5.37 times.

Figure 6

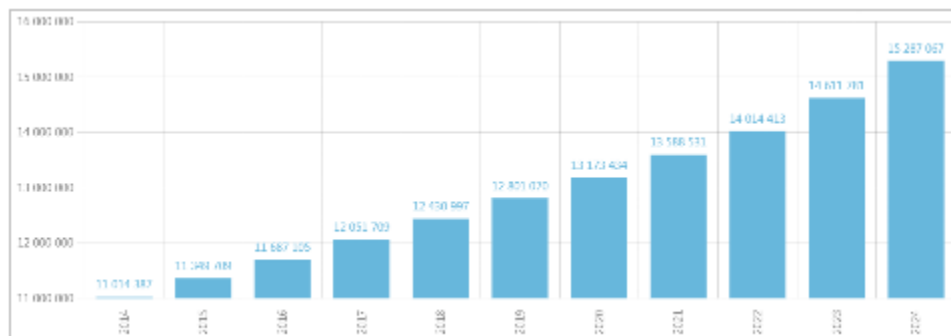


Source: World bank, World Urbanization Prospects UN.

The peak rural population count was registered in 2024 at 15,287,067 inhabitants, by contrast, the nadir occurred in 1960 with a mere 2,845,651 agrarian settlers. Rural populations are defined as those residing outside urban centers according to parameters set forth by national statistical bureaus (Figure 7).

Figure 7

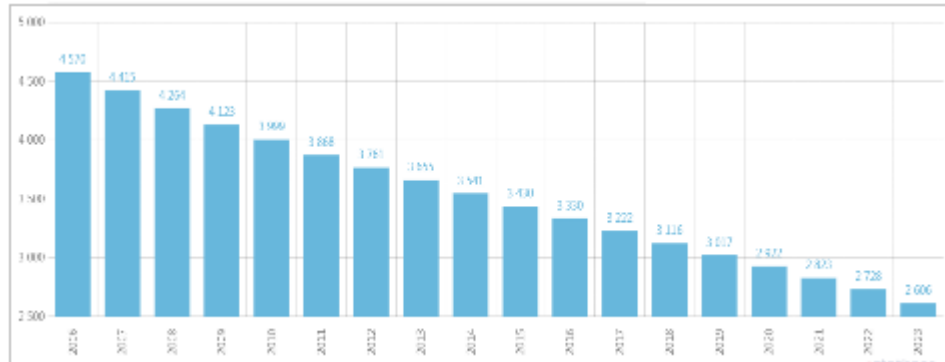
Chad - Rural population, people



Source: World bank, World Urbanization Prospects UN.

Agricultural land area in Chad during 2023 measured 503,373 km<sup>2</sup>, exhibiting a marginal decline of 0.001% compared to the preceding year’s extent of 503,380 km<sup>2</sup> (Figure 8). This constitutes the first instance of contraction following a prolonged trend of expansion. Since recording commenced via the Food and Agriculture Organization of the United Nations (FAO) in 1961, agricultural land coverage has amplified by a multiplicative factor of 1.05. The maximal territorial expanse dedicated to agriculture was achieved in 2022, registering 503,380 km<sup>2</sup>. Conversely, the minimal allocation occurred in 1972, equating to 479,000 km<sup>2</sup>. Agricultural lands encompass areas categorized as “arable land” and “permanent meadows and pastures.” Involving a broad spectrum of stakeholders, including local community representatives, in the formulation of urban renewal schemes can accelerate the development of more equitable strategies for urban agglomerations. Modern-day African urban centers are traversing a dynamic evolutionary stage, continuously adjusting to fluctuating internal and external circumstances.

Figure 8

Agricultural land area of Chad, km<sup>2</sup>/100 thousand inhabitants

Data source: UN, World Population Prospects, 2024

As a consequence, researchers and urban planning professionals must swiftly react to the perpetual flux of urban requirements, refining techniques for spatial organization and optimization of their administration. This necessitates the implementation of flexible approaches to design and the development of an adequate regulatory framework, as well as the establishment of regular monitoring and critical evaluation of the results of urban initiatives. In addition to these aspects, the development of educational mechanisms for training professional personnel and the retraining of existing participants in the urban planning process are of particular importance, contributing to the effective functioning of the continent's modern megacities. The surveys reveal that the interest of urban agriculture in Sarh is justified by its contribution to food security in the city. From these facts, its participation in the fight against poverty, its contribution to the social integration of so-called vulnerable social groups, its contribution to the national economy of Chad relatively remains essential. However, the problem that remains essential is the conflict over urban land which remains the worrying issue presented in this table above. Food security in the Republic of Chad is characterized by chronic food shortages resulting from factors such as scarcity of arable land, adverse agro-climatic conditions, desertification of its territory, and other contributing elements. The government of Chad is implementing measures aimed at revitalizing agricultural production to address the ongoing food crisis (Kang et al., 2023).

This article systematically analyzes key indicators of urbanization dynamics in regions of the African continent and identifies the implications of accelerating urban agglomeration growth for smallholders' socio-economic status and regional food security. It establishes that urban growth rates substantially deviate from conventional assumptions, characterized by consumption predominance over production, while trade liberalization measures have integrated regional agrarian systems into the global economy. Emerging issues of social disorganization and poverty escalation in peripheral areas necessitate the development of effective compensation tools for lost resources via self-sufficiency mechanisms implemented both within agricultural lands and urban centers. Such tendencies could significantly reduce the impact of urban infrastructure on forming stable market demand for agricultural products in remote regions. Optimal economic conditions are provided to small farmers situated near rapidly expanding towns, since this proximity generates the highest demand for high-quality locally produced goods. Ensuring satisfaction of basic nutritional needs should become a focal element of state policy for territories outside active urban development zones.

Considered as the former first city of Chad, it originates from the village Kokaga (village located 8 km from Sarh) created by the Sara kaba Démé followed by the Tounia. The colonizer Emil Gentil, after his failure held by Rabah in Massenya in July 1899, came to Kokaga and built a military fortification there which he named "fort-Archambault", a name he gave in memory of a young French lieutenant who died of malaria during his trip to Chad. Fort-Archambault was gradually built and became a commune in 1997. It was renamed "Sarh" on July 30, 1973 by the first Chadian president as part of the cultural revolution which means "place of regrouping". The City of Sarh is an important communication hub that controls the road to Bangui from the roads of Moundou, N'Djamena and Sido via Maro. The city is located on the western edge of the Chari and on the eastern edge of the Bahr Kôh in a plain of approximately 3000 hectares.

This area plays a major role in agricultural activities, especially agriculture, whose contribution in this area is essential and constitutes a support city for other cities such as Ndjamen, Moundou, Abéché, Sido, etc. for their supply of products such as corn, peanuts, beans, potatoes, earth weights and many other products. The city of Sarh was the first urban center developed in southern Chad in a confined site between two rivers (the Chari and the Bahr Kôh). It is often nicknamed "The Sleeping Beauty", "The Green City" or "The Garden City". Former administrative and tourist center, known by big game hunters. During the colonial period, Sarh was intended for trade with Oubangui-Chari, the Democratic Republic of Congo and Congo and it is thanks to its potential in meat produced by SIVIT, cotton, peanuts and sugar and also in the market gardening sector. Of which the colonial administration saw the opportunities and as we note that Chad is a country with an agricultural vocation. The factors contributing to the urban spatial dynamics of Sarh are intimately tied to population growth. As the urban population expands, so does the pressure for acquiring additional land within the city limits. Satisfaction of housing requirements and provision of other urban amenities occur at the expense of adjacent agricultural zones. The city of Sarh is no exception to this phenomenon. Chad does not possess any cities exceeding a population threshold of one million inhabitants. Instead, it features three settlements ranging between 100,000 and one million residents, along with thirty-three additional towns falling within the bracket of 10,000 to 100,000 inhabitants. The largest city in Chad is N'Djamena, boasting a population of 951,418 individuals. Below is presented a tabulated overview encompassing all Chadian municipalities surpassing the mark of seventeen thousand inhabitants (Table 1).

Table 1  
Chad Cities by Population 2025

<b>Citi</b>	<b>Population</b>	<b>Citi</b>	<b>Population</b>
N'Djamena	951,418	Doba	24,336
Moundou	135,167	Ati	24,074
Sarh	102,528	Fada	23,786
Abeche	74,188	Lai	19,382
Kelo	42,533	Oum Hadjer	19,271
Koumra	36,263	Bitkine	18,495
Pala	35,466	Mao	18,031
Am Timan	28,885	Massaguet	17,906
Bongor	27,770	Dourbali	17,682
Mongo	27,763	Mboursou Lere	17,132

Source: World Population Review

The history of chance constituted the installation of the site of the city of Sarh (Table 2). It was the turn of traders and military bases in 1899, that a few manual workers came to cling a few years after the avenue of the commune of Sarh in 1907, its population which represented 11,000 increased in 1950 to 15,000 inhabitants. Today it has 180,000 inhabitants. If until the 60s, the development of Sarh was moderate, but it doubled its demographic pace only after independence. In the 1993 census, it was or had only 75496 with an urban growth rate of 5% (BCR) which makes its population double every 10 years.

Table 2  
Comparative evolution of the population and the urbanized area (ha) from 1950 to 2016

Year	Population of Sarh (in thousands)	Total urbanized area (ha)	Gross density of Sarh (ha)
1950	15000	489	30
1964	33000	989	33
1968	32700	1.000	32
1975	50000	1007	45
1993	75496	1102	48
2005	102528	1200	52
2010	130909	2217	53
2016	18000	30000	58

Source: Urban Planning Department.

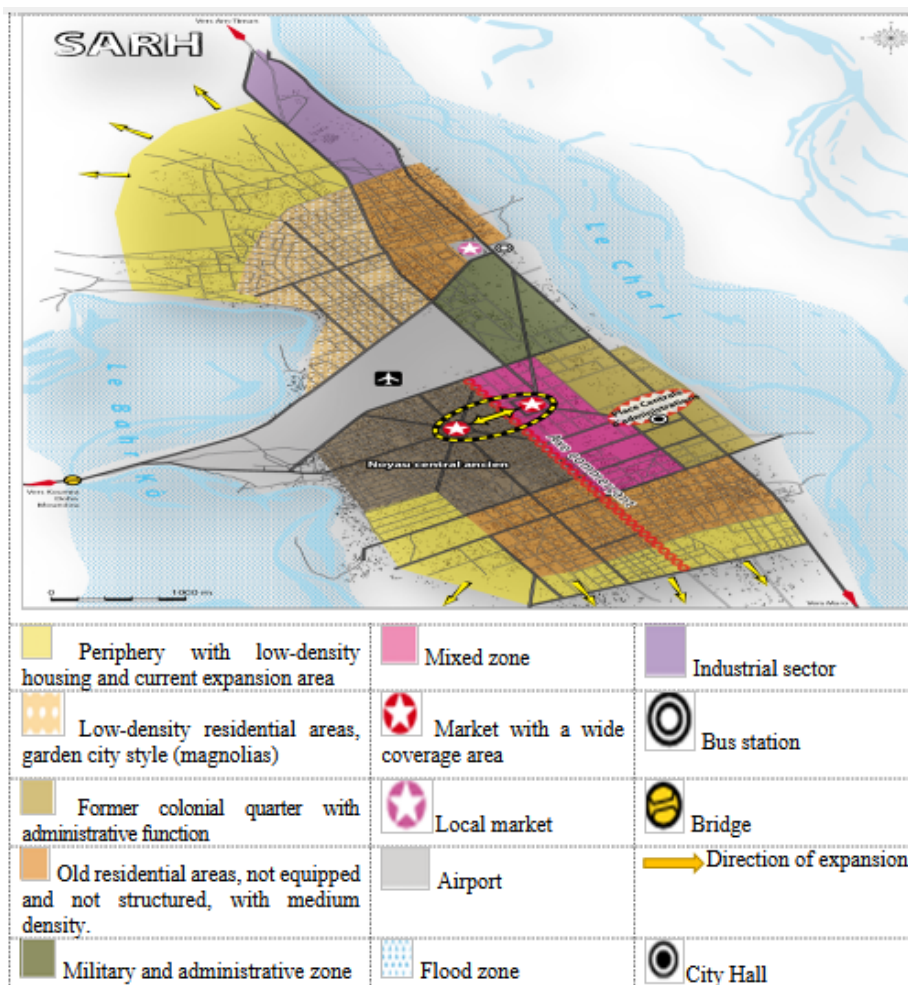
As far as everyone knows, it is the strong demographic growth that leads and has always galvanized our African countries to a rapid spatial expansion of their urban perimeters due to the "unfinished nature of these cities that spread more than they grow in height". Factors such as rapid population growth, speculative land markets, advances in building technologies, safety considerations, and lax regulatory compliance combine with local cultural norms, landscape legacies, and informal governance methods, giving rise to diverse forms of verticalization (Rimi Abubakar & Doan, 2017; Barau et al., 2025).

This extension that occurs on the peri-urban rural area is irregular and encroaches on the limited areas of fertile land where millet and vegetables grow. It obviously maximizes land competition with the economic principles of the area which are particularly for agriculture. The city of Bangui in the Central African Republic is experiencing the same phenomenon (Gonitoua & Ngana, 2024). The urban spatial dynamics and therefore of urban and peri-urban agricultural land in Sarh, revolves around five (5) categories of actors that can be distinguished among others: the administration or public authority, the local community, traditional authorities, economic interest groups and the local population. The objective of this article is to arrive at the description of this interaction and while following the actors, we will see the framing instruments, the stages of expansion of the city as well as the laws governing land in Chad and especially that of the city of Sarh. This strong land pressure on agricultural areas followed by sometimes uncontrolled urban sprawl generates a high cost of access to land and therefore difficulties of installation for young farmers, as well as a insecurity of existing farmers' productive resources (fragmentation, precarious occupation, jeopardizing the viability of farms). We thus observe a strong consumption of agricultural spaces since the 80s, we went from 2217 ha from 1997 to 1999 and today to 3000 ha from 2000 to 2016 (MATUH). The pressure on land in Chad, including excessive soil exploitation, inappropriate cultivation techniques, and the disappearance of long-term fallow periods, has profoundly altered the country's environment. Population growth exacerbated by a

significant influx of refugees combined with fishermen returning to agriculture due to declining water levels in Lake Chad has intensified this strain on regional soils. Currently, Chad is experiencing substantial agricultural expansion, characterized by intensive farming zones throughout the country. Consequently, Chadian soils are subjected to intense utilization, often yielding up to three harvests per year, which contributes significantly to their degradation and loss of fertility (Naitormbaide et al., 2010; Mekila et al., 2022; Arka et al., 2023; Awazi et al., 2025; Mouaromba et al., 2025).

However, our primary concern is to raise the issues related to this activity to generate a policy of awareness among stakeholders, especially the local urban planning commission, which is responsible for this. This local commission was established by decree No. 236/PR/MATUH/2004 of May 31, 2004. Its mission is to find a consensus on all the problems that arise for the proper functioning of the city, that is to say, to resolve all issues relating to the urbanization of space. In other words, it is responsible for: Planning and setting guidelines if the city needs to be expanded or densified; Bringing together the strengths and weaknesses and approving any subdivision and restructuring project; Examining and approving any project to extend the urban perimeter and investment files in a given area; Monitor the demographic and spatial evolution of the city and propose the updating of plans and laws in accordance with the development of this area if necessary; To correct but above all control the spatial dynamics of the city of Sarhi.

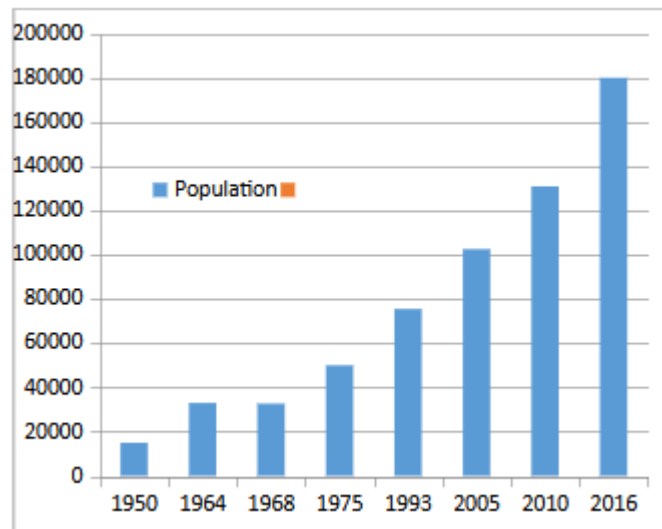
Figure 9  
Spatial view of the evolution of the city of Sarhi



Source: Own elaboration.

Sarh is developing in two opposite directions, parallel to the banks of the two rivers (Chari and Bahr Kôh). To the northwest, towards the districts of Bégou and Talala; and to the southeast (Kassai and Mangara districts). The city can only develop from north to south (inter-river zones). The extension to the southwest is in flood zones, essentially spontaneously (Kamati, Mangara south). The northwest zone is not threatened by annual floods. It constitutes, for this purpose, the preferred zone for future urbanization; provided, however, that the cutting effect of the airport is corrected (Figure 9). A project to move the Sarh airstrip to a site located after the new Hellibongo bridge (towards Kyabé) is under construction in the north of the city (studies have been completed and work will begin shortly) would free up a fairly large land area of around 250 ha in the city centre of Sarh. The land will be declassified for the benefit of the land registry and cartography services (Field survey). Thus, the model of the spatial evolution of Sarh is subject to several constraints: the location between two rivers, the airport located in the middle of the city and the South-East and North-West villages that are expanding towards the city. With this configuration, the city is developing from the inside from three independent poles and is experiencing a radial expansion on the southern and north-western peripheries, which the map below illustrates adequately (Field survey). Problems of land urbanization are associated with uncontrolled urban growth and a lack of proper development planning. Some of these include: Expansion of informal housing development due to a shortage of land for legal development amidst urban population growth. Insufficient infrastructure (water, electricity, transportation) for the growing population.

Figure 10  
Population growth in Sarh



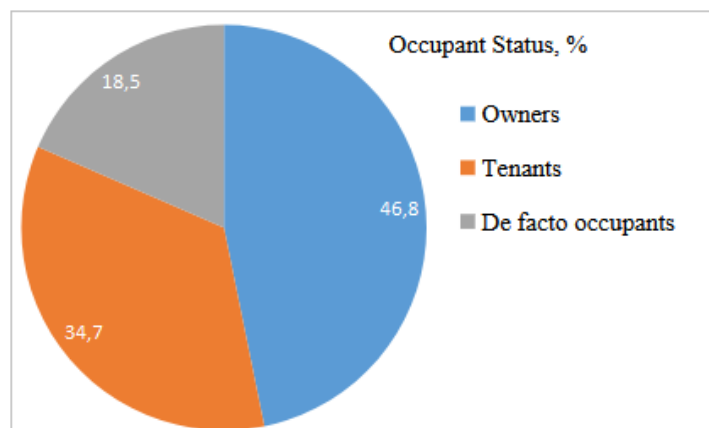
Source: Municipality of Sarh.

Fragmented territorial development and inefficient land use, which worsens with distance from the center. Causes of conflict: Lack of a clear approach to defining and protecting land tenure rights in legislation. A significant share of land purchases and sales in African cities are conducted on the informal market. Insufficient funding for infrastructure development programs in the context of urbanization. Fragmented urban governance: the number of institutions involved in urban management can be excessive, and their responsibilities sometimes overlap and duplicate each other. Consequences of Conflict: Social Stratification: Escalating inequality between slum dwellers and formally settled citizens owing to differential accessibility to essential public services; Environmental Degradation: Adverse ecological repercussions resulting from unchecked territorial expansion, including deforestation, contamination of aquifers, and degradation of surface water bodies. Impaired Mobility: Restricted intra-urban movement caused by inadequate transport infrastructure, limiting residents' access to distant employment opportunities. Measures for an effective land policy: Developing a targeted and inclusive urban development policy that integrates local, national, and regional efforts. Some elements of such a policy include: coordinating development projects at the national and local levels and improving their management; investing in basic service infrastructure, including in informal areas; expanding the capacity of local authorities to formulate local socioeconomic development strategies.

During the 1993 census, Sarh had a population of 75,496. In 2009, the population was estimated at 130,909. Today, however, this population is estimated at 180,000. The table below shows its periodic changes over the following years. This dynamic is very constant. The city is densely populated, and this is due to several factors, including migration, rural exodus, educational migration, and work (Figure 10).

Without proper urbanization planning, urban infrastructure is unable to meet the needs of growing populations: water and sewer systems fail, power grids are overloaded, the urban environment deteriorates, epidemics and diseases spread, and street violence increases. Furthermore, land use efficiency declines, the stability of property rights is undermined, and citizens' access to formal housing is limited. Poor infrastructure hinders the integration of urban spaces. In particular, underdeveloped transportation networks limit citizens' daily access to jobs located far from their homes. Because most African economies have not yet reached a sufficient level of industrialization, urbanization in Africa is in most cases not accompanied by increased employment in manufacturing or the formation of industrial zones, which could contribute to attracting investment and the socioeconomic development of African cities. Concurrently, African urban economies are distinguished by substantial expansion in the service sector, characterized by predominance of informal employment and comparatively low productivity levels. Under these circumstances, structural foundations for protracted urban poverty become established.

Figure 11  
Land tenure status in Sarh



Source: Field survey - Own elaboration.

This graphic representation illustrates the evolution of the population in the city of Sarh. This evolution is due to factors such as migration, rural exodus, and many others, and therefore remains constant. This is especially evident in the occupation statuses following our field surveys.

However, the city of Sarh has more indigenous people than non-indigenous people, which is what primarily drives its demographic growth. The city of Sarh has experienced very significant population growth over the past few decades, especially since this demographic growth is highly competitive on a national scale, as illustrated in the table below (Figure 11). In 2009, the gross population density of Sarh was estimated at 69 inhabitants/ha, compared to 54 inhabitants/ha in 1995. This represents a change of around 27%. We note an uneven distribution in terms of housing occupancy and housing characteristics. This average number of rooms per dwelling is equal to two rooms (2). However, 65% of housing units have between one and two rooms maximum.

However, it is the land use pattern that poses a problem in the city of Sarh, because the market value of plots is very restrictive even though 46.8% of the population has land. We note that urban and peri-urban agriculture stakeholders do not have enough resources to acquire a plot for their cultivation, which constitutes a significant constraint on this profitable activity around the city of Sarh. Above all, this constitutes a loss of income for the urban population. The site of the city of Sarh, wedged between the Chari River and the meanders of the Bahr Kôh, explains the presence of a fairly developed urban and peri-urban agricultural activity. The presence of market gardens, as well as the development of aquaculture, and orchards in floodplains or pockets of the river are located in neighborhoods such as Badara, Kissimi, Doyaba, Balimba, Jardin, and Morichon. The area specializing predominantly in commercial horticulture is the "Jardin" district, situated on the outskirts of Sarh City en route to N'Djamena, along the banks of Bahr Koh River. The development of this type of peri-urban agriculture is naturally linked to an increase in local demand. The spatial and cultural potential is available in the urban areas of Sarh in varying ways, as the images below illustrate. Smart urban planning - the compact placement of residential areas and social facilities - will optimize energy consumption, develop public transportation, and reduce greenhouse gas emissions. Urban planning is critical for managing rapid urban growth, particularly in African regions with high rates of urbanization. This study fills an empirical gap by analyzing how local planning mechanisms respond to these socio-environmental complexities, focusing on the interactions between institutional structures, legislative frameworks, and resource allocation.

Cities can appropriate agricultural land, utilizing it as a reserve for future development. Urbanization exerts notable influence on agricultural land use, explicitly inducing reductions in the extent of farmlands, arable fields, and cultivated plots. Conversely, alternative dynamics occasionally prevail: the emergence of garden colonies and dacha settlements surrounding major cities can stimulate rural development. Furthermore, reciprocal relationships manifest in urban and peri-urban zones: agriculture can flourish within city boundaries. Illustrative examples include the establishment of urban farms within densely populated areas, enabling individuals to engage in animal husbandry and plant cultivation for food production purposes. Thus, the dynamics of urban space and agricultural development are interconnected and influence each other. These horizontal views were taken on July 4, 2021, using a Nokia sensor by Rubain (Figure 12). The images show the Barh-ko River and the partially favorable conditions for urban farming in Sarh. This visual view of Sarh demonstrates the hydraulic and cultural potential of this city, allowing for the practice of urban and peri-urban agriculture. Within the context, the first panel shows a man sowing corn in his field, and we note that this field is fenced, demonstrating the security of his space.

Figure 12  
Hydrographic and spatial accessibility of the city of Sarh



Source: own elaboration.

According to Law No. 006/PR/2010 establishing the fundamental principles applicable to urban planning, the spatial framework for urban planning in Chad is implemented in the Master Plan for Urban Planning and Development (SDAU). In the absence of this plan, several cities in the country operate on the basis of Urban Reference Plans (PUR), which are very basic urban planning documents. Unlike the SDAU, their implementation does not require extensive studies. They merely provide a rapid exploration of the existing situation, identify the main problems, and propose solutions to resolve them. However, only three of the seven instruments have been used by stakeholders in Sarh so far: subdivision, land division, and restructuring.

## Discussions

The city of Sarh is an example of a small, developing town. Established by the colonial administration, it has managed to survive despite the multiple crises that Chad has experienced. Its dynamics are accompanied by land conflicts between the city and the surrounding agricultural areas. The rapid urbanization of the city of Sarh is a recent but brutal phenomenon. This accelerated spatial growth has numerous consequences, including the expansion of urban space into the nearby countryside. These transactions take place between traditional landowners, as well as modern administrations and city dwellers seeking land. Beyond this interchange, land is sold far from the front lines, to the detriment of the area's main activities, which are agriculture and agroforestry. This observation led us to conduct a comprehensive analysis of these stakeholders' concerns regarding agricultural land, particularly the reasons that drive them to excessive land sales. Traditional economic activities are losing momentum following the rise of this spatial dynamic.

Table 3  
Conflicts related to access to land

Year	District 1	District 2	District 3	District 4	District 5
2017	100	130	104	170	200
2018	150	133	122	205	234
2019	176	178	139	210	289
2020	175	201	145	267	390
2021	190	140	170	300	329

Source: Field survey - Own elaboration.

However, this sprawl leads to active competition between agricultural activities and the need for land for housing construction and the installation of urban facilities and infrastructure, in order to meet certain requirements related to this dynamic. The urban struggle between residential and agricultural land, resulting from the city's rapid expansion and the increasing scarcity of virgin land, is evident at first glance at the Kissimi agricultural site southwest of the city of Sarh. Since the early 2000s, this site (among other sites) has been highly vulnerable to land appropriation and sale, especially by members of the customary family with the participation and support of certain state actors. As such, a number of conflicts related to access to land were the subject of our field research, as demonstrated in the table below (Table 3).

Table 4  
Distribution of complaints concerning land and their subject at the Sarh court

Purpose	Quantity	Percentage
Complaint for allocated plot	107	65,24%
Land sale	32	19,51%
Inheritance	18	10,97%
Claim for expenses	3	1,82%
Suspension of work	4	2,43%
Total	164	100%

Source: Own elaboration, 2021.

This table demonstrates the reality of the results of very poorly organized governance in the city of Sarh. Above all, this table summarizes land-related conflicts, as mentioned above. Conflicts are all too frequent on the outskirts of the city, and this is evident in the newly acquired land, as well as the multiple trends in its uses. The Sarh court's jurisdiction does not stop at the urban perimeter. It extends beyond, reaching villages outside the urban perimeter (Table 4). Thus, in relation to the land study we are conducting and the year chosen (2021), let us say that all the complaints recorded concern the city of Sarh and its surrounding areas. It should be noted that the city has experienced two (2) expansion zones, namely the expansion towards the North and towards the South. Thus, of the 164 complaints concerning land in 2021: 89 come from the Northern expansion zone (54.26%); 32 from the Southern expansion zone (19.51%); 30 from the city center (18.29%) and 13 from the surrounding villages (7.92%). The current trend is to reconcile urban and peri-urban land by preserving spaces for agriculture. Modern architectural techniques encourage sustainable, ecologically oriented urbanization. Interstitial crops are found on urban plots, both on upper and lower levels.

The city of Sarh can experiment with this strategy. Theoretically, land is designated as state-owned property, specifically categorized as public land reserved exclusively for residential purposes. Empirical observations, however, reveal that governance of land use extends beyond state authority, involving multiple actors who frequently exercise greater influence in this domain. The case for all urban sites in Sarh is that, in general, "state ownership is likely to degenerate into a de facto open access system." This seems to be happening, largely due to current urban contexts and reasons for failure such as the widespread dispersion of the Sarh urban population and the uncontrollable nature of their natural resources. We see in the city that public property is indeed tending to become a relatively open access system (albeit governed by a specific group of actors who determine access). However, while state ownership is now evolving towards an "open access" system, community management is also not very effective: there is a clear lack of control, and many land conflicts are exacerbating the situation. In the prevailing scenario, inhabitants of the urban settlement in Sarh perceive imminent threats to their livelihood. Their apprehension stems from anticipations that their activities, particularly those concentrated proximate to the city center, might diminish in the foreseeable future. Sales of previously utilized land, parcels situated on lower valley slopes or depressions, as well as sales of abandoned terrains, collectively project a dire prognosis for their subsistence. Regarding customary authority, there is considerable ambiguity, as several so-called customary chiefs are reappropriating land on the site. As for the state, some market gardeners no longer have their land records, which works against them when faced with state agents who come to conduct surveys on the number of market gardeners working on urban sites. Above all, the state fails to protect the agricultural and public character of the sites, making it impossible to reclaim the spaces for proper agricultural gardens. The lack of good governance, particularly in land protection, has contributed to the abandonment and neglect of many areas of formerly cultivated land.

## Conclusion

Our investigation, focusing on agricultural land amidst the urban spatial dynamics of Sarh city vis-à-vis the governing authorities' development strategy, assumes both criticality and sensitivity. Henceforth, it becomes imperative to incorporate agricultural land within the urban fabric while assuring its resilience-oriented integration - a concern central to this endeavor. Recent years have seen heightened scholarly and institutional engagement with peri-urban agriculture, translating into manifold research initiatives and applied interventions. Yet, these undertakings do not consistently yield intended outcomes. Our experience in the field, both as a researcher and a development agent, but especially as a geostrategic, has allowed us to identify several causes: An approach that is not always sufficiently participatory. Indeed, it often turns out that projects are "imposed" on beneficiaries, without involving them in the design of the action to be undertaken. Thus, certain issues that arose during the land development process could have been prevented or at least contained by a participatory study of the action to be carried out. As we repeatedly emphasize in this work, residents are those who have the best knowledge of their context. Their participation in preliminary studies is crucial to the success of any development or research initiative; The lack of continuity between actions and the lack of coordination between stakeholders, the scattering of experiences and data. To this end, we conducted an inventory of the land situation, its conditions, its consideration, and the constraints hindering its proper functioning, and, where possible, identified possible solutions for its takeover by the authorities of the city of Sarh. In response to these difficulties, strategies were implemented with local stakeholders to overcome the management problems of this city. These strategies involved developing and establishing groups to revive the value of agriculture by defending areas suitable for its practice within the framework of its consideration in the city, particularly starting with the urban master plan.

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