Peri-urban environmental degradation and the urbanisation of the Bamako District, Mali: the case of the rural commune of Sanankoroba

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ABSTRACT

For several decades, the growth of the Bamako District has spilled over its administrative boundaries into neighbouring rural communes. This study examines the environmental effects of that urban spillover on the rural commune of Sanankoroba, located about 35 km south of the capital. The approach combines a questionnaire survey of 100 respondents with semi-structured interviews of five administrative and customary leaders. All respondents consider that the urbanisation of Bamako affects their commune. The interviews highlight five main effects: the conversion of farmland into housing plots and industrial sites, the decline of vegetation cover, the scarcity of wildlife, pollution of water, air and soil, and excavations that weaken soils. These are accompanied by social tensions, a perceived rise in insecurity and growing pressure on basic services. The three initial hypotheses, concerning vegetation, wildlife and land, are supported by the perceptions collected, although they have yet to be measured with biophysical indicators. The study calls for inter-municipal planning at the scale of Greater Bamako, the protection of farmland and the monitoring of vegetation cover through remote sensing.

Keywords: urbanisation, peri-urbanisation, environment, Sanankoroba, Bamako

INTRODUCTION

The planet is now predominantly urban, and most of the urban growth expected by the middle of the century will be concentrated in Africa and Asia (United Nations, 2019). This growth is not only reflected in the densification of existing centres; it also takes the form of sprawl that rapidly consumes the natural and agricultural land on the edges of cities. At the global scale, Seto et al. (2012) estimate that the urban expansion projected to 2030 will directly affect biodiversity-rich areas and reduce carbon stocks in vegetation. D'Amour et al. (2017), for their part, show that the land absorbed by cities is often among the most fertile, which raises the question of food security in the regions concerned.

Cities do not only transform the land they occupy. They alter the functioning of ecosystems far beyond their boundaries, through their demand for wood, water, building materials and agricultural products, but also through the waste they generate (Grimm et al., 2008). McKinney (2002) showed that most wild species decline along the gradient running from rural areas to the urban core, as their habitats are fragmented and then replaced. The fringes of cities are thus particularly exposed transition zones, where agricultural, residential and industrial uses overlap (Véron, 2008).

Bamako is a striking illustration of these dynamics. The population of the District rose from 1,088,510 in 1998 to 2,124,032 in 2009, an average annual growth rate of around 6%, and is estimated at about 4.2 million in 2023 (INSTAT, 2023). With no space left within the District's boundaries, built-up areas have spread into neighbouring communes, mainly on the right bank of the Niger River (Toure and Çöteli, 2026). The example of Kalaban-Coro, whose population grew from 4,228 in 1987 to 96,173 in 2009, shows the scale of the phenomenon (Sow and Diallo, 2026). It was to better manage this expansion that "Greater

Bamako", bringing together the District and some fifteen peripheral communes including Sanankoroba, was established in 2018 (Sow and Diallo, 2026).

Located on National Road No. 7, about 35 km from central Bamako, the rural commune of Sanankoroba now lies on the front line of this urbanisation. Its farmland is increasingly being subdivided into housing plots, industrial and poultry units are setting up there, and new residents from the capital are settling in. These changes raise concerns about the state of the commune's natural resources: soils, vegetation, wildlife and water. Yet few studies have looked at the environmental effects of Bamako's urbanisation on this particular commune, as the available literature focuses mainly on the District itself or on other neighbouring communes such as Mandé (Koné, 2024).

Three concepts structure the analysis. **Urbanisation** refers both to the increase in the share of the population living in cities and to the physical expansion of built-up areas. **Peri-urbanisation** is its most visible spatial form in large African cities: it refers to the settlement, beyond the city's administrative boundaries, of people and activities that remain functionally dependent on it for employment, services and trade. The communes concerned retain rural status even as their land use, landscapes and social relations are transformed. Finally, **environment** is understood here as the set of physical and biological components (soils, water, vegetation, wildlife) with which human societies interact. From this perspective, the impact of urbanisation can be read as a chain linking a driver (urban growth), pressures (land occupation, resource extraction, waste) and effects on the state of resources.

This study therefore starts from the following question: what are the impacts of the urbanisation of the Bamako District on the environment of the rural commune of Sanankoroba? More specifically, it aims to identify the effects of this urbanisation on vegetation, to analyse its effects on wildlife and to determine its effects on the commune's land. Three hypotheses guide the analysis: the urbanisation of Bamako degrades Sanankoroba's vegetation (H1), it has negative effects on its wildlife (H2) and it adversely affects its land, particularly farmland (H3).

MATERIALS AND METHODS

Study Area

The rural commune of Sanankoroba belongs to the cercle of Kati, in the Koulikoro region. Covering 615.51 km², it comprises 26 villages. It is bounded to the north by Commune VI of the Bamako District and by the commune of Kalaban-Coro, to the east by the communes of Bougoula and Mountougoula, to the south by the commune of Dialakoroba and to the west by the Niger River. Its main town, Sanankoroba, is crossed by National Road No. 7, which links Bamako to Bougouni and on to Côte d'Ivoire, a route that facilitates daily travel to the capital.

The climate is Sudanian. It is characterised by a rainy season from June to September, with most rainfall in July and August, and a long dry season from October to May, itself divided into a cool period (November to February) and a hot period (March to May). Annual rainfall rarely exceeds 1,000 mm and varies greatly from year to year; temperatures range from 12 °C to 40 °C (Commune rurale de Sanankoroba, 2010). The relief, generally flat, is dotted with chains of hills. Soils are mostly sandy clay. The vegetation is a tree savanna dominated by shea (Vitellaria paradoxa), African mahogany (Khaya senegalensis), tamarind (Tamarindus indica), baobab (Adansonia digitata) and balanzan (Faidherbia albida). The wildlife, already depleted, still includes a few antelopes, warthogs, rodents (hares, porcupines), reptiles and birds such as guinea fowl and francolin.

At the 2009 census, the commune had 37,294 inhabitants, including 18,694 men and 18,600 women (INSTAT, 2011). Its population was estimated at 46,193 in 2015, giving a density of about 75 inhabitants per km², with a natural growth rate of around 3.6% per year and a high proportion of young people (Commune rurale de Sanankoroba, 2010). The Bambara are the majority group, alongside Fulani, Malinke, Bobo, Somono and Moors. The economy is based on farming, livestock rearing, market gardening, fishing, gathering, trade, crafts and traditional gold panning. Since the major droughts of the 1970s, land degradation

has been a constant concern for producers, one that population growth and demand for firewood only intensify.

Table 1 brings together the main demographic benchmarks situating Sanankoroba in relation to the capital.

Table 1: Demographic benchmarks for the Bamako District and the commune of Sanankoroba

Entity	Year	Population	Source
Bamako District	1998	1,088,510	INSTAT, 2011
Bamako District	2009	2,124,032	INSTAT, 2011
Bamako District	2023	≈ 4,200,000	INSTAT, 2023
Commune of Sanankoroba	2009	37,294	INSTAT, 2011
Commune of Sanankoroba	2015	46,193	PDESC, 2010

Source: INSTAT, 2011 and 2023; Commune rurale de Sanankoroba, 2010.

Approach and Data Collection

The study adopts a mixed-methods approach combining quantitative and qualitative data. A literature review was first carried out in libraries and documentation centres in Bamako and Kati in order to gather available work on the urbanisation of Bamako, its environmental effects and the context of the commune, notably its Economic, Social and Cultural Development Programme (PDESC).

A questionnaire was then administered to a sample of 100 people living or working in the commune. It comprised three sections: identification of the respondent (sex, occupation, level of education), their perception of the influence of Bamako's urbanisation on the commune, and open-ended questions on the effects observed on vegetation and economic activities, as well as on the measures to be taken. The questionnaire was administered in September 2024. In parallel, semi-structured interviews were conducted in February 2025 with five key informants chosen for their knowledge of the area: the deputy mayor in charge of urban planning, the sub-prefect of Sanankoroba and the chiefs of the villages of Sanankoroba, Tamala and Koniobla. The interview guide covered three themes: the effects of Bamako's urbanisation on the commune; its effects on land, vegetation and wildlife; and the measures likely to mitigate its negative consequences.

Table 2 summarises the tools used, the target groups and the type of information sought.

Table 2: Data collection tools

Tool	Target	Number	Period	Data
Literature review	Libraries and documentation centres in Bamako and Kati	-	2024-2025	Context, theoretical framework
Questionnaire	Residents and officials working in the commune	100	September 2024	Quantitative and open-ended
Interview guide	Administrative and customary authorities	5	February 2025	Qualitative

Source: field survey, 2024-2025.

Data Processing and Analysis

Responses to closed questions were tallied and presented as frequency distributions. Similar occupational categories were grouped together for ease of reading. The interviews were transcribed and then subjected to thematic content analysis: each account was broken down into units of meaning, which were then assigned to impact categories (land, vegetation, wildlife, pollution, soils, social effects).

A matrix crossing informants and impact categories was built to identify convergences. Finally, these results were organised into a causal chain linking the driver of urbanisation, the pressures it exerts and the effects observed.

RESULTS

Respondent Profile

The sample is overwhelmingly male: 85% of respondents are men and 15% women (Table 3). In occupational terms, it is dominated by teachers and educators (41%) and students (40%). Farmers account for 15% of respondents, while other occupations (civil engineering technician, state-registered nurse, lawyer) make up only 4%.

Table 3: Socio-demographic characteristics of respondents (n = 100)

Variable / category	Number	Percentage (%)
Sex		
Men	85	85
Women	15	15
Occupation		
Teachers and educators	41	41
Students	40	40
Farmers	15	15
Other (technician, nurse, lawyer)	4	4

Source: field survey, 2024.

This composition reflects a rather educated and young sample, which should be borne in mind when reading the results. Farmers, although directly affected by the loss of farmland, are less well represented than people from the education sector.

General Perception of the influence of Bamako's urbanisation

When asked whether the urbanisation of the Bamako District influences their commune, all respondents answered yes (Table 4). No negative answers, abstentions or "don't know" responses were recorded.

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Table 4: Respondents' views on the influence of Bamako's urbanisation on the commune of Sanankoroba

Response	Number	Percentage (%)
Yes	100	100
No	0	0
Don't know	0	0
Abstention	0	0
Total	**100**	**100**

Source: field survey, 2024.

This unanimity shows that the capital's hold over Sanankoroba is taken for granted by its inhabitants. Responses to the open-ended questions clarify the nature of this influence: the arrival of new residents, housing construction, the establishment of industrial units, and the retreat of fields and trees. Several respondents also report that roads and sanitation infrastructure are not keeping pace with this growth and are deteriorating rapidly, while buildings erected without regard for planning standards are giving rise to pockets of informal housing.

Effects on land

Land is the component of the environment for which the effects of urbanisation are described in the greatest detail. Four of the five informants mention the gradual disappearance of cropland. For the deputy mayor, Bamako's growth has a twofold consequence: it increases demand for food crops and vegetables and, at the same time, "urban growth is encroaching more and more on agricultural land". The sub-prefect is even more explicit: "Farmland has become land for industrial sites." The chiefs of Tamala and Koniobla speak respectively of a "decrease in cultivable land" and a "scarcity of farming areas".

Beyond the change in use, the land is undergoing physical degradation. The chief of Tamala reports that the new industrial facilities have "shaken our land by having holes dug everywhere", a reference to excavations for extracting building materials. The sub-prefect points out that recently built roads, bridges and drains, for lack of maintenance, encourage gully erosion. Finally, respondents associate the arrival of new farmers with more intensive cultivation and land clearing, two factors that expose soils to erosion and reduce their fertility.

Effects on vegetation

The decline in vegetation cover is cited by four informants out of five. It results first from the clearing of plots intended for construction or industrial facilities, and then from the felling of trees for firewood and for the expansion of cropland, two needs that population growth intensifies. The sub-prefect observes that "the flora is becoming rare and the vegetation is no longer rich". The chief of Tamala sees urbanisation as "the root cause of the loss of trees", while the chief of Koniobla speaks plainly of deforestation. Respondents also report the appearance of introduced plant species, which tend to compete with local species.

Effects on wildlife

The growing scarcity of wildlife is also mentioned by four informants. According to the sub-prefect, "the animals have disappeared because of the noise of factory engines, the clearing of forests for gardening and the destruction of all their hiding places".

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The deputy mayor and the chief of Koniobla mention the loss of habitats and biodiversity. Respondents also blame hunting, which has intensified with population growth, and the increasing use of pesticides and chemical fertilisers on the market gardens that supply Bamako.

Pollution and Associated Social Effects

Pollution is the only effect cited by all five informants. It takes several forms: water pollution from industrial discharges according to the sub-prefect, factory smoke according to the chief of Tamala, and waste from the capital according to the chief of Sanankoroba, who states that "people from Bamako come and dump all kinds of toxic waste from factories".

Informants do not separate these environmental effects from their social consequences. Three of them mention rising insecurity and delinquency, which they attribute to the displacement into the commune of people in difficulty in the capital.

The sub-prefect stresses that health services are saturated, lacking doctors and midwives in the face of population growth. The chief of Sanankoroba mentions unemployment among informal workers forced to leave the city. Tensions are also emerging between newcomers and long-standing residents over access to land and employment. Table 5 summarises how these effects are distributed across informants.

Table 5: Effects of Bamako's urbanisation cited by key informants

Effect cited	DM	SP	VC-S	VC-T	VC-K	Total
Loss of farmland	x	x		x	x	4
Decline in vegetation		x	x	x	x	4
Scarcity of wildlife, habitat loss	x	x		x	x	4
Pollution (water, air, waste)	x	x	x	x	x	5
Excavations, soil degradation		x		x		2
Insecurity, delinquency		x	x	x		3
Pressure on services, unemployment	x	x	x			3

DM: deputy mayor; SP: sub-prefect; VC-S, VC-T, VC-K: chiefs of the villages of Sanankoroba, Tamala and Koniobla.

Source: field survey, 2025.

The effects cited are not independent of one another. Figure 1 organises them into a causal chain: Bamako's growth translates in Sanankoroba into three major pressures (residential overspill, the establishment of industrial and poultry activities, and waste dumping and material extraction), each of which produces several effects on the environment.

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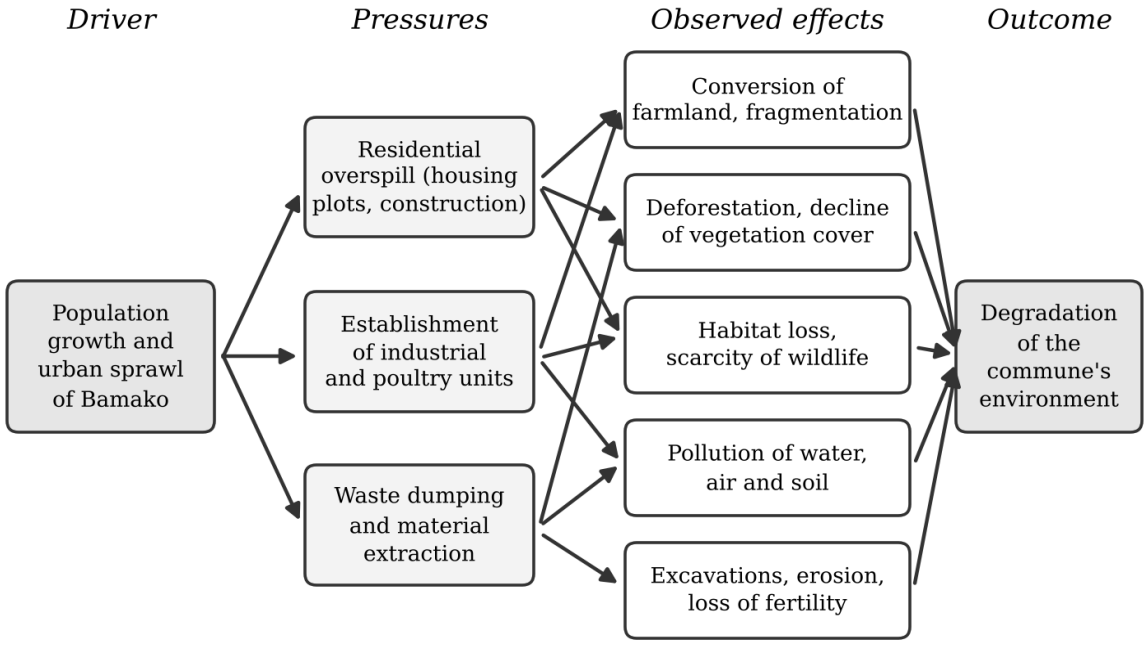


Figure 1: Chain of impacts of Bamako's urbanisation on the environment of Sanankoroba

Source: field survey, 2025.

Effects on Economic Activities

The effects of urbanisation on the local economy are described in more nuanced terms. On the one hand, the arrival of city dwellers and investors has encouraged the opening of industrial zones and poultry units that offer some jobs and diversify sources of income. The proximity of Bamako also creates a major outlet for market gardening, for which demand keeps growing, as the deputy mayor points out. On the other hand, these opportunities come with a reduction in the farmland available to rural households, rising land prices and increased competition for jobs between long-standing residents and newcomers. Subsistence farming, which remains the livelihood base for most households, thus appears to be the activity most weakened by the transformation of the commune's land.

Measures Proposed by Local Actors

Interviewees put forward several proposals. The deputy mayor stresses the preservation of farmland and natural areas, the development of agriculture and the development of public transport, which would reduce the need to settle close to the capital. The sub-prefect and the chief of Koniobla emphasise raising public awareness. The chief of Sanankoroba calls on the authorities to enforce environmental regulations, and the chief of Tamala would like inspectors to be sent to the worst-affected sites.

DISCUSSION

The results confirm that Sanankoroba is now fully integrated into Bamako's sphere of influence. Respondents' unanimity on this point matches the observation made at the scale of Greater Bamako, where the city "is sprawling very quickly at the expense of neighbouring communes and of nature" (Sow and Diallo, 2026). It is also consistent with the diachronic analysis of satellite imagery by Toure and Çöteli (2026), who show that from the 1980s onwards built-up areas spread into previously non-urbanised land, mainly on the right bank of the Niger, that is, in the direction of Sanankoroba, and that vegetation cover declined sharply between 2000 and 2023.

The conversion of farmland, cited by most informants, is the most far-reaching effect. It corresponds to the mechanism described at the global scale by d'Amour et al. (2017): cities expand preferentially onto

cropland, often more fertile than average, because it is accessible and easy to develop. In Sanankoroba, this conversion benefits housing estates and industrial units. It creates a paradoxical situation noted by the deputy mayor: the commune is losing its cropland at the very moment when the capital's demand for vegetables is rising. This paradox pushes the remaining farmers to intensify production on smaller areas, with greater use of chemical inputs, which accelerates soil depletion. Hypothesis H3 is thus supported.

The decline in vegetation (H1) is part of the same process. Koné's (2024) work on the neighbouring commune of Mandé, based on satellite imagery, revealed a decline in vegetation cover linked to the occupation of land by people from Bamako. Our results point in the same direction. They also show that pressure on woody vegetation does not come solely from construction: the demand for firewood from a rapidly growing population weighs at least as heavily. The effects on wildlife (H2) stem directly from the loss and fragmentation of habitats, in line with the pattern described by McKinney (2002), whereby wild species richness decreases closer to built-up areas. In Sanankoroba, noise from industrial facilities and hunting add to this habitat loss. The study's three hypotheses are therefore supported, subject to the limitations discussed below.

Pollution, cited by all informants, shows that Bamako's influence is not limited to land occupation. City fringes receive part of the urban area's waste, whether industrial effluents, smoke or dumped refuse. This role as a receptacle for urban nuisances is well documented for cities in developing countries, where sanitation provision lags behind urbanisation (Véron, 2008; Grimm et al., 2008). The establishment of industries on former farmland, without facilities for treating discharges, is one of the main causes here.

The nature of the plant formations affected increases the significance of this decline. In the Sudanian zone, much of the woody cover is found within the fields themselves, in the form of agroforestry parklands where farmers deliberately retain shea, baobab, tamarind or balanzan for their fruit, their shade or their role in soil fertility. When a field is subdivided into plots, these trees disappear along with the crops, since subdivision generally involves clearing the entire plot. The loss of farmland and the loss of vegetation are therefore closely linked in Sanankoroba, and the disappearance of these trees also deprives women of important resources, notably shea kernels.

The social effects identified by informants (insecurity, saturation of health services, land tensions) are not directly related to the physical environment, but they weigh on the commune's capacity to manage its resources. A local authority whose services are overwhelmed and whose population is rapidly changing finds it harder to enforce rules on the use of land and natural resources. This observation echoes that of Kacyira (2012), for whom urbanisation is sustainable only if planning and basic services keep pace with population growth.

The trajectory of Kalaban-Coro, which borders Sanankoroba, sheds light on what could happen if expansion continues unchecked. In some twenty years, its population increased more than twentyfold (Sow and Diallo, 2026), and its territory has largely become a residential fabric continuous with the capital, to the point that part of it was incorporated into the District during the 2023 territorial reform. Sanankoroba, further away, is currently in the phase in which housing estates are advancing along National Road No. 7 while farmland still predominates. It is precisely at this stage that planning choices have the greatest effect, before land occupation becomes irreversible.

Land tenure lies at the heart of these dynamics. In Bamako's peri-urban communes, farmland, long governed by customary rules, acquires a high market value as soon as the city draws near. Customary landholders are then encouraged to sell their fields, often to buyers from the capital, while official and informal subdivisions overlap. The tensions between long-standing residents and newcomers reported by our informants arise in this context. The role of village chiefs in land management makes them essential players in any policy to protect farmland, as the recommendations they made confirm.

Another risk, absent from the informants' accounts but reported in the literature, deserves attention: flooding. The sealing of soils by buildings and roads accelerates runoff and increases peak flows during heavy rains, as studies of flood-prone areas in the District have shown. In a commune bordered by the Niger River and

marked by hilly relief, the urbanisation of lowlands and riverbanks could expose new neighbourhoods to this risk, especially as, according to the sub-prefect, the drains that have been built are poorly maintained.

These results should nevertheless be interpreted with caution. The questionnaire sample is dominated by teachers and students, and women are very poorly represented; it therefore does not reflect the structure of the commune's population. The closed question on the influence of urbanisation, phrased directly, may have steered responses towards agreement, which suggests that the observed unanimity should not be over-interpreted. Furthermore, the effects described are based on perceptions: no measurement of the area of converted land, of changes in vegetation cover or of water quality was carried out. Finally, the study focused on negative effects, whereas actors also acknowledge positive spin-offs, such as the arrival of job-creating industrial units or the opening of an urban market for vegetables. Future work would benefit from combining satellite image analysis, as Toure and Çöteli (2026) did for the District, with sampling stratified by village, sex and activity, in order to measure the actual extent of the changes and better distinguish situations across social groups.

CONCLUSION

This study set out to analyse the effects of the urbanisation of the Bamako District on the environment of the rural commune of Sanankoroba. It shows that the capital's hold is perceived by all and that it results in the conversion of farmland into housing plots and industrial sites, a decline in vegetation cover, a growing scarcity of wildlife, pollution of water, air and soil, and physical land degradation linked to excavations and unmaintained infrastructure. These effects are accompanied by social tensions and increased pressure on basic services. The three initial hypotheses are supported by the data collected.

Several courses of action emerge. The first is to integrate Sanankoroba into inter-municipal planning at the scale of Greater Bamako that clearly delineates building zones, industrial zones and farmland to be protected. The second is to subject every new industrial facility to an effective environmental assessment and to monitoring of its discharges. The third concerns waste management, with a collection system and controlled disposal sites. Finally, raising residents' awareness and involving customary authorities in land management appear essential, as the interviewees emphasised.

Other, more technical measures can accompany these orientations. Developing public transport between Sanankoroba and Bamako would reduce residential pressure on the land closest to the road. In new neighbourhoods, requiring that some existing trees be retained, creating green spaces and village woodlots, and harvesting rainwater would help limit the loss of vegetation cover and runoff. Promoting less resource-intensive building materials and regulating sand and gravel extraction, with an obligation to rehabilitate sites, would help curb the physical degradation of land. These measures, however, require financial and technical resources that the commune rarely has on its own, hence the value of cooperation with the District and the State's technical services.

From a scientific perspective, this work paves the way for more in-depth research. Monitoring vegetation cover and land use through remote sensing, measuring water and soil quality near industrial sites, and extending the survey to farmers and women would make it possible to move from perceived change to measured change and to inform the commune's planning choices.

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