

Would Brasília be less Brasília if more people lived in the protected area?

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Abstract

The capital of Brazil, Brasília, has been a UNESCO World Heritage site since 1987 due to its modernist characteristics. Although it is now the third-largest city in Brazil, only 10.87% of the population lives within its designated heritage area, which supports 40.7% of formal employment. Despite abundant open spaces and underutilized buildings, both the government and parts of the public are resistant to increasing density, resulting in sprawling, low-density expansion into natural savanna areas. One of the arguments for this resistance is that higher residential density in the protected area might compromise its core characteristics and potentially endanger its UNESCO status. This study aims to demonstrate, through simulations of four new residential areas based on existing building types and typical public/private space ratios, that densification can be achieved without compromising Brasília's modernist essence. A comparison with four gated communities – a typical model of the city's expansion – illustrates that this proposed model also promotes more efficient use of infrastructure, preserves natural landscapes, and fosters diversity and inclusivity, all aligned with sustainable urban density principles. The study believes that simulations and morphological comparisons can contribute to informing the debate and help combat the exclusionary and prejudiced rhetoric of those against densification.

Keywords

Brasília, world heritage site, sustainable urban density

1. Introduction

Brasília, the modernist city and third capital of Brazil (Figure 1), had its design chosen through a national public competition held in 1957, which was won by Brazilian architect Lucio Costa. According to the competition guidelines, it would be located in the Federal District (DF), within a 5,761 km² rectangle in the central-west region and was intended to house a maximum of 500,000 people (IPHAN, 2018).

Men and women from all over the country came to work on the construction of the city, leading to the emergence and consolidation of additional urban centers around it, adding to the two that already existed there. Brasília was inaugurated in 1960, with a population of 141,742, including residents of the modernist core, or Pilot Plan—which in a way was born as a historic center—and the residents of the satellite cities. By 1970, its total population had already exceeded the estimated limit, reaching 546,015 inhabitants (CODEPLAN, 2022), and today it is the third-largest city in the country, with 2,817,381 inhabitants (IBGE, 2022). In 1987, Brasília earned UNESCO World Heritage status, and a protection perimeter was defined within which only 327,413 people currently live, or 11.62% of the city's population. Within this perimeter, however, 40.7% of formal jobs are concentrated (Figure 2).

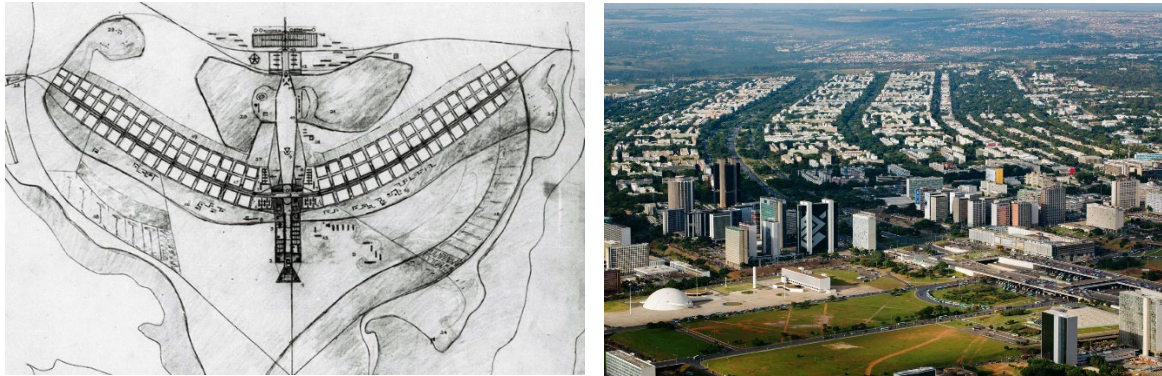


Figure 1. Brasília, Brazil. Pilot Plan (left) and the city today (right). Source: left: IPHAN, 2018; right: Nelson Kon.

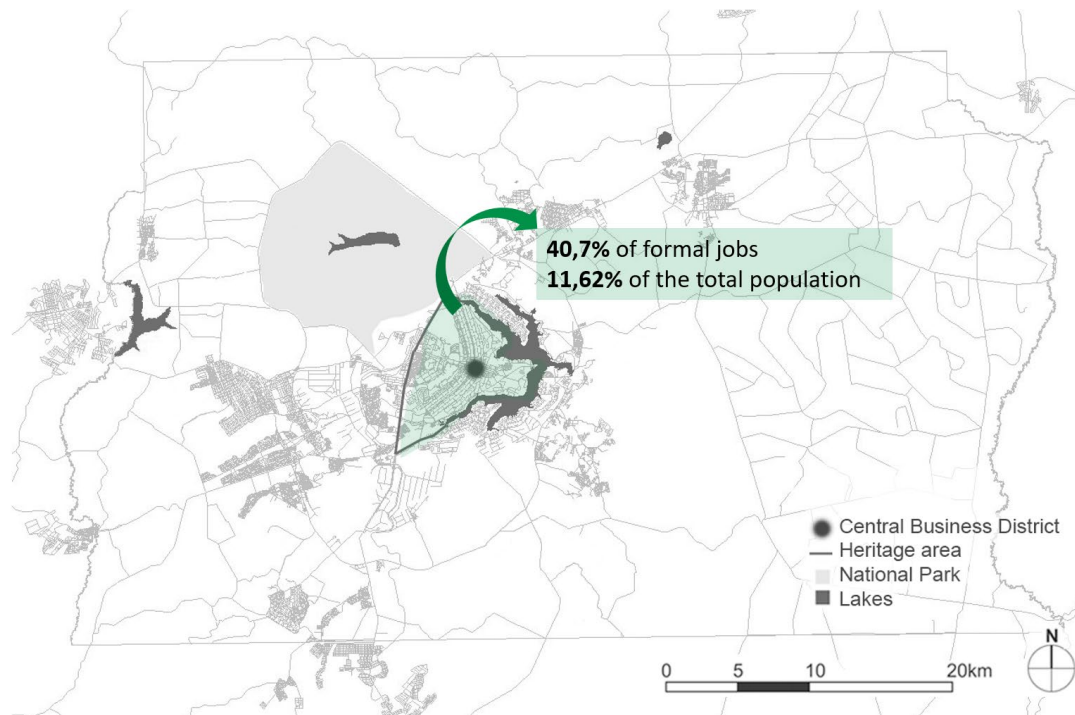


Figure 2. The Federal District and the perimeter of the protected area. Source: the author, CODEPLAN, 2022 and IBGE, 2022.

Recently, after more than 15 years of studies, drafting, and debates, the Brasília Urban Ensemble Preservation Plan (PPCUB) was approved, a document that sparked controversy for suggesting, among other things, relaxing certain zoning regulations and creating new areas for construction. Heated debates ensued, in which it was often argued that allowing certain changes would lead to Brasília losing its World Heritage status or that it would be unsustainable for the designated heritage area to accommodate more residents. Generally, these claims appear to come primarily from current residents of the heritage area, who are concerned about potential changes to their status quo. However, such claims are rarely backed by data, studies, or simulations to support or validate them.

To help inform this debate, this article records the author's contribution in November 2017 during a roundtable titled "Possibilities and Strategies for Housing Inclusion in Brasília's Urban Ensemble," held as part of the "Housing in Central Areas of the Federal District" seminar organized by the Federal District Government (GDF). One of the key motivations for this seminar was the idea of relaxing zoning regulations in central areas to allow residential use, based on findings that several properties in sectors such as the

Commercial and Banking Sectors were vacant. Here, simulations and comparisons are presented to demonstrate that increasing density in the heritage area does not necessarily disrupt the city's essential characteristics and may be far more sustainable than the current growth model.

This paper was originally written in Portuguese, and used ChatGPT (OpenAI, 2024) for the translation process.

2. Simulation

The study began by selecting four areas with distinct characteristics within the designated heritage perimeter (Figure 3). In each area, a visual simulation was created by introducing new residential buildings, and the population was estimated.

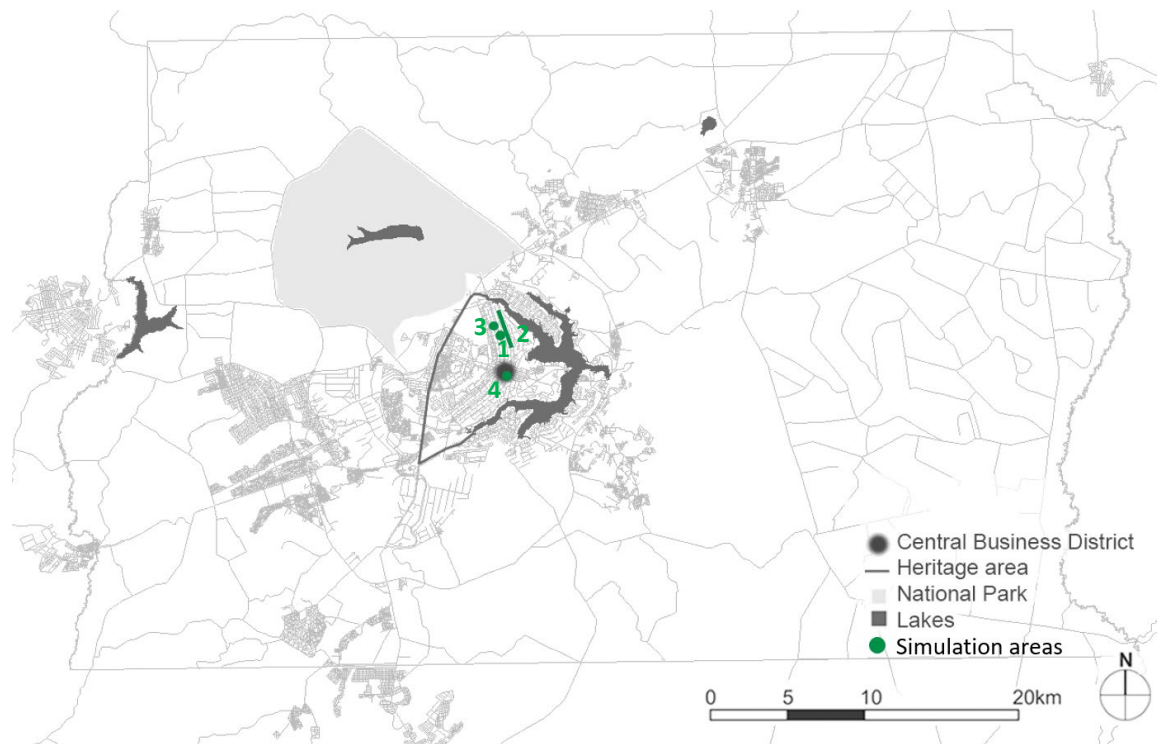


Figure 3. The simulation areas: 1) Superquadra Norte/SQN 206; 2) Avenida L3 Norte; 3) Setor de Grandes Áreas Norte 707/907 e 4) Setor Bancário Sul. Source: the author.

The visual simulation used an aerial view provided by Google Earth as a starting point, as it allows for observation of the relationships between public and private areas, which in the case of the Pilot Plan highlights the large predominance of open spaces over built-up areas. All buildings added in the simulation are copies of buildings present in the original image, created using Adobe Photoshop. This insertion respected the existing public/private space ratio, aimed to maintain the same level of greenery, and employed established building types that are deeply ingrained in the image that Brasília's residents hold of their city.

The population estimate was based on disaggregated data from the 2010 census. Census tracts with the same type of building were researched to calculate the number of inhabitants per residence for that specific type, using the corresponding attribute table (Figure 4). Since these are well-established areas with very limited potential for transformation, it is believed that the values still reflect the current reality, as the most recent data from the 2022 census remains preliminary.



Figure 4. Census tracts and attribute table. Source: Google Earth and IBGE, 2012.

2.1. Superblock SQN 206

The superblock has been present since the city’s conception and was one of the two forms of housing envisioned in the original plan. There are two types of superblock: one with six-story buildings on pilotis, and one with three-story buildings on pilotis. The first type, which is more common, was chosen for the study. It consists of a square measuring 250 meters per side, surrounded by tree vegetation, and generally contains 11 buildings, which should occupy 15% of its surface, with the remaining 85% designated as public space. Ideally, these pilotis should be open, without fences or any barriers that might block pedestrian access.

The SQN 206 - the author's place of residence – was chosen, and it consists of 11 identical buildings, each with 36 apartments (Figure 5). Two additional buildings were added to the original image. For the calculation of the new population, it was assumed that each new building would house 68 apartments.



Figure 5. SQN 206 as it is (left), and with 2 more buildings (right). Source: Google Earth, with adaptations.

In summary:

+136 dwellings

+408 inhabitants

1 building type

Area occupied by the "new" buildings: 1,920 m²

Average number of residents per household: 3

Distance from the CBD: 4.5 km

2.2. North L3 Avenue

North L3 Avenue is an arterial road that, in the selected stretch, separates the residential buildings of the University of Brasília to the east from the large plots designated for schools, institutions, clinics, and temples to the west, in front of which there are extensive parking lots and setbacks. In this area, the simulation involved adding square mixed-use buildings with commercial ground floors and two additional floors of studio apartments or commercial spaces, which are found in the local commercial streets of the region, as well as two more residential buildings from the university (six stories on pilotis) (Figure 6).

The square mixed-use building type was not included in the city's original design; it was created and adapted over the course of its growth. Originally, local commercial streets were not allowed to have residences of any kind, as still prevails in Asa Sul. Their presence in Asa Norte adds significant dynamism to this neighborhood.



Figure 6. Avenida L3 Norte as it is (left), and with the simulation (right). Source: Google Earth, with adaptations.

In summary:

+850 dwellings

+1,562 inhabitants

2 building types

Area occupied by the "new" buildings: 23,400 m²

Average number of residents per household: 1.7 to 3

Distance from the CBD: 7.4 km

2.3. North Large Areas Sector 707/907

This area includes the private university UniCEUB, large plots housing institutions, temples, and schools, as well as a storage facility for vehicles seized by the Department of Traffic (Detran). Here, the simulation

involved occupying vacant areas, surface parking lots, or spaces whose use does not align with the social role of urban property. For this purpose, the urban design and various building types present in the nearby 700 blocks were adopted, namely: row single-family houses; mixed-use buildings with commercial ground floors and five residential floors; and residential buildings with pilotis and two or five stories (Figure 7).

This section was not included in the city's original design; it was added during its construction and adapted over the course of its development.



Figure 7. 707/907 North as it is (left), and with the simulation (right). Source: Google Earth, with adaptations.

In summary:

+1,955 dwellings

+4,396 inhabitants

5 building types

Area occupied by the "new" buildings: 342,000 m²

Average number of residents per household: 1.7 to 3.7

Distance from the CBD: 6 km

2.4. South Bank Sector

This is one of the central sectors of the city, where residential use is prohibited and where taller buildings are allowed. It is part of the gregarious scale of Brasília, which includes sectors such as the Bank Sector, Radio and TV Sector, Hotel Sector, and Commercial Sector. The chosen area encompasses blocks 1 and 2 of the South Bank Sector, which is a large platform with buildings that typically feature institutions and commercial offices, with generally 15 floors. The lower levels of the platform are widely used as garages (Figure 8).

Here, the speculation of the study advances the discussion of relaxing the rigid zoning imposed on central sectors, allowing for residential use in small units without garages, taking advantage of the proximity to the city's main public transportation terminals. Thus, it is proposed to utilize areas occupied by large surface parking lots to construct new mixed-use buildings. In estimating the population, only the new residences were considered, without calculating a possible conversion of existing underutilized buildings into housing on their upper floors, while retaining the ground floor for retail and service activities. The proposed buildings would have the same configuration as the existing ones.



Figure 8. South Bank Sector as it is (left), and with the simulation (right). Source: Google Earth, with adaptations.

In summary:

+1,300 dwellings

+2,600 inhabitants

1 building type

Area occupied by the "new" buildings: 6,375 m²

Average number of residents per household: 2

Distance from the CBD: 1.4 km

The proposed areas added 8,966 inhabitants through 4,241 housing units offered by 8 different building types, occupying an area of approximately 374,000 m² or 37.4 hectares. Although this may not seem like a very large number, it becomes significant when considering the potential of the heritage area to absorb more residents, especially when compared to the data that will be presented next.

The decision to consider the actual number of inhabitants per dwelling, depending on the building type, was made to provide greater accuracy in the simulation. Currently, the average in the Federal District is close to 3 residents per household (a figure used for the "pilotis plus 6 floors" type). If we had used this number, the proposed 4,241 housing units would have brought 12,723 new inhabitants to the heritage area, a figure significantly higher than the approximately 9,000 obtained.

In 2021, the housing deficit in the Federal District was 100,701 units, with 48.64% of those falling within the medium-low income range (IPEDF, 2023). Coupled with current data on household arrangements, which show that 38.6% of households are occupied by single individuals or couples without children (CODEPLAN, 2022), it makes sense to speculate about building types that provide smaller apartments, such as those proposed for central areas, or those located in mixed-use buildings, where the resident-to-dwelling ratio tends to be below 2. These building types also typically have lower sale and rental prices.

3. Comparison

For comparison purposes, the study selected 4 gated communities located to the north of the heritage area: Império dos Nobres, RK, Bianca, and Recanto Real, which together cover a total area of 2,047,000 m² or 204.7 hectares. These communities are primarily composed of single-family detached houses on 450 m² lots (Figures 9 and 10). At the entrances of these condominiums, it is common to find a small commercial street with mixed-use buildings, where up to 4 upper floors are occupied by offices or residences. For the purposes of this speculation, these commercial areas were not considered.

These gated communities are representative of a growth model widely practiced in Brasília: suburban sprawl, characterized by low height and low density occupancy in homogeneous neighborhoods (dominated by a single type of housing), which are closed off from the surrounding area and lack diversity in use.

In this case, visual simulation was not employed; rather, population figures were obtained from the census, and the area occupied was calculated.

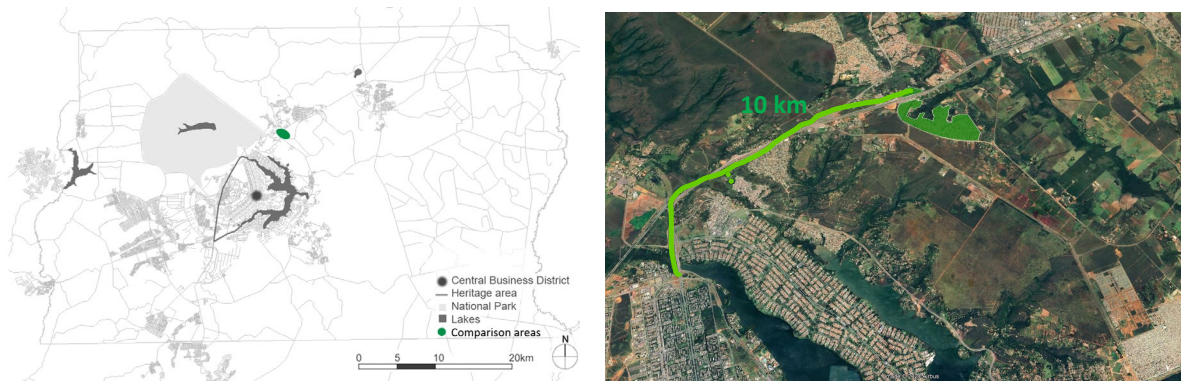


Figure 9. The Federal District and the location of the comparison areas, 10 Km outside the protected area. Source: the author (left) and Google Earth, with adaptations (right).



Figure 10. Area occupied by 4 gated communities (left) and their typical dwelling (right). Source: Google Earth, with adaptations.

In summary:

8,846 inhabitants

1 building type

Area occupied: 2,047,000 m² or 204.7 hectares

Average number of residents per household: 3.5

Distance from the CBD: 18.5 to 20.7 km

4. Discussion

The following table compares some data obtained from the simulation with that of the comparison areas, as both accommodate approximately the same number of inhabitants.

	Simulation	Gated Communities
Inhabitants	8,966	8,846
Area occupied	374,000 m ² or 37.4 ha	2,047,000 m ² or 204.7 ha
Building types	8	1
Integration with the city	total	none
Average distance to CBD	4.82 km	19.25 km

From this simulation and brief comparison, several reflections can be made.

Regarding the area occupied, the buildings proposed in the simulation would occupy five times less land than the existing condominiums. The condominiums took over natural land, while the proposed buildings would occupy already anthropized and urbanized land. Furthermore, a significant portion of them would be situated in areas currently occupied by surface parking, which are already impervious.

As for the need for infrastructure implementation, the new housing could utilize the existing urban infrastructure within the heritage area (water, electricity, sewage, drainage, landscaping, public transport); benefit from already established facilities for health, education, culture, and leisure; and have nearby commerce and services. In contrast, residents of the gated communities, while having local shopping options, must travel to other regions to access all the other necessary activities for their daily lives.

Regarding the need for commuting, in addition to the points mentioned earlier, the proposed housing would be located in the area with the highest concentration of jobs in the city. This would reduce commuter traffic, congestion, time loss, greenhouse gas emissions, and perhaps even the need of owning a private vehicle. The average distance to the CBD reinforces this argument.

In terms of integration with the city, urban vitality, and enhanced security, the new housing would be situated within existing or proposed streets and blocks, featuring a roadway system that allows for the free movement of all transportation modes, promoting walking and active transport. The mixed-use buildings would offer active ground-floor facades, and both these buildings and the row houses would maintain a direct public/private relationship, with their doors opening onto the sidewalk. Although the pilotis buildings do not have a direct public/private relationship (as one must use stairs or elevators to access the residences), they would still feature permeable, open, and traversable pilotis, characteristic of the modernist city. All these features, combined with an increased population, would enhance safety in the city, providing more "eyes on the street" and greater activity on the sidewalks, as exemplified by Jane Jacobs (2017). In contrast, gated communities represent the antithesis of these qualities.

Regarding the variety of building types, certain attributes (such as the presence or absence of underground garages, pilotis, or elevators), along with specific characteristics of their neighborhood urban design, determine their accessibility to different segments of the population (Holanda, 2007 and Tenorio & Santos Júnior, 2010). Consequently, whenever there is only one type of housing – or a significant predominance of one type – in a given area, it leads to a homogeneous community, as seen in gated condominiums. This creates enclaves, undermines urbanity, and fosters distrust and intolerance among different social groups (Tenorio, 2013).

The simulation employs eight different building types, all of which are already present in the designated heritage area, aiming to maintain the same volumetric relationships and the strong presence of urban greenery that characterize it. Only one type is not currently used for housing – the one from the Southern Bank Sector – and it should be adapted while retaining its volumetry and direct relationship with the sidewalk.

5. Final considerations: limitations, further developments, and contribution

The research proposes densification in the designated heritage area, but it was not initially within its scope to conduct a thorough study on the territory's capacity to support this new population. There was no consultation with utility companies to assess the landscape of water supply, sewage treatment, urban cleaning, and energy for the new units, for example. However, the following two facts were considered: 1) the original city plan was intended to accommodate 500,000 people, according to the competition notice for the new capital, indicating that there is room for densification; and 2) Brasília continues to grow, and new housing will be constructed in the Federal District, meaning that all necessary infrastructure must be provided. Studies that relate urban form and costs show that more compact and dense cities save more on the implementation and maintenance of infrastructure than sprawling and low-density cities (Mascaró, 1989).

There is also no in-depth analysis of the calculations that relate permeable to impermeable area. The impermeabilization of soil and its detrimental effects in the designated heritage area, due to the construction of additional housing, is often cited as an argument against increased density. However, comparisons show that growth beyond the designated perimeter could lead to much greater impermeabilization, as well as other environmental risks, such as the suppression of native savana vegetation, contamination of the groundwater, and loss of aquifer recharge. If an ecosystemic and integrated approach is required, impermeabilization of 10 km from the designated perimeter should be considered just as harmful as that occurring within it.

Future research could involve: updating data based on the 2022 Census; simulating more housing throughout the entire heritage area; creating 3D simulations to allow for observer-level visualizations; calculating the areas to be impermeabilized and obtaining more precise quantifications of the infrastructure needs for this new population.

And now, addressing the question posed by this article: Would Brasília be less Brasília if more people lived in the protected area? The belief is that the answer is no. Although the study also discusses issues related to sustainable density, its initial focus was on configurational aspects. According to these aspects, the use of existing building types with the same intervolumetric and public/private relations, while maintaining the predominance of green spaces and promoting the necessary urban density, ensures the preservation of significant elements of Brasília's modernist urban landscape. This approach upholds the characteristics that led to Brasília being designated a UNESCO World Heritage site.

The study aims to engage both the general public and experts, contributing to an informed debate on the city's growth and development. It provides a visualization of a possible scenario and its positive implications, emphasizing the need for contemporary cities to recognize and value their past while preparing for a near future focused on resource and energy efficiency, more responsible use of urbanized land, and the promotion of justice, urbanity, and equity.

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