

ASSESSMENT OF LAND AVAILABILITY FOR HOUSING IN BHUBANESWAR DEVELOPMENT PLANNING AREA

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Abstract

Bhubaneswar has a tropical savanna climate classified under the Koppen climate classification. The original plan for Bhubaneswar was drafted by the German architect Otto Königsberger. Königsberger's vision for Bhubaneswar was to create a city that blended modernity with traditional Indian elements, incorporating wide roads, gardens, and residential and commercial zones, all while keeping in mind the city's ancient heritage. Bhubaneswar was originally designed for 40000 people but now it stands at 1200000. Since the last decade, the maximum annual temperature of Bhubaneswar Smart City has been increasing at an alarming rate. Rising infrastructure, increased vehicular activity, immigration etc changed the urban climate parameters within the city. Improper town planning also leads to lack of ventilation in the indoor spaces. Bioclimatic design helps maintain ambient temperature in the indoor spaces, especially in residential complexes where prevalent ventilation solutions are inadequate. Materials used nowadays in Bhubaneswar are mainly concrete and fly ash bricks. These materials make the building unbreathable which becomes a major problem for the occupants. Research findings could uncover cost-effective methods to enhance thermal comfort in homes, potentially cutting energy costs for residents and easing the economic strain of building and maintaining structures in Bhubaneswar's hot, humid climate. This research offers practical solutions for stakeholders to tackle climate challenges effectively.

Keyword: Affordability; EWS; Land Shortage; Vacant land, Housing

1 Introduction

Being the capital city of Odisha, the city has experienced a rapid urbanization in recent years led to an increasing demand for housing, particularly affordable housing. This rapid growth is putting a strain on the city's resources, including land. The city has a large backlog of unmet housing demand, particularly among the EWS groups. This situation has grown since recent years- due to certain factors which are

Shortage of land: As Bhubaneswar has grown, the amount of land available for housing development has decreased. **Inflated real estate prices:** The cost of land and housing has increased significantly in recent years, making it difficult for EWS to afford housing in the city.

The BDPA encompasses a diverse landscape, including agricultural fields, vacant plots, and densely populated urban settlements. Understanding existing land usage patterns is crucial for assessing hous-

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ing development potential. Covering 419.10 sq km compared to BCUC's 721.9 sq km, BDPA constitutes about 58% of the area. Chandrashekharpur, East Kuakhai, Aiginia, Tamando, and Gangapada are earmarked for significant development, addressing nearly 73% of BDPA's housing shortage, predominantly observed in slum areas like East Kuakhai. BDPA houses 193 slums, with BMC's 47 wards hosting 62 authorized and 131 unauthorized slums. Slum dwellers face overcrowding, unsanitary conditions, and are vulnerable to eviction. (Executive Summary n.d.)

The research findings will be useful for the government, private developers, and civil society organizations in developing and implementing policies and programs to address the housing problem for EWS in Bhubaneswar.

2 Literature Study

The literature study in this paper will review existing literature on the topic, the survey on existing land use and ownership identifies the key factors affecting land availability, and assess the potential for future housing development. Previously in several researchers have examined the availability of land for housing in Bhubaneswar. These studies have found that the availability of land is limited due to several factors, like rapid growth of population, urban sprawl, land use regulations, land speculation.

In research on the impact of urbanization on Bhubaneswar, India, it is analyzed that overexploitation of natural resources has led to significant changes in land use, causing spatio-temporal variations in land surface temperatures and influencing the Urban Heat Island (UHI) effect. The city has experienced rapid urbanization, with an 83% increase over 15 years, resulting in substantial alterations in land cover, showing an 89% reduction in dense green cover and an 83% decline in agricultural fields. Understanding these modifications in the city's energy dynamics and resultant UHI effects is crucial for mitigating the adverse impacts of urbanization across Bhubaneswar and ensuring long-term sustainability. (D Swain 2017)

In the study on spatial analysis of urban expansion around the Greater Bhubaneswar region, India, it is highlighted that there has been substantial growth and expansion in the Bhubaneswar region since independence. The surge in administrative and institutional activities has played a significant role in boosting trade and commerce. According to the Census of India 2011, Bhubaneswar's population surged from 16,512 in 1951 to 881,988 in 2011. Despite this growth, the state

remains among the least urban-developed states, with only 13.5% of the population residing in urban areas. A significant portion (around 69%) of Odisha's population depends on agriculture, contributing to the state's status as having the third-lowest urban population growth rate in the country. While Bhubaneswar boasts modern planning, including wide roads and numerous parks and gardens designed by Otto H. Koenigsberger, rapid development over the years has led to a somewhat cumbersome planning process, impacting the city's original design. (Nilanjana Das Chatterjee 2015)

The spatio-temporal changes of urban land use in Bhubaneswar city, Odisha from 2000 to 2010 were analysed using remote sensing and GIS. The findings indicate significant changes, particularly in agricultural and forest areas. Residential zones increased from 17.87% in 2000 to 27.26% in 2010, while agricultural land decreased by 51.7% during the same period. Forest areas also experienced a decline, with a notable shift towards residential, institutional, and industrial areas, as well as vacant land, occurring at a high rate from 2000 to 2010. The conversion of agricultural land to vacant land witnessed a notable rise. Additionally, many vacant lands were repurposed for residential, institutional, and industrial use. The urban sprawl map depicted a growth in Bhubaneswar's built-up area from 104.89 hectares in 1930 to 14,008 hectares in 2010. This expansion was attributed to factors such as the city becoming the capital of Odisha in 1956, leading to rural-urban migration due to employment opportunities, economic development, and improved transportation. (Thandar 2012)

In the research paper focused on residential conditions and housing affordability in the expanding urbanized region of India – A Case Study of Bhubaneswar City, Odisha, affordability extends beyond mere property acquisition or rental considerations. It encompasses expenses such as taxes, maintenance, utilities, and commuting, beyond house purchase or renting. The strategic use of disputed land by the government could address housing affordability for economically weaker sections (EWS). Bhubaneswar's uncontrolled population growth has impacted city planning, despite a 2007 proposal for the city's development. High land costs, ranging from Rs 330 to Rs 1300 per square foot, pose challenges for EWS groups, hindering their access to quality housing due to loan constraints. (Dibya Jivan Pati 2015)

In the research on the neoliberal regime of land grabbing, Bhubaneswar's development projects encompass a spectrum, from contemporary high-rise apartments to educational institutions. The city's land

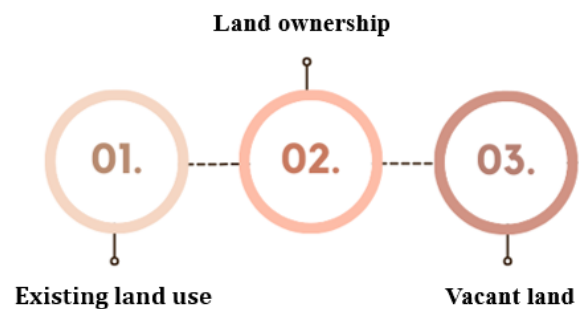
transformation mirrors patterns seen in other Indian urban centres. The commodification of housing units, office spaces, and market areas aligns with Lefebvre's notion of selling planning ideology (Lefebvre, 1996). However, Harvey's concept of reshaping the city for surplus absorption appears less applicable. Real estate developers play a pivotal role in shaping urban space through enticing offers. It is not merely housing on sale but also urban planning and lifestyle. The neoliberal regime of land grabbing is evident, and Suchismita Satpathy sheds light on key factors influencing land use. The rise of corporate healthcare and private educational institutions significantly impacts the cityscape. While these facilities target IT professionals and the burgeoning middle class, they inadvertently draw rural migrants seeking livelihoods as construction and hospital workers. The influx of these workers contributes to the functioning of planned neighbourhoods but also results in the growth of slums. In shaping contemporary land use in Bhubaneswar, factors extending beyond the neoliberal political economy framework play a crucial role, notably the influence of caste dynamics on land ownership. The historical dominance of Brahmins and Kshatriyas, both politically and economically, continues to leave an imprint on the temple city's landscape. The local chapter of CREDAI in Bhubaneswar, comprising 55 real estate developers, reflects this entrenched social hierarchy. More than 30 members hail from the Brahmin and Kshatriya communities, bearing surnames such as Mishra, Pattanaik, Mohanty, Rath, Mohapatra, and Samantaray. These traditional upper castes persist as significant players in the city's land market transactions, even as a substantial portion of the land is owned by the state. Despite the city's economic evolution and increased investments, the social structure remains resistant to substantial change. The creation of the capital city in proximity has not disrupted the influence wielded by these communities over urban land use. While economic shifts are evident, the social fabric maintains a semblance of continuity, showcasing the enduring impact of historical caste dynamics on the city's development. (Satpathy 2021)

In the study titled "Influence of Land Use Control on Affordable Housing in Bhubaneswar City," the considerable expansion of local zoning and land-use restrictions over the years is highlighted. The procedures and guidelines linked to land-use planning form an essential component of the institutional structure that facilitates the creation and execution of housing-related strategies. The primary aim of land-use management is to ensure an adequate housing supply. It serves as the mechanism through which governing authorities regulate urban space and oversee its growth in metropoli-

tan regions. Effective land-use policies play a vital role in providing ample land for residential and other social and economic purposes. In various urban centers across India, housing affordability issues have arisen due to constrained housing supply. Contrary to popular belief, Urban Local Bodies (ULBs) have proven ineffective in delivering basic services, including housing, to most residents. The management of land use significantly impacts housing costs, thereby limiting housing options, especially in urban areas where zoning authority is extensive. It's important to note that average housing costs have surged at a pace considerably faster than GDP, placing constraints on home affordability, particularly for Economically Weaker Sections (EWS) and low-income households. The numerous zoning and land-use limitations imposed by cities tend to drive up housing prices, further exacerbating the challenge for low-income individuals. (Manoj Kumar Nayak 2022)

In the research on "Approaches for Developing Peri-Urban Regions in a Developing Nation (A Case Study of Bhubaneswar)," an analysis of land use changes in the delineated region for the years 2005, 2011, and 2019 reveals a notable increase of nearly 30% in commercial and mixed land use. The study highlights a predominant expansion of residential land use in peri-urban areas, accompanied by the spontaneous conversion of vegetation and agricultural land into urban development spaces. Residential development accounts for a significant portion of this expansion within the delineated region, making it an attractive investment option for individuals seeking property outside the costly urban nodes. As described by Wehrwein, Rural-Urban Fringe areas serve as transitional zones between designated urban areas and agricultural land, representing areas of emerging mixed land use development. (Leena Sahoo 2021)

3 Methodology



I. Existing land use in BDPA

Since 1971, Bhubaneswar has undergone dynamic development driven by Master Plans and Comprehensive Development Plans, fostering economic growth and establishing itself as a central hub for administration, institutions, and tourism in the region. The Bhubaneswar Development Plan Area (BDPA) integrates land use patterns from various zones, with agriculture dominating at 30.07%, followed by the Chandaka Reserve Forest at 19.07%. Residential areas, comprising 12.40%, are concentrated in the core alongside public/semi-public/institutional and recreational zones. Commercial areas cover 0.83%, mainly in Old Bhubaneswar and New Bhubaneswar. Industrial zones span Gadakana and Patia villages (Chandrasekharpur Zone) at 1.15%. Public/semi-public areas, including educational institutions and government offices, occupy 3.57%. Approximately 25% of the BDPA area consists of waste land, water bodies, and vacant land. Notable developments are occurring in bordering villages like Sribantapur (Zone 14), East Kuakhai (Zone 15), Sisupal (Zone 16), Aigania (Zone 20), and Tamando (Zone 21). Brick kilns and small scale industries cover 1.74% of the total area.

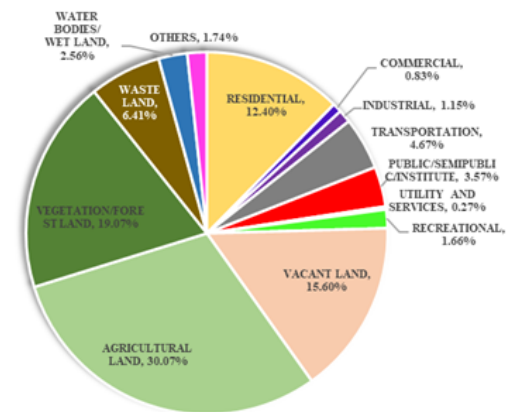


Figure 1: LAND USE OF BDPA — Source (Existing Land Use n.d.)

In East Kuakhai Zone 15, agricultural land covers 38.96% (533.76ha), with vacant land following at 20.33% (278.49ha), including 275.04ha for Plotted Land/Speculated Development V.L., Residential Area, and Other vacant land categories. Residential land constitutes 11.18% occupying only 3.57%. The entire BDPA area has almost 25% of total area devoted to waste land, water bodies and vacant land. The major developments are being carried in the bordering villages of the BDPA area, majorly covering areas of Sribantapur (Zone 14), East Kuakhai (Zone 15), Sisupal (Zone 16), Aigania (Zone 20) and Tamando (Zone 21). Brick Kilns and other small-scale industries have been set up in different areas, covering 1.74% of the total area. (Existing Land use n.d.)

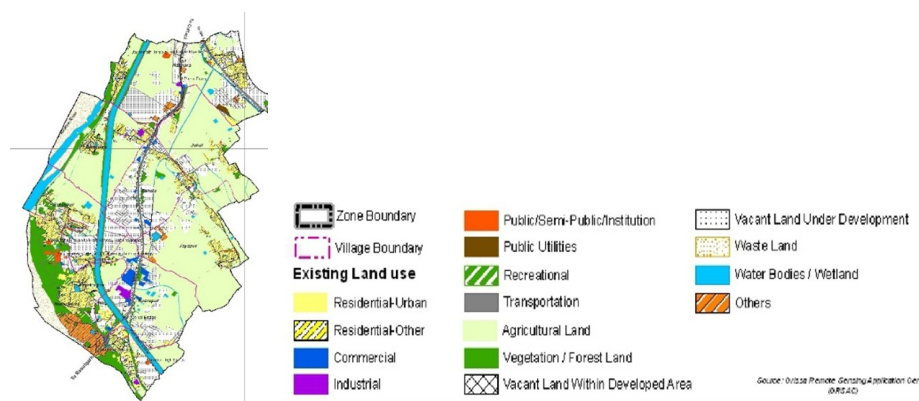


Figure 2: EXISTING LAND USE OF EAST KUAKHAI ZONE/ Source (3.10_Existing Land use of East Kuakhai n.d.)

II. Land ownership pattern in BDPA

According to the Bhubaneswar Development Authority (BDA), there has been a significant increase in the number of private landowners in BDPA from 2010 to 2023. This is due to several factors, including the city's rapid urbanization and population growth. As of 2023, private landowners own approximately 69.73% of the land in East Kuakhai zone. The remaining percentage of the land is owned by the government, institutions, and communities. The increase in private land ownership has had several impacts on BDPA. One impact is that it has led to an increase in land prices. This has made it difficult for low-income people to afford to buy land in the city. Another impact of the increase in private land ownership is that it has led to a decrease in the amount of land available for public use. This has made it difficult for the government to provide essential services such as housing, education, and healthcare. (Executive Summary n.d.)

III. Vacancy of land in BDPA

Assessing land availability for housing in the Bhubaneswar Development Planning Area (BDPA) requires a comprehensive strategy. This entails examining existing land use, mapping vacant parcels using satellite imagery, conducting on-site inspections, validating ownership records, collaborating with local authorities, involving the community, and evaluating in-

frastructure and environmental factors. This holistic approach ensures a detailed understanding of land vacancy in BDPA, facilitating well-informed decisions for successful residential development.

4 Data Analysis

The East Kuakhai zone comprises a total of eight villages, namely Nakhara, Banguari, Jhohala, Jayapur, Pahala, Haridaspur, Rudrapur, and Naharakanta. The following charts illustrate the land use/land cover statistics for each of these villages, highlighting the available vacant land. Qualitative analysis enriches the research by delving into the nuanced aspects of the housing problem. It helps uncover underlying socio-economic factors contributing to the issue, such as historical context, cultural dynamics, and community perspectives. This holistic understanding aids in crafting more targeted and effective solutions, considering not just the quantitative data but also the human aspect of the problem. Qualitative analysis adds depth and context, essential for devising sustainable interventions tailored to the specific needs of the community. The percentage of total land area occupied by each land use class within each study unit is calculated. This assists in understanding the relative dominance of different land use types in the area.

$$\text{Proportion of Unused Land Area in Class X village} = \frac{\text{Area of Vacant land of Class X village}}{\text{Total Land Area of Class X village}} \times 100$$

$$\begin{aligned} \text{Proportion of Unused Land Area in Nakhara village} &= \frac{\text{Area of Vacant land of Nakhara village}}{\text{Total Land Area of Nakhara village}} \times 100 \\ &= \frac{66.24}{283} \times 100 = 23.40\% \end{aligned}$$

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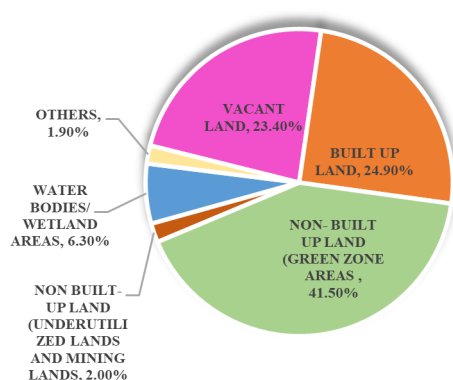


Figure 3: LULC OF NAKHARA / Source (Odisha 4k GEO n.d.)a
LULC AREA FOR VILLAGE NAKHARA

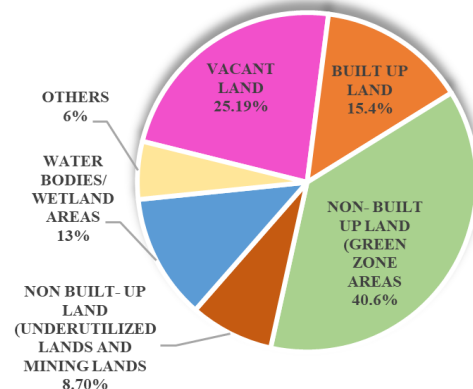


Figure 4: LULC OF BANGUARI/ Source (Odisha 4k GEO n.d.)
LULC AREA FOR VILLAGE BANGUARI

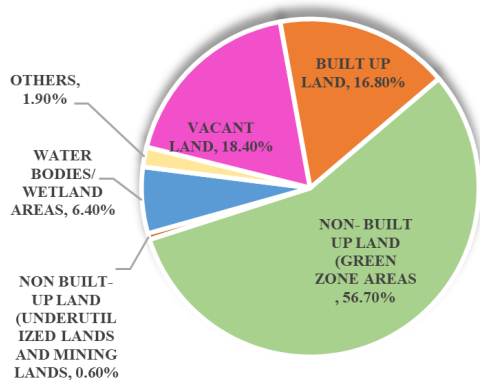


Figure 5: LULC OF JHOHALA / Source (Odisha 4k GEO n.d)

LULC AREA FOR VILLAGE JHOHALA

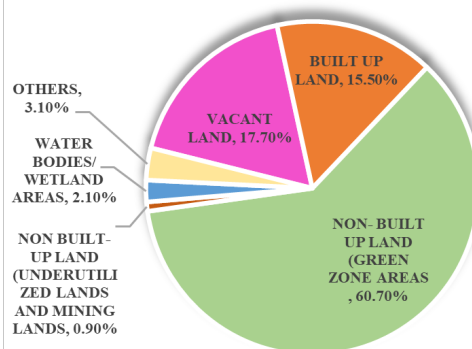


Figure 6: LULC OF JAYAPUR/ Source (Odisha 4k GEO n.d)

LULC AREA FOR VILLAGE JAYAPUR

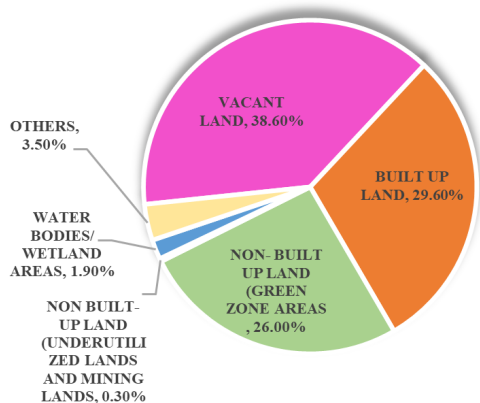


Figure 7: LULC OF PAHALA/ Source (Odisha 4k GEO n.d)

LULC AREA FOR VILLAGE PAHALA

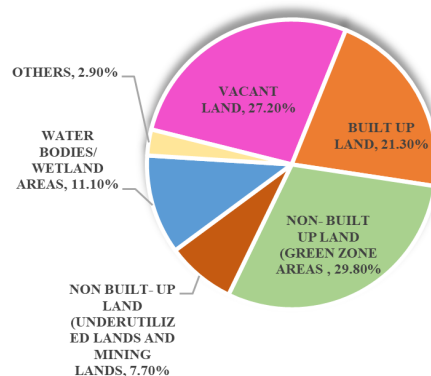


Figure 8: LULC OF HARIDASPUR/ Source (Odisha 4k GEO n.d.)

LULC AREA FOR VILLAGE HARIDASPUR

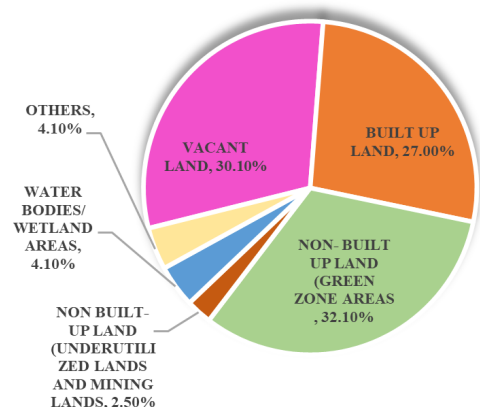


Figure 9: LULC OF RUDRAPUR/ Source (Odisha 4k GEO n.d.)

LULC AREA FOR VILLAGE RUDRAPUR

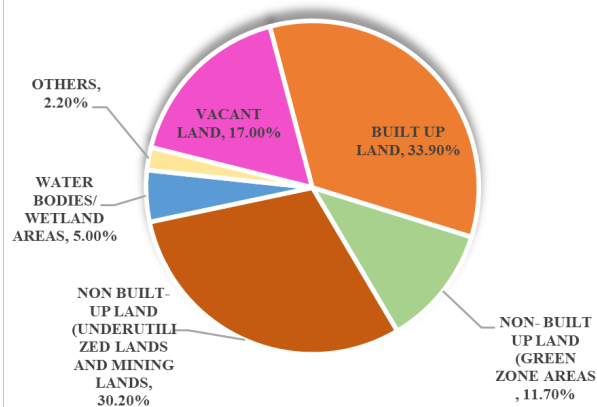


Figure 10: LULC OF NAHARAKANTA/ Source (Odisha 4k GEO n.d.)

LULC AREA FOR VILLAGE NAHARAKANTA

Based on the statistical charts provided, it is evident that there is a total of 352.78 hectares of unused land, serving no specific purpose. This analysis establishes the ratio of utilized and unused land within the examined area.

5 Conclusion

The research underscores the pressing demand for targeted interventions to mitigate the scarcity of land for economically weaker sections. Urbanization requires sustainable solutions that prioritize the vulnerable. The comparative analysis, revealing 352.78 hectares of unused land, signals a crucial opportunity to alleviate housing shortages. The statistical charts stress the urgency for strategic interventions to repurpose this land effectively, emphasizing the need for meaningful contributions to affordable housing solutions. In essence, the findings emphasize the immediate need for comprehensive and purposeful actions to address the critical housing needs of the economically weaker sections in the evolving urban landscape. To address this crisis, recommendations include an immediate review of urban development policies, tailored interventions for the EWS, and collaborative efforts involving government, private sector, and non-governmental organizations. Moreover, exploring innovative and sustainable housing solutions is imperative. Future research endeavors should explore the socio-economic factors shaping housing choices among Economically Weaker Sections (EWS) and evaluate the environmental impact of proposed solutions. Additionally, conducting longitudinal studies to track the effectiveness of interventions will enhance adaptive urban planning. This research establishes a groundwork for informed decision-making, stressing the importance of swift and collaborative efforts to foster a more equitable, sustainable, and resilient urban environment that caters to the needs of all residents.

6 Abbreviations:

BDPA- Bhubaneswar Development and Planning Area
EWS- Economical Weaker Section
LULC- Land Use Land Cover
BCUC- Bhubaneswar Cuttack Urban Complex

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