

Issue of Slums in India : High Rise Constructions as Solutions

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Abstract

As per 2019 Census data, 65 million people in India live in slums. Like other developing countries India has a big slum population in various cities. Slum dwellers face numerous issues like lack of sanitation, clean drinking water, and draining system that cause diseases. The government of India is concerned about this issue. This paper presents the issues of slums in the Indian and global context, the fundamental causes, high rise buildings as a solution for slums, and the challenges associated with high rise buildings.

Keywords : High rise buildings, slums

I. INTRODUCTION

A slum can be defined as “a residential area where dwellings are unfit for human habitation by reasons of dilapidation, overcrowding, lack of ventilation or sanitation facility, and having drinking water facilities in unhygienic conditions.” According to government sources, the slum population of India even exceeds the population of Britain. This constitutes 5.1% of total population of the country. This issue of slums has become a major concern for the Government, particularly at a stage when India is aspiring to become a developed country and is likely to become the 3rd largest economy in the world in years to come.

In overseas countries, the problem of slums exists in almost all under developed countries like Central African Republic, Sudan, Pakistan, Bangladesh, Myanmar etc. However, few countries like Sweden, Denmark, Norway, Poland, Germany, Canada are considered slum free nations. The slums problem extends to almost all 1,743 cities in India and slum dwellers constitute almost 18.5% of the urban population in various states and Union Territories of country.

The Government is showing its concern to the problem of lack of proper housing in rural areas by

launching schemes like PM Awas Yojna but the problem of slums in cities are little different. The problem of slums needs a strategic approach for its solutions. In-situ re-development schemes undertaken by few states under Prime Minister Awas Yojana are not likely to bring desired results and eradicate the real dark aspects of slums in life of slum dwellers, particularly the new generation being brought up there. Each major slum of large cities needs a well-developed plan to suite its situation and geography.

II. SLUMS IN INDIA

Slum dwellings lack certain vital things for healthy living environment.

✎ **They lack adequate ventilation:** The dwellings are unfit for human habitation for reasons of dilapidation, overcrowding, and lack of ventilation.

✎ **They lack proper area drainage system:** During rainy season there is standing water everywhere, spreading all kinds of water borne diseases. The approaches to dwelling units become unhygienic and congested

✎ **They lack required sanitation:** Filth and dumps of

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garbage can be seen lying everywhere. The dumped waste emanates foul odor and at the same time becomes breeding ground for flies and mosquitoes. This carries risk of several diseases for residents and their children who are playing near the garbage dumps oblivious of the fact that they may get infected with some fatal disease.

↳ **They lack proper and safe water supply:** The dwelling units in slums are not having proper drinking water facilities. Even where they exist, they are in the most unhygienic conditions.

↳ **They lack security and safety for family living in slums:** The slum dwellers generally live in the shadow of insecurity and safety as the houses are in risk of getting bulldozed due to illegality involved in building construction. Due to congested living conditions, there is risk of theft, robbery, and other illegal activities and lawlessness prevailing in the area.

“High Rise Constructions” can help a lot in tackling the negative issues involved with inhabitants of slums. High rise residential complexes are better from the point of view of ventilation, secured living, sanitation, cleanliness, natural, and artificial lighting. The municipal services can be rendered in more prompt and efficient

manner. The accessibility to the dwelling units and the dwellers is easy. Law and order issues like drug trafficking, thefts, and sheltering of unsocial elements can be controlled in a better way by enforcement agencies. Children can be provided with schooling facilities at primary and secondary level in a more planned and convenient manner without much travelling and transportation. Adequate open spaces, play spaces, and market places can be conveniently located in plans of high-rise constructions.

The additional requirements involved with high rise towers are the lift services, fire fighting system, and fire escape routes that are required to be taken care of by construction and maintenance agencies.

Some of the major slums in cities of India are:

↳ Dharavi Slum, Mumbai: Population 10 Lakhs, Area 590 Acres, Largest slum in the world

↳ Bhalswa Slum near Jahangirpuri, Delhi: Population 1.51 Lakhs

↳ Lalbagh slum area near Azadpur (New Delhi) : Population: 3.0 Lakhs
(In Delhi there are almost 750 clusters of large/small slums with population around 20 Lakhs)



Fig. 1. Slum area Dharavi in Mumbai

✚ Basanti Slum, Kolkata: Population 3.3 Lakhs

✚ Rajendra Nagar Slum, Bengaluru: Population 1.00 Lakhs, Area 2 sq. km.

✚ Indiramma Nagar, Hyderabad: Population 1.01 Lakhs (There are 775 notified slums in Hyderabad. Approximately 25 lakh people are living in slum like conditions)

✚ Saroj Nagar Slum, Nagpur: Population 6.61 Lakhs (There are 427 slum pockets out of which 292 are in notified slum area of 17 sq. km. with population of 6.61 lakhs)

✚ Mehabullapur Slum, Lucknow: Population 3.64 Lakhs

(There were 787 slum clusters in Lucknow having population of 10 lakhs (Oxfam India Survey 2005)

Various plans are under execution to keep the cities slum free and implement the PM Awas Yojana effectively.

III. ADVANTAGES OF HIGH RISE CONSTRUCTION

A high-rise building is a tall structure, typically with multiple floors, specifically designed for residential or commercial purposes. The definition of a high-rise building varies across different countries and professional disciplines, but generally it is characterized by its significant height, and the use of elevators to access the upper levels. In India buildings that are 5–9 stories are normally considered as mid-rise constructions and buildings beyond 10 stories are treated as high rise constructions. There are no exact regulations on number of stories in high rises, but most important is the design concept involved to take care of fire safety measures, the transportation of occupants by means of elevators, and provision of adequate distances between two high rise towers. Buildings having more than 40 floors are termed as skyscrapers and also come in the scope of definition for high rise constructions.

In urban areas, particularly in metropolis like Delhi, Mumbai, and Kolkata high-rise buildings become a vital component of vertical expansion strategies due to their ability to accommodate numerous people or businesses in a very limited land area. Such constructions are becoming an essential requirement seeing the soaring value of land resources. Architects and engineers play an important

role in designing high-rises by considering structural integrity, fire safety measures, efficient space planning, and aesthetic appeal.

1) Getting rid of congested living

The most undesirable factor involved in slum life is congestion, lack of vehicular approach road/paths, and unhygienic conditions created due to poor area drainage, particularly during rainy seasons. A high rise block can really be an effective remedy to this problem faced by slum dwellers, but it is a different thing that most of the families have become used to the situations they are facing in their day to day life. Introduction of living style in “High Rise Towers/ Skyscrapers” may lead to initial psychological resistance from existing slum residents and certain vested interests in their society. This aspect needs to be tackled by the government agencies, municipal authorities, and NGOs operating in this field.

Government aided high rise colonies can prove to be a congestion free living place for slum dwellers, where availability of dwelling units can be by Government on easy loans in subsidized system on a long term basis where occupants pay their share in the form of EMIs over time of 20 to 50 years. Upgradation of units can be made possible where requirements of any family changes with passage of time. The colonies are provided by the municipal authorities a standard class of infrastructure like roads, paths, parks, schools and colleges, and public transport system.

An uninterrupted power supply, a 24x7 water supply, medical facilities, sanitation. and garbage collection system as well as an excellent waste disposal system is most essential requirements for comfortable living in colony.

2) Protection from natural calamities-heavy rains/flooding of area

The slum area is generally located in low lying part of cities, and gets adversely affected due to heavy rains and even during normal monsoon rains. This causes large losses to household assets and paralyzes normal living. In cities like Mumbai where monsoon is generally heavy, the situation becomes critical and it needs rescue operations by government agencies. Living in high rise constructions involves no such risks and life remains absolutely safe during such events.

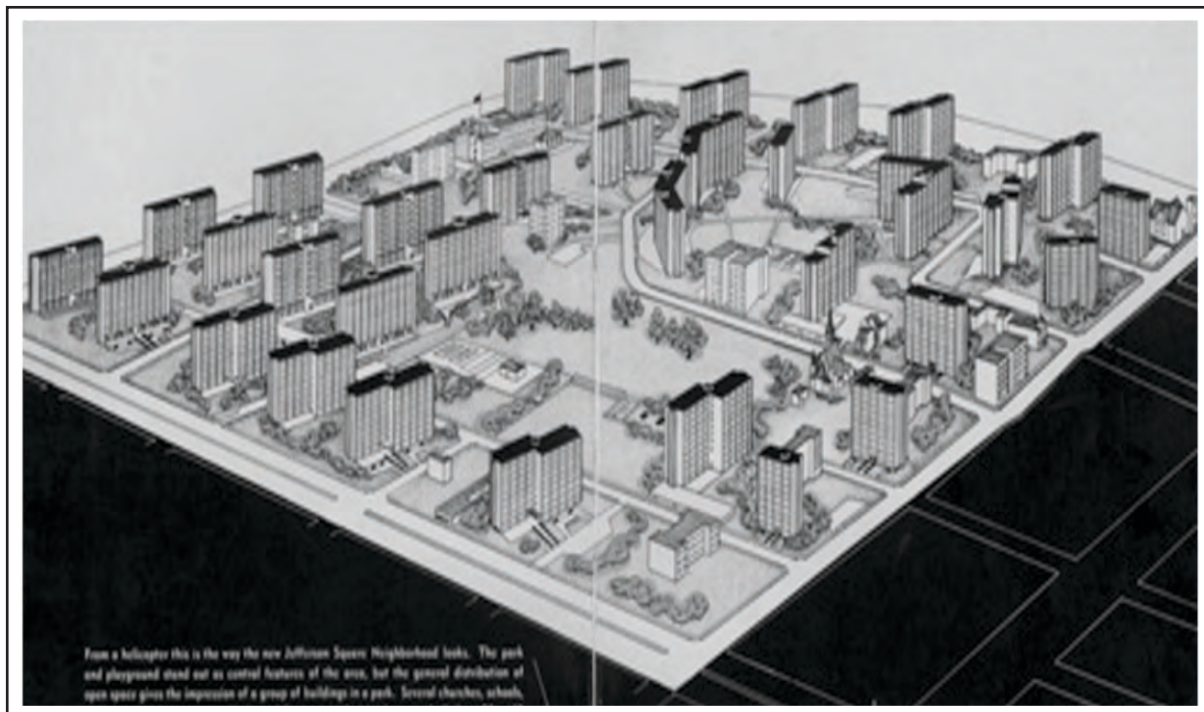


Fig. 2. Typical layout of high rise sectors to do away with slums

3) Convenience in delivery of civic amenities and services

High rise blocks where bulk of population starts living, because of easy access after provision of approach roads can be a convenient point for the municipal agencies and community health authorities for service delivery with more promptness and efficiency. This is generally a grey area in present system of slum living causing great dissatisfaction in residents.

4) In-situ location of kindergarten schools and primary schools

Movement of children and kids to schools poses a great inconvenience for residents in slums due to lack of proper roads and large distances are involved from residence to schools. The “High Rise Blocks” can be well designed to accommodate Kindergarten schools and even primary schools up to 5th standard at intermediate floors in the block itself, say every fifth floor. If strength of students demands, larger schools can be planned and the adjoining high rise blocks may be integrated together by providing well designed “Sky Walks” at intermediate floors so that good accessibility is achieved between the towers to ensure optimum utilization of common services like

schools, grocery shops, and shops for other amenities needed on day to day basis.

5) Space for dwelling can be planned on modular concept

The ultimate goal is to provide a comfortable living space to slum dwelling families as per their need and affordability, but a minimum living unit should not be less than the minimum standard for a decent living. The residential spaces can be provided in modules of 350 sq. ft. (35 sq. m.), with an outer wall enclosure with essentially few windows opening to external atmosphere for required ventilation and natural light for healthy living conditions in the dwelling units. The window needs to be provided with secured grills/guard bars to prevent untoward incidents with infants and children, as accidental falls do take place in high rise complexes.

The space utilization inside a dwelling module is kept flexible enough to suite the needs of occupying family and its member's requirements. The internal partitions are to be done up by using light fiber board's in temp or semi-permanent manner. The larger space of 700 sq.ft. may be allotted to larger families who can economically afford to pay higher EMIs associated with living space. The toilet blocks and kitchen blocks are portable in nature and are

readymade available in the market. These are fixed in dwelling units and get connected to the external plumbing network in high rise towers.

6) Adopting new technologies and making high rise constructions energy efficient

It is important that the construction materials utilized in high rise buildings meet stringent quality standards to

ensure durability and strength against external forces like wind and seismic events. The development of advanced technologies further allows for the incorporation of sustainable features such as energy efficient systems and eco-friendly materials in modern high rises, making the structures more environmentally conscious. Architects and engineers associated with planning and design of high rise townships play an important role in designing high rises by considering their structural integrity, adopting fire safety measures, ensuring efficient space planning, and aesthetic appeal.

IV. CHALLENGES ASSOCIATED WITH HIGH RISE BUILDINGS

Unlike normal buildings, a high rise tower involves certain specific challenges in design/construction as well as its routine maintenance and upkeep. High rise blocks, particularly, residential complexes involve high risk of fire damages and need evacuation of people during fire incidents. Therefore, a fool proof fire detection system and a fire fighting system must be in place and it should remain active all the time. Massive static water storage in the form of underground water should be made available in the buildings for firefighting operations all the times. Automatic sprinklers should also be installed in the basements used for car parking or storage occupancy. Every building with a height of more than 25 m should have diesel generators which can be used for controlling fire in the case of power failure.

Provision of smoke detectors, fire alarms in adequate numbers, and fire extinguishers installed in common areas are critical issues to be taken care of. Apart from this, a well designed fire escape route and emergency evacuation plan in case a fire break out must be in place. During construction, use of fire-resistant materials such as fire-rated doors, walls, and windows are things to be watched by agencies involved. In common public places, centralized fire suppression system, such as a sprinkler system needs to be installed to observe fire safety norms. The building layout must have adequate fire exits, staircases, and fire lobbies. Provision of “sky walks - sky bridges” to interconnect high rise residential towers located in close vicinity can further add to ease in fire evacuation /rescue operations apart from integrating the towers physically and socially.



Fig. 3. Portable readymade toilet cubicle



Fig. 4. Portable readymade kitchen cubicle



Fig. 5. Skywalks: Connecting towers at intermediate floors

1) Staircase rules high rise buildings

Each floor of the building should have two staircase exits for faster evacuation during a fire. This is crucial for buildings where residential accommodation exceeds 150 sq. m. of the floor area and holds a capacity of 20 occupants. Also, the width of the staircases should be at least two meters since narrow staircase heightens the risk of a stampede during evacuation.

The National Building Code of India (NBC) serves as the primary regulatory framework for fire safety in high-rise buildings, providing guidelines for implementing adequate firefighting systems. Local authorities and municipal corporations across different states further enforce building codes and undertake periodic inspections to ensure compliance with fire safety regulations.

2) High rise buildings need light weight structures

High-rise structures are essentially designed as lightweight structures, making the selection of materials for structural and non-structural members a challenge during planning and execution. It becomes essential to make use of high-performance concrete (HPC), pre-stressed concrete, composite construction with steel, high-strength steel, lightweight masonry for walls, and partitions etc.

3) High rise towers need wind and earthquake resistant design

Wind and earthquake forces are the most predominant loads that demand lateral design of structures. Further, residents may have nausea effects in case of large deflections and vibrations; hence, the buildings must be designed for both earthquake safety and comfort.

In the buildings with base isolation, the building's response gets modified in such a way that the ground below is capable of moving without transmitting no or minimal motion to the structure above. Hence, base isolation is adopted for high-rise buildings. Usually, wind load is the governing factor of structural design in the case of high-rise buildings. The shape of the building plays a vital role in minimizing wind forces and therefore, circular, chamfered cornered square or nearly circular and square-shaped buildings are preferred.

The foundations of high-rise structures need special attention, both during geotechnical investigation and construction. The basic principle of geotechnical investigation is to go as deep into the earth as the height of the building. Further, a unique design of foundation may also be required with detailed analysis.

4) High rise buildings need provision of basements

Since there is a large requirement of parking services in high-rise buildings, the provision of basements becomes almost essential. All the activities associated with the construction of basements such as retaining walls, diaphragm walls, and underground waterproofing pose a challenge for designers and engineers.

5) Efficient vertical transportation – back bone of high rise living

Vertical transportation systems must be highly efficient and fast in high-rise buildings, particularly residential blocks. The number of elevators is a matter of concern and must be incorporated judiciously to ensure least idle and waiting time.

6) Speed of construction - an important factor

The speed of construction in high-rise buildings is another challenge. New construction technologies need to be always adopted in high-rise structures for speed, which also ensures quality, safety, and stability. Prefabricated steel, composite, and RCC structures with high-strength concrete are adopted in high rise construction with the latest formwork techniques. Pumping of concrete, lifting materials and equipment, and working at higher levels in tall buildings are some of the major challenges for attaining speed.

7) Repair and maintenance of high rise towers

Repair and maintenance of high-rise buildings and services, including manual facade cleaning is another challenge, which may soon get replaced with new technique of robotic maintenance in the future. Maintenance and repair costs are also high in such buildings. Providing easy access for maintenance of services is also a challenge for architects and engineers. The use of materials requiring no or minimum maintenance should be given priority in high-rise construction.

The materials used in the services and hard-to-reach components should be compatible with the life of the buildings as maintenance and their replacement is difficult in high-rise buildings.

8) Efficient plumbing services in high rise residential towers

Plumbing services are critical requirements in high-rise structures. Designing of water storage, water pressure at various floors, recycled water system, soil and waste drainage system, and rainwater piping are challenging tasks, alongwith maintenance and repair of plumbing services during occupancy of buildings.

Every building is unique in form and comes with specific design solutions and therefore, requires a plumbing design that complements the building's needs. This is an aspect related to day to day life of each occupant and therefore, demands adequate attention of planners and architects.

V. ISSUE OF SLUMS IN THE GLOBAL CONTEXT

While the Indian subcontinent is home to the largest number of slum dwellers given its large urban population, slums are not unique to India. There are large slum cities in developing countries across the world from Mexico City to Johannesburg's Soweto, and Jakarta to name a few. Slums world over, share some common characteristics, which are listed here:

- ✦ A higher incidence of violent crime due to lack of attention from local law enforcement authorities.
- ✦ A higher incidence of disease due to poor sanitation and access to healthcare facilities
- ✦ The dominance of the informal economy and political bosses
- ✦ Higher incidence of child labor, prostitution, and social abuses. Clearly, the culture of a nation or region plays a large role in determining the degree to which these factors shape the slum.

The development of slums appears to be an entirely organic phenomenon which occurs when poor countries that obviously have under developed urban management and governance structures, poor infrastructure, but rapid industrialization and urbanization. Therefore, they fail to minimize the disparity of prosperity between urban and rural population.

VI. SLUMS ISSUE – EXPERIENCE OF GLOBAL CITIES SUCH AS LONDON, PARIS AND NEW YORK

Each of these global cities faced issues of slums during its industrialization phase in the growth of informal housing, workhouses, exploitation of the poor and disenfranchisement of migrant workers. Over time, however, these cities found ways to expand and make room for the increasing number of migrants flowing in and became great cities in part because of their ability to not only gainfully employ these migrants but also to attract and accommodate even more highly skilled immigrants.

Each city developed the ability to absorb and assimilate the influx of migrants and was ultimately able to provide low cost housing, infrastructure and services to its growing populations.

However, slums do not seem to fully disappear. The phenomenon of disparity and migration that persists even now in rich nations. Despite the prosperity of the UK, France, and America, in the outskirts of their major city centers, slums have been replaced by housing estates segregating their inhabitants along socio-economic lines, which even today pose a risk to the stability of their nations. Social exclusion and the lack of opportunities leading to dissatisfaction left the Paris suburbs occasionally burning in riots and protests. There is similar situation in London and other major cities of the UK.

VII. SLUMS ISSUE IN INDIA - THE FUNDAMENTAL CAUSES AND LIKELY SOLUTIONS

In the context of India, slums are perhaps the expected outcome of the rapid economic changes the country is currently undergoing. Rapid pace of urbanization and industrialization are the root causes behind formation of slums and growth. This happens to be the outcome of uncontrolled influx of rural population in search of livelihood for a better life. Rural economy was left unattended by the past governments, rural areas left without basic infrastructures like roads, highways, schools and colleges, hospitals, factories, water supply, electrification and so on and the result was large scale migration to cities.

However, classifying the problem of slums as a

“necessary condition” and relegating them to the list of unsolved global phenomenon will be negating the prospect of solutions.

The approach of central and state governments in the last two decades in implementing schemes like PMGSY (Prime Ministers Gramin Sadak Yojna) and PMAY (Prime Ministers Awas Yojna) have brought great impact on the rural area developments and rural economy. Even small villages get connected with motorable roads and they are well accessible from cities/towns nearby. The second major change that has taken place is electrification of villages and availability of power in rural areas has started showing positive impact on the rural economy. Digitalization and internet connectivity and spread of banking networks in rural sector definitely accelerates the pace of growth in rural India. Thus, mass immigration from villages to large cities is bound to stop.

The attention of government on rural development is likely to help in achieving sustainable solutions to the burning problem of slums in cities.

VIII. IN-SITU SLUM REDEVELOPMENT - AN EFFECTIVE CONCEPT

In Situ Slum Redevelopment (ISSR) happens to be the central theme behind the ongoing Pradhan Mantri Awas Yojana—Urban scheme, where the aim is to create housing units on existing land of economically weak families with the help of government financial assistance, it uses land value-based tools for developing low-income housing.

The focus of ISSR on attracting private capital to redevelop India's slums reflects a perceived rent gap on slum lands.

IX. AN ATTEMPT TO REDEVELOP DHARAVI SLUMS ON ISSR CONCEPT

The much awaited Dharavi Redevelopment Project has finally moved forward with the Adani Group emerging the victor with its Rs 5,069 crore bid. The project, whose development has been stalled for the past two decades merely because of lack of political will and indecisiveness of government has now been put on track. The redevelopment of Dharavi slum in Mumbai which

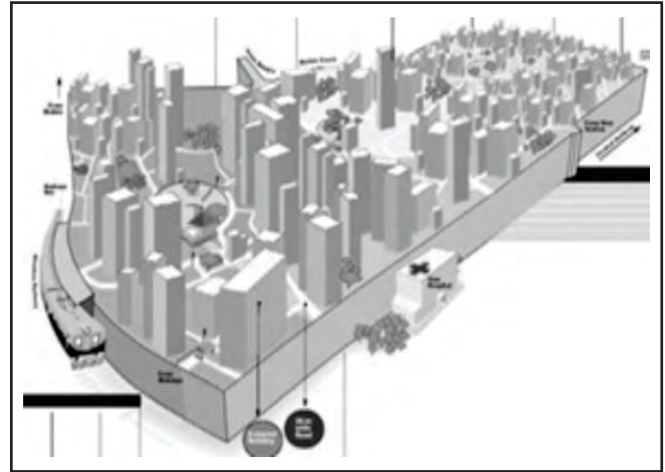


Fig. 6. Tentative layouts – Dharavi Slum Redevelopment

happens to be the largest slum in the world, with a population of 10 lakhs and area of 590 acres.

The redevelopment project for which tenders were finalized aims to rehabilitate 6.5 lakh slum dwellers in seven years. This scheme for the “Dharavi Slum” project includes using 200 acres to rehabilitate residents and build commercial units, 100 acres for a community garden and the remaining 290 acres will be for sale and commercial complex constructions. This also means that new infrastructure will be implemented and bring in-situ creation of job opportunities for the dwellers.

X. CONCLUSION

While slums may be born organically in due course of time, they will not disappear automatically just because cities build more houses. If slum is a fact of modern urbanization of India, India's choice is to decide what is its vision for the slum of the future, the role of the slum, its design and purpose, how it will transform slums to make them assets and thereby, put them on the path to transforming the entire set up into being the waiting room to enter a better civic life.

If this is to happen, the real challenge is to support the organic process of mutating slums into dynamic city sub-centers in an ever expanding city boundary. Ultimately, slums become assets and start contributing effectively to economic growth of the country.

The Dharavi slum has been put in process of transformation and will show the path for transformation of all other slums in various cities of India where almost 100 million people live and the problem is growing

rapidly with influx of 14 million migrants every year into cities.

The cities have shortage of land resources in general, hence, the obvious solution is going to be high rise constructions to accommodate the large number of dwelling units within city area and prevent creation of new slums which can become a stigma for prosperous India in the years to come.

AUTHOR'S CONTRIBUTION

Mahesh Prasad is the sole author of this paper and he has done the entire work for the paper. There is no co-author for this article.

CONFLICT OF INTEREST

The author certifies that he has no affiliation with any firm/organization and there is no financial or non-financial conflict of interest in the subject matter or materials discussed in the manuscript.

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