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APPLICATION OF GRIHA RATING IN HIGH RISE BUILDING

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Abstract: *This paper explores the application of GRIHA (Green Rating for Integrated Habitat Assessment) in high-rise buildings, focusing on its significance in promoting sustainable practices and environmental performance. The study presents an overview of GRIHA, discusses its relevance in high-rise constructions, and highlights the methodology employed for evaluating green building aspects. The results showcase the positive impact of GRIHA implementation in high-rise buildings, including enhanced energy efficiency, water management, and overall sustainability. The paper concludes by outlining future prospects and emphasizing the importance of integrating GRIHA principles into the design and construction of high-rise structures.*

Keywords: GRIHA (Green ratings for integrated habitat assessment); green rating system, high-rise buildings, sustainability, energy efficiency, water management.

1. INTRODUCTION

The construction and operation of high-rise buildings have significant environmental impacts, requiring sustainable approaches to mitigate their carbon footprint and resource consumption. GRIHA, a green building rating system developed in India, offers a comprehensive framework for assessing and certifying the sustainability of buildings. With the rapid urbanization and growing population density, high-rise buildings have become a prominent feature of modern cities. However, their construction and operation significantly impact the environment, leading to increased energy consumption, carbon emissions, and resource depletion. To address these concerns, the application of sustainable building practices has gained substantial attention. GRIHA, a green building rating system developed in India, offers a comprehensive framework to assess and promote environmentally responsible design and construction practices. This paper explores the application of GRIHA in high-rise buildings, focusing on its potential to enhance sustainability and mitigate the environmental impact associated with tall structures.

2. METHODOLOGY

- Comprehensive review of existing literature
- Data collection
- Analysis techniques.
- The criteria used for evaluating the application of GRIHA in high-rise buildings.
- Discuss the selection of case studies and project examples to illustrate successfulimplementations of GRIHA in high-rise constructions.

Comprehensive review of existing literature:-

They've shown the potential for large energy savings and the viability of incorporating renewable energy sources into buildings. They have shown the value of adding natural ventilation, appropriate lighting, and low-emission materials into buildings. These case studies have provided insights into successful design methods, technology, and GRIHA compliance strategies. They advocate conducting a literature search utilising academic databases like Scopus, IEEE Xplore, or Google Scholar, with relevant keywords like "GRIHA rating system," "sustainable buildings in India," or specific metrics ofinterest within the GRIHA framework.

Data collection:-

Understanding energy use, measuring structural performance, checking indoor air quality, or analysing occupant behaviour are all examples of tasks. This will aid in choosing the sort of data to collect as well as the strategies to use. Determine the factors or variables that are relevant to your goals. When evaluating energy consumption, for example, factors may include electricity usage, HVAC system efficiency, or illumination levels. Make a list of the precise data points that must be gathered.

Analysis techniques:-

The function of green building design in architectural design is continually being reflected as the urbanization process and construction industry expand. Comprehensive green construction implementation is a crucial step in promoting China's energy-saving emission reduction and low-carbon city goal. However, there are few examples of green building design being used in super high-rise civil constructions, and much research and data analysis are required.

The criteria used for evaluating the application of GRIHA in high-rise buildings:-

• Site Selection and Site Planning • Conservation and Efficient Use of Resources • Building Design and Architecture • Sustainable Materials and Construction Practices • Indoor Environmental Quality • Operation and Maintenance • Innovation • Socio-Economic Aspects These criteria provide a thorough framework for evaluating GRIHA implementation in high-rise buildings, ensuring that sustainable concepts are incorporated into the design, construction, and operation of these structures. It strives to reduce the environmental imprint, improve resource efficiency, and provide occupants with healthier and more comfortable living areas.

3. APPLICATIONS

The application of GRIHA (Green Rating for Integrated Habitat Assessment) in high-rise buildings offers numerous benefits and opportunities for promoting sustainable practices and improving environmental performance. Here are five key applications of GRIHA in high-rise constructions:

1) **Energy Efficiency:** refer from (http://www.grihaindia.org/ , http://www.beeindia.gov.in/ , http://www.teriin.org/)

GRIHA promotes energy-efficient design strategies in high-rise buildings, such as optimizing building orientation, using high-performance building envelopes, and incorporating energy-efficient lighting systems. These measures help minimize energy consumption and reduce the carbon footprint of high-rise structures. energy efficiency plays a crucial role in reducing the environmental impact of buildings and improving their operational performance. GRIHA rating encourages the implementation of various energy-efficient measures and technologies to optimize energy consumption in high-rise buildings.

2) **Water Conservation:** refer from (https://www.grihaindia.org/files/Guidelines_large_area.pdf)

Water scarcity and the need for responsible water management make water conservation a crucial component of sustainable building practices. GRIHA rating encourages high-rise buildings to adopt various measures and technologies to minimize water consumption and promote efficient watermanagement.

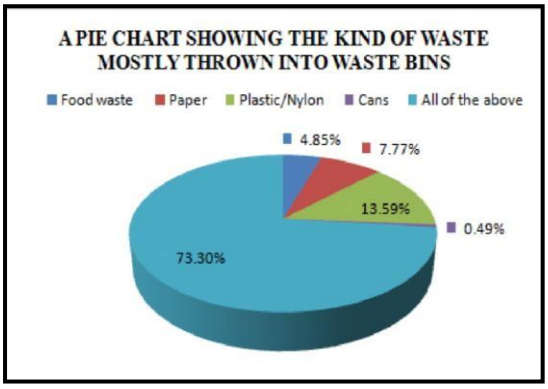
To achieve a higher GRIHA rating in terms of water conservation, high-rise buildings need to focus on several key areas. These include water-efficient fixtures, rainwater harvesting systems, wastewater treatment, and reuse.

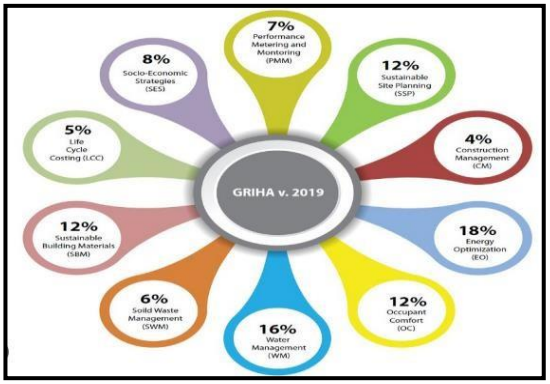
3) **Waste Management:-** refer from

(https://www.grihaindia.org/files/GRIHA_V2015_May2016.pdf) Waste management practices in GRIHA-rated

high-rise buildings:

a) Waste Segregation: GRIHA rating emphasizes the practice of waste segregation at the source. This involves separating different types of waste, such as organic waste, recyclable materials, and hazardous waste, at the point of generation. Properly segregated waste makes subsequent management processes more efficient and enables effective recycling.
b) Recycling Facilities: GRIHA rating promotes the provision of recycling facilities within high-rise buildings. These facilities may include designated collection points for recyclable materials like paper, plastic, glass, and metal. They also encourage the use of recycling bins or containers with clear labeling for easy segregation by occupants.
c) Composting Units: GRIHA rating encourages the implementation of composting units in high-rise buildings. These units facilitate the composting of organic waste, such as food scraps and garden waste, on-site. The resulting compost can be used for landscaping, gardening, or other beneficial purposes.





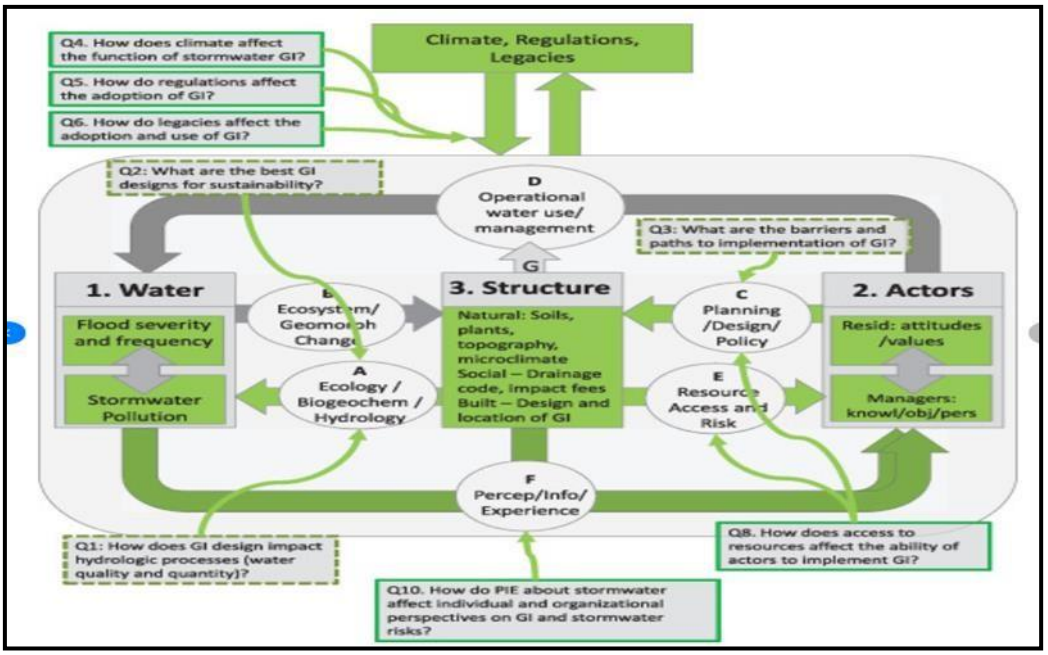
4) **Indoor Air Quality:-** refer from (https://www.grihaindia.org/grihasummit/presentations/10tgs/R-Suresh.pdf , https://www.mdpi.com/1660-4601/18/6/3276 , https://www.ashrae.org/technical-resources/bookstore/indoor-air-quality-guide)

Indoor air quality practices in GRIHA-rated high-rise buildings:

a) Ventilation Systems: GRIHA rating emphasizes the provision of effective ventilation systems in high-rise buildings. These systems ensure a continuous supply of fresh air, diluting indoor pollutants and maintaining proper air circulation. Mechanical ventilation systems, such as energy recovery ventilation (ERV) or demand-controlled ventilation (DCV), are encouraged for optimal IAQ.
b) Low-Emission Materials: GRIHA rating promotes the use of low-emission materials in high-rise buildings. These materials, such as low-VOC (volatile organic compound) paints, adhesives, and sealants, help minimize the release of harmful chemicals into the indoor air, improving IAQ and occupant health.
c) Air Filtration: GRIHA rating emphasizes the installation of air filtration systems in high-rise buildings. These systems effectively capture and remove

5) **Stormwater Management:-** refer from (https://www.irjet.net/archives/V7/i7/IRJET-V7I7894.pdf)

Stormwater management is an essential aspect of sustainable building practices, including high-rise buildings. It involves implementing strategies to effectively manage stormwater runoff, reduce the risk of flooding, and minimize the impact on natural water bodies. Here's a brief note on stormwater management in high-rise buildings:
High-rise buildings face unique challenges in stormwater management due to their large footprint and limited green space. However, incorporating effective stormwater management measures can help mitigate these challenges and promote sustainable development.



4. RESULT

- The application of GRIHA ratings in high-rise buildings has yielded positive results in terms ofenergy efficiency, water management, and sustainable construction practices.
- Case studies have demonstrated significant reductions in energy consumption, ranging from 20% to40%, in high-rise projects certified under GRIHA.
- Similarly, efficient water management practices have led to considerable water savings andimproved water resource conservation in these structures.

5. FUTURE SCOPE

- The future scope of GRIHA rating application in high-rise buildings is promising.
- It involves further research and development to refine the rating system, address specific challengesrelated to tall structures, and promote innovation in sustainable building practices.
- Future considerations should include aspects such as vertical transportation efficiency, urban heatisland mitigation, smart building technologies, and the integration of renewable energy sources.

6. CONCLUSION

- The application of GRIHA ratings in high-rise buildings plays a vital role in enhancing sustainability and environmental performance. By focusing on energy efficiency, water management, and material selection, GRIHA contributes to reducing the ecological footprint of high-rise constructions. The future implementation of GRIHA in tall structures holds significant potential for achieving more sustainable and environmentally responsible urban developments.
- Conclude by highlighting the need for further research and collaboration to advance the application of GRIHA in high-rise buildings.

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