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Title of the Ph.D Thesis: Assessing the Sustainability of Coastal Tourism in the Sindhudurg District, Maharashtra: A Spatial Analysis

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FINDINGS

The core findings illuminate a critical sequencing challenge where the rapid pace of economic and tourism development is significantly outpacing the necessary environmental and social planning required to sustain it. Through advanced spatial analysis utilising high-resolution Sentinel-2 satellite imagery and the MOLUSCE modelling framework between twenty seventeen and twenty twenty-four, the study reveals a profound and alarming shift in land-use and land-cover patterns. The data explicitly demonstrates a consistent and widespread conversion of natural vegetation and agricultural croplands into concrete built-up environments, a transition that is particularly intense and concerning along the ecologically sensitive shorelines. This rapid urbanisation is dangerously concentrated within the fragile five hundred-meter Coastal Regulation Zone, which is meant to be a protected ecological buffer against environmental degradation. The magnitude of this encroachment is starkly evident at specific locations, with Shiroda Beach seeing nearly sixty percent of its built-up structures located entirely within this restricted zone. The situation is even more critical at Achara Beach, where a staggering eighty-nine percent of all construction has occurred within the Coastal Regulation Zone, signalling a severe and immediate threat to the local ecosystem. Other prominent tourist destinations, such as the Malwan, Tarkarli, and Bhogave beaches, are similarly experiencing massive, unregulated urbanisation. At these locations, built-up concentrations within the Coastal Regulation Zone are recorded at an astonishing ninety-six percent, thirty-three percent, and ninety-

seven percent, respectively. This indiscriminate spatial transformation not only compromises the fundamental integrity of the coastal ecosystem but also drastically heightens the region's vulnerability to future environmental changes. In conjunction with the spatial data, the study's carrying capacity analysis across seven major beaches uncovers a profound systemic imbalance in how tourist pressure is distributed. The findings indicate that certain areas are bearing an unsustainable burden while others remain vastly underutilised. Achara Beach, for instance, is operating perilously close to its maximum sustainable ecological threshold, exhibiting a sixty percent utilisation rate despite having critically low management preparedness to handle such intense visitor pressure. Conversely, higher-capacity destinations like Tarkarli and Malwan are operating at merely thirteen percent and twenty-four percent of their utilisation rates, highlighting a significant missed opportunity for strategically managed growth. Beyond the environmental metrics, the research intricately details the socio-economic realities and human experiences associated with this rapid tourism boom. A perception-based survey of stakeholders, evaluated against the targets of the United Nations Sustainable Development Goals, acknowledges that tourism has successfully augmented local disposable incomes and driven positive trends in digital and physical connectivity. However, these economic benefits are simultaneously fuelling a troubling rise in social inequality within the host communities. Local entrepreneurs continue to face severe structural barriers in accessing the financial credit necessary to sustain their businesses. Furthermore, the region suffers from a critical lack of adequate sanitation infrastructure, and current waste management practices remain entirely reactive rather than proactive, addressing pollution only after the damage has occurred. The research also identifies profound governance gaps, noting that while the region's rich natural biodiversity and inherent local hospitality are its greatest enduring assets, a lack of institutional coordination and the threat of cultural commercialisation present significant vulnerabilities. The local community's involvement in vital decision-making processes remains extremely low, pointing to a profound need for localised, participatory governance structures. Ultimately, the study concludes that achieving true sustainability demands a strategic spatial model that actively redirects tourist flows to underutilised areas, rigorously enforces Coastal Regulation Zone setbacks to halt ecological degradation, and empowers local communities. By institutionalising participatory governance and investing in local skill-building, the region can ensure that the economic benefits of tourism are equitably distributed and do not come at the irreversible cost of its natural heritage.