

## DESIGNING FOR MENTAL WELLNESS: THE IMPACT OF SENSORY ELEMENTS IN PUBLIC SPACES ON STRESS REDUCTION

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### ABSTRACT

Human well-being is closely related to the quality of public spaces, especially in urban environments where stress levels generated by noise, crowding and other environmental factors often increase the stress levels. This research examines the function of the sensory design elements (sound, light, and texture) in reducing stress and fostering mental wellness in public spaces with a view to Marina Beach in Chennai. The study is empirical, employed a qualitative methodology, and uses semi structured interviews, observational analysis, and case studies to find out how the sensory experience at Marina Beach impacts on the psychological state of its visitors. To test for stress recovery that occurs due to natural auditory stimuli, soft lighting, and tactile textures, the study applies Stress Recovery Theory (SRT) by Ulrich (1991). Results demonstrate that natural sounds, soft natural lighting and engaging textures offer large amounts of mental well-being to visitors, especially in the form of a restorative environment that encourages relaxation and psychological recovery. Results show that sensory conscious design integration in urban planning to formulate public spaces with health and well-being properties is an important issue. In this regard, it offers useful insights for architects, urban planners and policymakers about incorporating sensory elements as integral components to public space design in a healthy urban context.

## 1. INTRODUCTION

However, public spaces are crucial parts of the urban living and play a significant role; especially for social interaction, recreation, and emotional restoration of inhabitants. In cities like Chennai, where there is a dense population, public spaces need to be designed and ambiances such that the same creates a good mind and an emotional state of the people using such spaces. In the face of the growing city, the need for design of such public spaces becomes more acute that can serve to reduce stress and improve mental well-being. The Marina Beach, located in Chennai, and is one such a space with a huge shoreline, scenic beauty with its cultural importance. Nevertheless, Marina Beach, aside from its visual appeal, is a rare chance to observe how sensory design components (such as sound, light and touch) influence stress levels and psychological wellbeing.

This study investigates the relation between environmental psychology, urban design and sensory experience in the public spaces and mainly investigates how sensory elements at Marina Beach affects stress relief as well as mental well-being among individuals visiting at that place. Based on Stress Recovery Theory (SRT) by Roger Ulrich (1991), the study is guided by idea that exposure to nature based environment can aid people in recovery from stress and promote their emotional health. This research analyses natural sounds such as waves of the sea, beautiful soft lighting of sunrise and sunset, the texture of sand, to understand further therapeutic potential of sensory elements in urban coastal spaces.

This study investigates how these sensory elements help to create a restorative environment through semi structured interviews, observational analysis, and reviewing of the existing literature. Readers will learn about valuable recommendations for urban planners, architects, and policymakers to design spaces that function for purposes but improve the quality of life of the people that use it. The research thereby values the necessity of implying sensory-awareness in building of urban public spread by supplementing it in the run of planning and development of urban public spread.

### **1.1 Introduction to Marina Beach**

The Marina Beach extends for a length of about 13 kilometres along the Bay of Bengal in Chennai, Tamil Nadu. It is one of the longest urban beaches in the world. Marina Beach is a well-known place for its beauty, ambience, revenue and its population that comes there to visit or spend a holiday. It is a civic and social centre for people of varying backgrounds, including the locals, tourists, street vendors and the fitness enthusiasts. It's not just a physical space, the beach represents the Chennai's heritage, leisure culture, and interactions of the community.

Marina Beach types an important security into the city's wellbeing, offering to the agglomerate a break from propelled city way of life. The natural felt elements of the beach are sand, waves, clear blue sky, all produce a unique sensory experience that impacts the mental and emotional state of the visitors. In addition to the numerous iconic structures, a beach is also historically and aesthetically appealing due to its Kannagi Statue, Triumph of labour Statue and various memorials. In addition to this, it is an active space that also promotes physical as well as mental well-being as a result of activities, such as morning walks, yoga, beach sports, and cultural gathering.

Marina Beach is however an urban public space that is subject to other challenges such as overcrowding, pollution, commercialization as well as insufficient infrastructure in some areas. However, these concerns do not stop it from being a psychological retreat for many cities dwellers looking for relaxation, stress relief and some connection with nature. Marina Beach serves as an ideal site for the study because it is an urban coastal setting and sensory design elements play an important role in stress reduction and betterment of mental well-being.

The emphasis here is on analysing Marina beach as a therapeutic public space and analysis is taken on how natural and sensory characteristics of the beach affect emotional and psychological state of its visitors. The study aims to point out how these interactions should play a role in designing a healthier, more engaging public space by understanding them.

## **2. BACKGROUND STUDY**

Environmental Psychology, Urban Planning, and Architecture have already done much of the work on the relationship between public space design and mental well-being. The public space is not merely a location for walking or social interaction; rather, spaces in the public space seek to provide an environment that affects human emotions, cognitive operations, and physiological reactions. Together, they [light and sound] act as devices that can help design sensory experiences in such spaces, which is known as sensory design.

### **Sensory Design and Its Role in Public Spaces**

Sensory design is the approach of seeing how different environmental stimuli affect human perception behaviour. This research has identified that sensory experiences in public space can be calming and relaxing or otherwise stressful and uncomfortable (Pallasmaa, 2012). There is an increasing interest in the concept of biophilic design, which combines natural components in urban contexts, which tends to decrease mental stress (Kellert et al., 2008).

### **Soundscapes and Their Psychological Effects**

Sound is one of the leading sensory elements to consider in the planning of public spaces. Natural sound study suggests water flow, birdsong and rustling leaves have a calming effect and lower cortisol levels and thus lowering stress and anxiety (Alvarsson et al., 2010). Contrarily, while urban noise pollution—traffic, construction, and industrial sounds—associated with excess amounts of noise pollution, has been shown to increase stress, cognitive fatigue, and even cardiovascular diseases (Basner et al., 2014). To reduce noise, and to make sound splendors, urban planners have explored the uses of sound barriers, water features and green buffers.

### **The Role of Light in Emotional Well-Being**

Public spaces have their own mood, their own circadian rhythms and psychological comfort level, which is, to a great extent, dependent on lighting conditions. Natural daylight exposure has been shown to increase serotonin and reduce symptoms of depression, two things that studies say (Küller et al., 2006). Harsh artificial light or poorly illuminated spaces in urban environments can cause discomfort, stress and generally feels insecure (Boyce, 2014). Effective thought lighting design, including warm light, dynamic daylight integration, and night-time safety lighting plays an important role in improving human perception of well-being and relaxation in public spaces.

### **Texture and Tactile Perception in Public Space Design**

Not taken into consideration in urban planning, the sense of touch plays an important role when thinking about human interaction with spaces. Different emotions: Textured surfaces, such as wood, stones, water and vegetation. Natural and varied textures are thought to be good stimuli for comfort, but unnatural and smooth textures can take on a feel of impersonal cold (Heschong, 1979). In urban design, one means of increasing the perceived diversity of the tactile is in the seating, pathways, and architectural finishes.

### **Theoretical Perspectives on Sensory Design and Mental Well-Being**

There are several theories that have shown the link between sensory environments and mental health.

- According to Attention Restoration Theory (Kaplan & Kaplan, 1989), engagement within non-demanding environments (like natural environments) leads to cognitive recovery and reductions in mental fatigue.
- Stress Recovery Theory (Ulrich, 1991) maintains that stress levels are lessened by unconscious physiological responses that are offered by aesthetically pleasing, naturally integrated environments.
- Yet, Prospect-Refuge Theory (Appleton, 1975) and how the perspective of people can be heightened through thoughtful sensory design is even more relevant.

### **3. METHODOLOGY**

For this research, adopted a qualitative methodology to understand how the sensory design elements (sound, lights, and textures) at the Chennai's Marina Beach relate to stress reduction and mental well-being. As a qualitative approach, this method is chosen to capture one's personal experience and emotional response in this iconic public space.

#### **3.1 Research Design**

An attempt is made by the study to make use of a phenomenological approach in which the lived experiences of people who visit to Marina Beach are analysed in terms of the impact of sensory elements on their psychological state. In so doing it provides in depth understanding of how sounds, lights and textures work together to provide a public with overall well-being.

#### **3.2 Data Collection Methods**

##### **Primary Data**

In order to gain insights into visitors' consideration with the sensory elements of the beach (sounds of the waves, how it looks at different times of day, the textures of the sand), semi structured interviews were conducted with visitors to Marina Beach, both tourists and locals, and observation of environmental conditions and interactions with the environment.

In the former, site observations to document people's 'traveling' on the beach environment, how they use space, express emotions and do things during their exposure to certain 'sensory elements' at the beach.

##### **Secondary Data**

Literature review and studies regarding urban design, sensory elements and mental well-being particularly city and in beach coastal environment.

Other coastal public spaces that have been designed in a manner focused on sensory elements for mental well-being.

#### **3.3 Data Analysis**

The common themes in the impact of sensory elements on mental well-being will be determined through thematic analysis. It will consist of looking at the interview responses as well as observational notes.

To analyse comparisons of different sensory conditions in different time (e.g. early morning, evening) to understand the effect of lighting and sound on the visitors' experience.

Mapping emotional responses to sand, stones, pathways, natural vs artificial lighting, and waves, breeze, etc. along the beach.

This study concentrates on Marina Beach in Chennai, aiming at providing a highly detailed analysis of how sensory design elements prospectively improve the wellbeing of the people in coastal public spaces.

### 3.4 Research Objectives

- To analyse the role of sound, light, and texture in shaping human experiences in public spaces.
- To explore how these sensory elements influence stress reduction and mental well-being.
- To examine case studies of urban spaces designed with sensory-conscious elements and their effectiveness in enhancing psychological comfort.

## 4. INTERPRETATION

The paper applies Stress Recovery Theory (SRT) by Roger Ulrich (1991) to show how aesthetic and nature integrated environments facilitate psychological relaxation and reduce stress. SRT says that the combination of such calming sensory elements, for example natural light, soft textures and soothing soundscapes stimulate positive physiological reactions including lower heart rate, lower cortisol levels and generally improved emotional well-being.

In the realm of public space design, this theory affirms that stress reduction theory is supported by the presence of sound, light, and texture. For example: Water features or birdsong can also act as natural sound and reduce the urban noise pollution to make the environment peaceful. Natural daylight is mimicked by soft and warm lighting, and it increases mood and helps to regulate circadian rhythms. Sensory comfort is provided by tactile diversity (wood, stone, and greenery) which increases the welcoming and therapeutic feeling of public spaces.

Through SRT, this research examines the positive contribution sensory conscious public spaces have in the emotional healing and mental well-being and how they support the design of stress reducing urban environments.

To analyse the data gathered from interviews, observations, and secondary research, Stress Recovery Theory (SRT) by Roger Ulrich (1991) is applied in this section. The theory states that the aesthetic, nature integrated environments promote stress reduction and emotional restoration, especially through the sensory element – sound, light and texture.

### Sound

*Observation: Visitors at Marina Beach did report, them finding a feeling of calm and being relaxed when approaching the water's edge noting the sound of the waves crashing on the beach as well as the wind blowing as a major component in their mental wellbeing.*

The interviews turned out that most individuals started to experience a decrease in anxiety and stress when they were making use of these natural sounds.

Theory Used on: According to SRT, relaxing sounds like the sound of waves lower the heart rate and cause the parasympathetic nervous system to kick into action, bringing the individual into a state of relaxation and lowering stress. According to Ulrich's assertion that exposing

oneself to natural auditory stimuli results in emotional restoration, it is not surprising that participants frequently mentioned that these sounds helped them to 'disconnect from the noise of the city' and to become 'at peace.'

*Interview 1: Visitor: The waves are so calming. It is what is feeling like natural therapy. Just listening to the ocean I feel more at ease.*

*Interview 2 (Urban Planner): "Usually, we tend to overlook the aspect of sound in public spaces, but the soundscape of the beach is one of the most therapeutic aspects of the beach."*

## **Light**

*Observation: The emotional response differed based on lighting from sunrise, midday, to sunset. There were points of quietness in the sunrise and sunset, lower natural lights were calming and higher artificial lights at night are disturbing especially near the busy walkways and parking space.*

Theory of Application: According to SRT, exposure to natural light and softer lighting conditions elicits a provision for emotional well-being. That is, specifically, warm sunlight, and the transition from daylight towards evening light, create feelings of safety and comfort. Marina Beach findings show that sunrise and sunset associated natural lighting might help in reducing psychological stress, corroborating the theory which attaches emphasis to natural environmental cues.

*Interview 3: "I came here early morning or few seconds of the sunset." The place is so peaceful, because of the soft light. It feels as if I am in a calmer state of mind."*

*Observation Note (Evening): 'People spend even longer time on the beach in the evening, which may indicate a more positive perception, an emotional feeling the time has come to be alone on the beach by twilight.'*

## **Texture**

Result: Visitors comfort and relaxation were actually uncovered as being strongly related to the soft texture of sand. Some reported barefoot walking on the beach or sitting on the sand as an emotionally restorative thing. They mentioned other manmade such as the stone pathways and other parts of the beach's rough textures as less inviting which caused discomfort and felt disconnected to nature.

Ulrich's SRT here suggests that natural textures, i.e, soft sand, support emotional restoration by allowing people to feel connected with the natural world. It enables people to engage their senses in a soothing way and have a breather from what is constantly demanding their mental processing, to walk on sand or to feet around and feel the touch of the beach.

*Interview 4: I found the sand so nice under my feet when interviewed in Marina Beach. Everything, work, stress everything, reminds me that I used to forget, to forget everything."*

*Observation Note: 'The visitors that walked or sat on the sand more seemed to feel relaxed (slower movements and more frequent smiles).'*

## Integration of Sensory Elements

Visitors to the complex reported feeling well in a holistic sense when all sensory elements—sound, light, and texture were brought together. One example is the number of participants who remarked that they found the farthest mental recovery from the communications they ultimately relinquished, when they spent time while the sun on the beach during the early dawn hours of the calm sound of waves and soft sunlight and warm sand.

Application Theory: Ulrich's SRT indicates that it is the interaction of several sensory elements that has best effect on reducing stress. Overall, sound, light and texture contribute to enhance psychological comfort. Marina Beach offers a holistic sensory experience wherein visitors unravel a plethora of simultaneous sensory stimuli for the process of deep restoration.

*Interview 6 (Visitor at Marina Beach): "If I walk down the beach, I walk on the sand, I hear the waves of the beach—I feel totally at ease; I am another world."*

*Observation Note: "At sunrise, groups of visitors would sit near the water's edge, a pleasant way to indicate that the combination of sensory elements and the soothing of merely observing created an amazingly restorative atmosphere."*

## 5. CONCLUSION

Stress Recovery Theory (SRT) is applied to the sensory design elements at Marina Beach and found that sound, light, and texture are major contributor to the reduction of stress or mental well-being. Ulrich's theory emphasizes that exposure to aesthetically pleasing and natural environments provides emotional recovery, and I agree, as natural soundscapes, soft natural lighting, and engaging textures of the beach environment tend to have restorative effect to people. Finding gain importance the integration of sensory elements in the public space design, to produce healthier, more supportive urban environments.

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