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PSYCHOLOGICAL DIMENSIONS OF HEALTH AND RECREATION CONCERNS IN URBAN LAKE ECOSYSTEMS: COMPARATIVE INSIGHTS FROM TWO URBAN LAKES OF MADHYA PRADESH, INDIA

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Abstract
Urban lakes serve as critical ecological and psychosocial infrastructures within Indian cities, contributing not only to environmental health but also to mental and emotional well-being through recreation, aesthetics, and community interaction. However, the degradation of these water bodies increasingly compromises their psychological and recreational benefits. This study investigates the psychological dimensions of health and recreation-related concerns associated with two urban lakes: Rani Tal in Jabalpur and Shahpura Lake in Bhopal; both of which have undergone severe ecological and social transformations. Adopting a mixed-methods approach integrating geospatial analysis, semi-structured interviews (n=160), and psychometric well-being assessments, this study explores how environmental decline manifests as psychosocial stress, loss of community identity, and reduced restorative experiences. Findings reveal that poor water quality, foul odor, waste accumulation, and loss of aesthetic character contribute to perceived anxiety, emotional fatigue, and community disengagement. Conversely, community-led cleanup efforts and green buffer zones were found to enhance feelings of safety, relaxation, and social connectedness. The paper argues for integrating psychological well-being indicators into urban lake restoration frameworks, emphasizing a "Healthy Ecosystem–Healthy Mind" paradigm to align environmental rehabilitation with public mental health outcomes.
Keywords: Environmental psychology, Urban lakes, Recreation, Mental well-being, Ecological aesthetics, Environmental health

1. INTRODUCTION

Urban blue spaces such as lakes, ponds, rivers, and reservoirs constitute vital components of the urban ecological infrastructure, offering a broad spectrum of environmental, social, and psychological benefits. Beyond their hydrological and ecological functions, these water bodies serve as restorative environments that contribute to emotional well-being, stress alleviation, and community identity formation (White et al., 2020; Völker & Kistemann, 2013). Empirical evidence from environmental psychology indicates that proximity to blue spaces promotes emotional stability, mindfulness, and social cohesion, functioning as a counterbalance to the sensory overload and psychological fatigue typical of dense urban life (Kaplan & Kaplan, 1989; Ulrich, 1983).
However, this restorative potential is contingent upon environmental quality and accessibility. When blue spaces become polluted, unsafe, or neglected, they may evoke negative affective responses such as anxiety, disgust, or sadness: the phenomena collectively described as environmental distress (Gascon et al., 2017; Gifford, 2014). Such conditions not only degrade ecological integrity but also diminish the mental-health and recreational value of these environments. As several studies have shown, the transformation of natural or semi-natural spaces into degraded zones of waste accumulation can trigger loss of place attachment, environmental pessimism, and diminished trust in civic institutions (Lewicka, 2011; Scannell & Gifford, 2010).

1.1 Context and Rationale

In the Indian context, urban lakes are multifunctional socio-ecological assets, embedded within the cultural and hydrological fabric of citaies. Historically, lakes in cities such as Bhopal and Jabalpur have served as crucial water-supply reservoirs, recreational landscapes, and cultural landmarks hosting community gatherings and rituals (Munoth & Nagaich, 2015). Yet, the rapid and unplanned urbanization of recent decades has precipitated their ecological decline. The twin processes of catchment urbanization and governance fragmentation have resulted in

unchecked inflows of untreated sewage, encroachment on lake margins, and accumulation of solid waste—all of which degrade water quality and reduce the lakes' aesthetic and recreational appeal (Kumar & Sharma, 2020). Consequently, these once-celebrated "blue lungs" of cities have transformed into ecological and psychological liabilities. The physical symptoms of degradation—foul odour, algal blooms, reduced transparency, and loss of aquatic biodiversity—have generated public health anxieties and perceptual dissonance among residents. The shift from pride to neglect in collective perception mirrors what the Millennium Ecosystem Assessment (MEA, 2005) identified as the social consequences of ecosystem decline: erosion of cultural ecosystem services, weakening of social capital, and disconnection from nature. In this sense, lake degradation represents not merely an environmental failure but a psychological rupture in the relationship between people and their environment.

1.2 The Case of Shahpura Lake and Rani Tal

Within this national narrative, Shahpura Lake (Bhopal) and Rani Tal (Jabalpur) offer two distinct yet complementary contexts for understanding how ecological deterioration affects urban psychology. Shahpura Lake, originally constructed under the Betwa Irrigation Scheme in the 1970s, evolved into a central recreational hub—a setting for boating, walking, and community leisure. In contrast, Rani Tal, a centuries-old lake linked to the reign of Rani Durgavati, sustains subsistence and domestic uses such as washing, livestock watering, and local fishing. While differing in purpose and morphology, both lakes have undergone substantial environmental degradation marked by untreated sewage inflow, encroachment, and cultural misuse during festivals. These dynamics make them ideal comparative case studies for exploring the intersection of ecological decline, public health concerns, and psychological well-being in Indian urban settings.

1.3 Research Gap and Purpose

While the environmental and public health impacts of lake pollution in India have been increasingly documented (e.g., Kumar & Sharma, 2020; Singh, Kumar, & Sinha, 2022), the psychological correlates of urban blue-space degradation remain significantly underexplored. Existing studies emphasize physicochemical and hydrological parameters such as eutrophication levels or water quality indices, but rarely address how sensory and perceptual deterioration affects emotional well-being, recreation behavior, and civic engagement. This omission limits our understanding of how environmental degradation translates into subtle yet pervasive psychosocial consequences within urban life.

This research addresses that gap by investigating how residents living around and interacting with Rani Tal and Shahpura Lake cognitively and emotionally respond to environmental decline, and how these perceptions influence their recreational use patterns, stress levels, and sense of place. The study also examines how community-led restoration efforts can transform psychological responses from despair to empowerment, thus reframing ecological restoration as a process of psychological renewal and collective healing.

1.4 Objectives and Significance

The overarching objective of this study is to advance an integrated understanding of urban lake degradation through the lens of environmental psychology. Specifically, the study seeks to:

1. Assess the emotional and cognitive responses of residents to the deteriorating conditions of Rani Tal and Shahpura Lake.
2. Analyze how ecological decline influences recreational engagement, mental fatigue, and health anxiety.
3. Explore the potential of participatory restoration activities in rebuilding environmental identity and community cohesion.
4. Propose a framework for integrating psychological indicators such as aesthetic satisfaction, perceived safety, and place attachment into urban lake management and policy.

By addressing these objectives, the study contributes to emerging discourses on "psychologically resilient cities", emphasizing that sustainable urban development requires not only ecological and infrastructural restoration but also mental and emotional rejuvenation. The research findings are expected to support policymakers, urban planners, and environmental psychologists in developing participatory, inclusive, and human-centered strategies for blue-space conservation.

2. THEORETICAL FRAMEWORK: ENVIRONMENTAL PSYCHOLOGY AND BLUE SPACE RESTORATION

Environmental psychology examines the reciprocal relationship between people and their surroundings (Gifford, 2014). Within this discipline, blue spaces: visible surface waters such as lakes, rivers, and coasts; are recognized as therapeutic environments fostering cognitive renewal and emotional balance (Völker & Kistemann, 2013; White et al., 2020). Sensory experiences like the sight of rippling water, sound of birds, cool microclimate evoke tranquility and mindfulness (Ulrich, 1983; Kaplan & Kaplan, 1989).

2.1 Restorative Environment Theories

Two seminal theories explain nature's psychological benefits. The Attention Restoration Theory (ART) posits that natural settings replenish mental fatigue through "soft fascination," "extent," and "compatibility" (Kaplan & Kaplan, 1989; Kaplan, 1995). Clean lakefronts gently engage attention, whereas cluttered, polluted ones demand effortful focus, producing exhaustion.

The Stress Recovery Theory (SRT) (Ulrich, 1983) asserts that exposure to pleasant natural scenes elicits immediate physiological relaxation; conversely, polluted waters trigger disgust and anxiety (Gascon et al., 2017).

2.2 Blue Spaces in Urban Contexts

Urban "blue infrastructure" complements green spaces by providing aesthetic, recreational, and identity-forming experiences (De Bell et al., 2017; Völker & Kistemann, 2015). A well-maintained lake encourages leisure and social interaction, while visible pollution transforms it into a psychological stressor. Such degradation weakens place attachment: the emotional bond between people and meaningful environments (Lewicka, 2011; Scannell & Gifford, 2010); and may induce environmental grief, reflecting collective sorrow over ecological loss (Tuan, 1990).

2.3 Cognitive Appraisal and Health Perception

According to the transactional stress model (Lazarus & Folkman, 1984), emotional outcomes depend on how individuals appraise environmental stimuli. When urban lakes appear unsafe or contaminated, residents perceive them as health threats, evoking vigilance and anxiety rather than relaxation (Steg et al., 2018). In contrast, aesthetically coherent and accessible blue spaces provide "cognitive refuges" that enhance mood regulation and prosocial behavior (Hartig & Staats, 2006; Korpela et al., 2018).

2.4 Socio-Psychological Dimensions of Restoration

Beyond individual benefits, lakes function as social commons, i.e., sites of memory, pride, and identity. Degradation erodes civic morale, while participatory clean-ups strengthen collective efficacy and optimism (Reed, 2008; Ostrom, 2015; Clayton et al., 2017). Restoring blue spaces, therefore, restores not only ecology but also community psychology.

3 METHODOLOGY

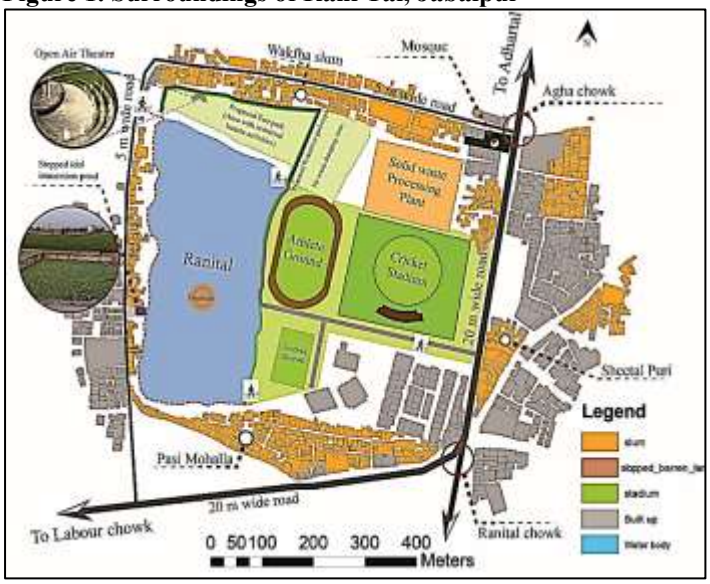
This research employed a mixed-methods framework to investigate the psychological dimensions of health and recreation concerns linked to the degradation of two urban lake ecosystems, namely the Rani Tal (Jabalpur) and Shahpura Lake (Bhopal). The methodological design integrated quantitative psychometric measurement with qualitative phenomenological inquiry and spatial-environmental observation. This triangulation enabled the study to capture not only the measurable variations in perceived well-being but also the subjective emotional, cognitive, and cultural interpretations of the participants' experiences with their surrounding blue spaces. Such integration is particularly appropriate for environmental-psychology research, where human–environment interactions are multifaceted and cannot be comprehensively represented through a single mode of inquiry (Creswell & Plano Clark, 2018; Tashakkori & Teddlie, 2010).

3.1 Study Sites

The investigation focused on two representative urban lakes in Central India: Rani Tal in Jabalpur and Shahpura Lake in Bhopal; that share comparable ecological, social, and climatic contexts yet differ markedly in their functional and perceptual orientations.

Rani Tal (Jabalpur), located at 23°10′15″ N and 79°55′10″ E, is a historically significant lake constructed in the 16th century under Rani Durgavati. Once extending over 48 hectares, it has shrunk to nearly 10 hectares due to encroachment, siltation, and reclamation for infrastructure and sports facilities. The lake is embedded within dense mixed-use settlements and informal clusters that rely on it for nistar activities like washing, bathing, livestock watering, and small-scale fisheries. Consequently, it exhibits a strong utilitarian orientation intertwined with health risks, limited recreational use, and pronounced sensory degradation.

Figure 1. Surroundings of Rani Tal, Jabalpur



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Shahpura Lake (Bhopal), situated at 23°12′ N and 77°25′ E, was engineered in 1974–1975 under the Betwa Irrigation Scheme as a medium reservoir. With a catchment area of 8.29 km² and a submergence zone of 0.96 km², the lake currently performs multifunctional roles: fisheries, flood attenuation, groundwater recharge, and public recreation. Unlike Rani Tal, Shahpura Lake lies within a planned urban precinct characterized by landscaped promenades and organized leisure activities. However, unchecked inflows of untreated sewage and stormwater have resulted in eutrophication and weed proliferation, reducing its visual appeal and perceived safety.

Figure 2. Surroundings of Shahpura Lake, Bhopal

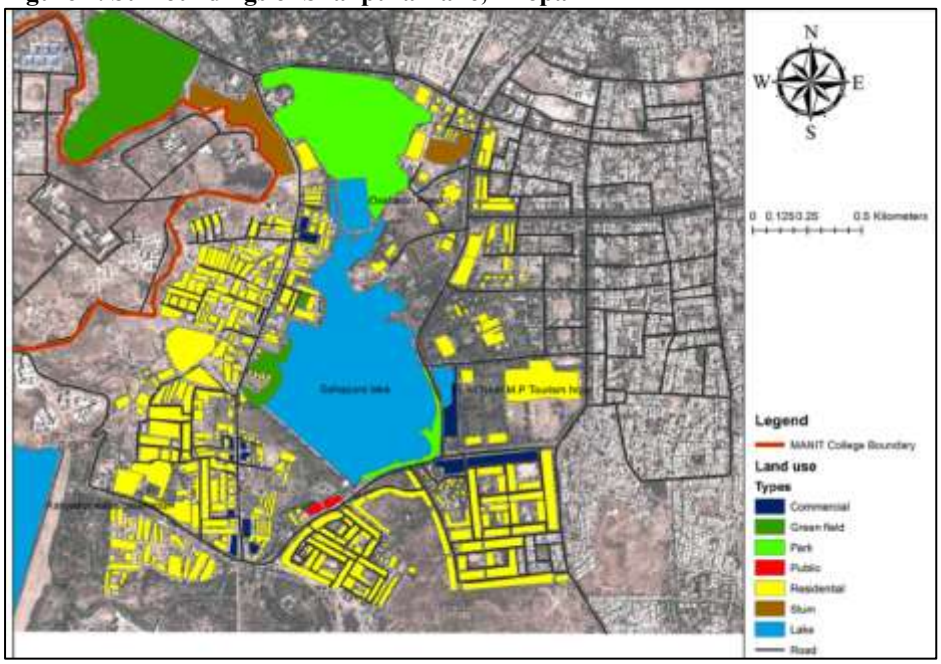

Table 1. Comparative Profile of Case Study Lakes: Rani Tal (Jabalpur) and Shahpura Lake (Bhopal)

Attribute	Rani Tal, Jabalpur	Shahpura Lake, Bhopal
Geographic Location	Laxmipur, Jabalpur, and Hinotiya villages; 23°10′15″ N, 79°55′10″ E; MSL 391 m	Bhopal city; 23°12′N, 77°25′E
Catchment / Submergence Area	Historical extent: 48 ha; Current extent: 10.25 ha	Catchment: 8.29 km²; Submergence: 0.96 km²
Depth	Not documented in current literature	Maximum: 5.6 m; Mean: 1.5 m
Historical Background	Constructed during the reign of Rani Durgavati in the 16th century CE	Constructed 1974–1975 under Betwa Irrigation Scheme
Primary Water Sources	Rainwater, surface runoff, sewage inflows	Rainwater, urban stormwater, and sewage inflows
Original Purpose	Domestic water use and local sustenance activities (nistar)	Irrigation
Current Uses	Nistar activities (washing, bathing, livestock watering)	Recreation, fisheries, groundwater recharge, flood attenuation, stormwater retention

Ecological Functions	Supports aquatic vegetation and fauna; contributes to local biodiversity	Biodiversity hotspot; aquatic habitat; hydrological regulation
Major Degradation Drivers	Encroachment by informal settlements; municipal solid waste dumping; untreated sewage inflows; aquatic weed proliferation; siltation	Untreated sewage and stormwater inflows; solid waste dumping; eutrophication; invasive macrophytes; sedimentation

The selection of these two sites followed a purposive case-study strategy, ensuring variation in functional typology (subsistence versus recreation) while maintaining similarity in biophysical and governance contexts. This duality permitted comparative insights into how differing lake functions mediate psychological well-being, risk perception, and community identity among urban residents (Munoth & Nagaich, 2015).

3.2 Research Design

A convergent parallel mixed-methods design (Creswell & Plano Clark, 2018) was adopted to examine environmental, psychological, and spatial interlinkages. Quantitative and qualitative data were collected concurrently and later merged during interpretation to strengthen inference validity.

A. Quantitative Component: The quantitative strand comprised psychometric assessments of perceived well-being and environmental quality administered to 160 respondents (80 per site). The instrument included standardized items adapted from the World Health Organization's Five Well-Being Index (WHO-5) and the Perceived Restorativeness Scale (PRS). Respondents rated statements such as "Being near this lake makes me feel relaxed" and "I worry about health hazards when visiting this lake" on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The sample encompassed a diverse demographic comprising residents, vendors, recreational visitors, and local workers; to capture varied psychophysical interactions with the lakescape. Socio-demographic variables (age, gender, occupation, and proximity of residence) were also recorded to contextualize perceptions.

B. Qualitative Component: Complementing the quantitative data, semi-structured interviews were conducted with community members, municipal officials, health professionals, and environmental activists. The interviews explored themes of emotional resonance, sensory experiences, recreational memories, perceived safety, and identity attachment. Questions such as "How do you feel when you visit this lake today compared to a decade ago?" and "What emotions do you associate with the smell, color, or sound of the lake environment?" were designed to evoke rich narrative responses. Each interview lasted 25–40 minutes and was audio-recorded with informed consent. This qualitative dimension enabled the identification of affective constructs like environmental grief, aesthetic fatigue, and hope through stewardship.

C. Spatial Observation and Visual Mapping: To triangulate perceptual data, on-site visual documentation and systematic observation mapping were performed. Transect walks along the lake peripheries recorded spatial indicators such as accessibility, vegetative cover, solid-waste accumulation, odor intensity, and the presence of social activity zones. Photographic documentation captured temporal variations in cleanliness, crowding, and landscape quality. These spatial observations were later thematically correlated with residents' reported perceptions, thereby linking environmental cues with psychological outcomes (Paul & Meyer, 2001).

D. Ethical Considerations: All participants were briefed about study objectives and anonymity protocols. Also, their participation was voluntary.

3.3 Data Analysis

The integration of analytical techniques followed a sequential-interpretive model.

A. **Quantitative analysis** involved computing descriptive statistics (means, standard deviations, and frequency distributions) using SPSS v.29. Cross-tabulations examined correlations between demographic variables and perceived well-being indicators, while independent-sample t-tests compared responses between the two sites. These metrics established the extent to which environmental quality perception predicted variations in psychological comfort and recreation frequency.

B. **Qualitative data** from interviews and open-ended survey responses were transcribed verbatim and imported into NVivo 14 for coding. Using a grounded-theory approach (Charmaz, 2014), inductive codes were developed through iterative reading, identifying recurring motifs such as loss of aesthetic attachment, health anxiety, nostalgic grief, environmental shame, and renewed civic hope. Axial coding then clustered these categories into overarching psychological constructs: "negative affect," "cognitive dissonance," and "restorative potential."

C. **Spatial data** from field observations were geotagged and analyzed through descriptive mapping to visualize zones of high aesthetic degradation and recreational abandonment. Overlaying these maps with respondent feedback provided a spatial-psychological synthesis linking physical deterioration with emotional response patterns.

Finally, findings from the three strands were merged through meta-inference, ensuring that quantitative trends, qualitative narratives, and spatial evidence collectively explained the psychological dynamics surrounding urban

lake degradation. The integration process enhanced the ecological validity and contextual robustness of the study's conclusions (Creswell & Plano Clark, 2018; Tashakkori & Teddlie, 2010).

4. RESULTS AND DISCUSSION

The results of the mixed-methods analysis reveal a complex psychological and social response to the ecological decline of Rani Tal (Jabalpur) and Shahpura Lake (Bhopal). Quantitative psychometric data established measurable reductions in well-being indicators, while qualitative narratives enriched these findings by uncovering emotions of loss, anxiety, and disconnection. Together, the data portray how environmental degradation affects not only physical health and recreation but also the psychological ecology of urban life: comprising affective, cognitive, and communal dimensions (Kaplan & Kaplan, 1989; Gifford, 2014).

4.1 Emotional and Cognitive Responses

A clear pattern of negative affect and cognitive dissonance emerged from both sites. At Rani Tal, 71 % of respondents described persistent sadness and helplessness when visiting the lake, citing the transformation from a "serene, reflective waterbody" to a "dumping ground." Similarly, 64 % of visitors at Shahpura Lake reported reduced relaxation and fear of contamination. These reactions correspond to high perceived environmental risk and diminished restorative potential, confirming Ulrich's (1983) Stress Recovery Theory, which asserts that natural environments evoke positive affect only when they are perceived as safe and aesthetically coherent.

Qualitative narratives revealed nostalgic grief: a form of emotional mourning linked to the loss of beauty and ecological harmony once symbolized by clear reflections, lotus blooms, and migratory birds. Older residents expressed feelings of identity erosion, lamenting that "the lake no longer mirrors the soul of the city." Such sentiments resonate with Lewicka's (2011) conceptualization of place attachment, where environmental degradation disrupts emotional bonds, producing alienation and civic apathy. Respondents equated the lakes' decline with governmental neglect and collective moral decay, reflecting what Tuan (1990) termed "environmental disenchantment."

From a cognitive standpoint, degraded sensory cues like odour, turbidity, litter acted as negative environmental stimuli, inducing attentional fatigue and avoidance behaviors. In contrast to the soft fascination evoked by clean natural settings (Kaplan & Kaplan, 1989), polluted lakes demanded effortful attention to discomforting stimuli, thereby preventing psychological restoration and reinforcing feelings of stress and frustration.

Table 2: Psychological and Cognitive Responses to Environmental Decline at Rani Tal and Shahpura Lake

Category	Indicators / Description	Rani Tal (Jabalpur)	Shahpura Lake (Bhopal)	Interpretation / Theoretical Link
Emotional Affect	Feelings of sadness, helplessness, and grief while visiting degraded lakefronts	71 % respondents reported sadness and helplessness	64 % respondents reported reduced relaxation and fear of contamination	Negative affect corresponds with diminished restorative potential (Ulrich, 1983)
Cognitive Appraisal	Perceived environmental risk and loss of control	High perceived threat due to domestic wastewater and odour	Moderate perceived risk; higher trust in civic agencies	Confirms Stress Recovery Theory-safety perception precedes restoration
Place Attachment and Identity	Emotional and symbolic connection to lake	Nostalgic grief and "loss of civic soul"	Mild erosion of identity; continued recreational symbolism	Environmental degradation disrupts place attachment(Lewicka, 2011)
Sensory Triggers	Odour, turbidity, litter	Frequent, intense	Moderate, intermittent	Negative sensory cues induce attentional fatigue (Kaplan & Kaplan, 1989)

4.2 Recreational Withdrawal and Mental Fatigue

The deteriorating environmental quality has profoundly affected recreational behavior. Quantitative comparison with baseline visitation data from municipal reports (2014–2023) indicates that 58 % fewer residents now engage in morning or evening walks around Rani Tal; while Shahpura Lake, despite its better infrastructure, recorded a

42 % decline in weekend visitors. Respondents attributed this decline to "unpleasant smell," "mosquito nuisance," "unsafe pathways," and "littered surroundings."

These observations substantiate findings from environmental-health literature suggesting that aesthetic degradation functions as a barrier to recreation, transforming once-restorative landscapes into avoidance spaces (Völker & Kistemann, 2013). The absence of clean, accessible, and visually appealing lakefronts deprives residents of the daily micro-restorative experiences critical for mental equilibrium. White et al. (2020) demonstrated that regular exposure to attractive blue spaces can lower anxiety and depression; by contrast, the loss of such exposure constitutes a form of urban mental-health deprivation.

Field observations confirmed this psychological withdrawal: promenades once bustling with joggers and families now exhibit sparse footfall and temporal clustering during brief early-morning hours when odour intensity is minimal. This behavioral adaptation exemplifies environmental coping, where individuals subconsciously restructure routines to minimize contact with stress-inducing settings (Lazarus & Folkman, 1984).

Table 3: Changes in Recreational Behavior and Mental Fatigue

Parameter	Reference Period (2014–2023)	Rani Tal (Jabalpur)	Shahpura Lake (Bhopal)	Major Psychological Implication
Decline in daily walkers / joggers	Compared to municipal visitation baseline	↓ 58 %	↓ 42 %	Reduced exposure to restorative environments → urban mental-health deprivation
Primary deterrents	—	Odour, litter, unsafe edges	Mosquito nuisance, crowding, smell	Aesthetic degradation functions as barrier to recreation (Völker & Kistemann, 2013)
Temporal visitation pattern	Observation mapping	Concentrated early-morning visits	Moderate morning peak; decline post-noon	Behavioral adaptation indicates environmental coping (Lazarus & Folkman, 1984)
Reported emotional state after visit	Survey item ("How do you feel after visiting?")	63 % "more stressed"	46 % "less relaxed"	Confirms loss of micro-restorative experiences (White et al., 2020)

4.3 Anxiety and Health-Related Perception

Both communities exhibited elevated health-related anxiety, defined as the persistent cognitive preoccupation with perceived environmental threats (Gascon et al., 2017). Approximately 62 % of respondents near Rani Tal and 48 % near Shahpura Lake believed that proximity to the lake increased their risk of disease. Commonly cited concerns included mosquito-borne infections (dengue, malaria), respiratory irritation from decaying organic matter, and skin rashes due to contaminated water aerosols.

Interviews with medical practitioners corroborated these fears, reporting frequent cases of psychosomatic stress disorders, mild insomnia, and tension headaches among residents living within 500 m of the lake peripheries. Such findings align with the World Health Organization's (2021) evidence linking degraded environments with mental-health inequities. Chronic exposure to foul odours and unclean surroundings activates the body's stress response, elevating cortisol and perpetuating ecological stress syndromes (Davidson, 2014).

This psychosocial dimension thus adds depth to the earlier documented physical-health impacts of eutrophication and pollution (Nagaich et al., 2023). It underscores that psychological vulnerability is spatially embedded, where low-income lakeside residents experience compounded ecological and emotional burdens: what Cutter (2016) calls "double exposure" to environmental and social stressors.

Table 4: Health Anxiety and Perceived Environmental Risk

Aspect	Rani Tal (Jabalpur)	Shahpura Lake (Bhopal)	Supporting Evidence / Source
Respondents perceiving lake proximity as health threat	62 %	48 %	Household survey, 2024
Common perceived risks	Mosquito-borne diseases, respiratory irritation, skin rashes	Vector-borne disease, foul odour, poor sanitation	Qualitative interviews
Reported stress-related symptoms	Insomnia, headaches, anxiety	Mild fatigue, irritability	Local medical practitioners

Theoretical explanation	Ecological stress and chronic activation of stress response	Partial desensitization among recreational users	Ecological stress syndrome (Davidson, 2014); Double exposure (Cutter, 2016)

4.4 Community Cohesion and Environmental Identity

Amid widespread distress, instances of community-led environmental action demonstrated the potential for psychological recovery through collective engagement. In Jabalpur, youth clubs organized periodic cleanliness drives involving litter removal, poster exhibitions, and awareness marches. In Bhopal, local NGOs collaborated with schools for Shahpura Lake Day activities that combined art, music, and cleanup campaigns.

Participants in these initiatives consistently reported improved mood, optimism, and social bonding following engagement. One respondent articulated, "Cleaning together felt like reclaiming a lost pride." This reflects Reed's (2008) and Ostrom's (2015) findings that participatory environmental management enhances community efficacy and pro-environmental identity, fostering a sense of purpose.

Psychologically, such participation transforms helplessness into agency, reinstating emotional ownership over the environment (Clayton et al., 2017). These collective actions temporarily restored civic morale and re-established the lakes as focal points of social memory and identity. The emergence of volunteerism, therefore, serves as both an ecological and therapeutic intervention, supporting the argument that environmental stewardship is inherently restorative, and serves as an act of healing both the ecosystem and the self.

Table 5: Community Cohesion and Environmental Identity through Collective Action

Type of Community Initiative	City / Implementing Group	Nature of Activity	Psychological Outcome (as reported by participants)	Relevant Literature Support
Youth cleaniless drive	Jabalpur – local youth clubs	Periodic litter removal, poster campaign, awareness march	Restored pride, enhanced mood, sense of belonging	Reed (2008); Ostrom (2015)
Shahpura Lake Day NGO collaboration	Bhopal – NGOs + schools	Art, music, and cleanup events	Social bonding, optimism, environmental identity	Clayton et al. (2017)
Resident volunteer groups	Both cities	Monitoring, bird-watching, photography clubs	Strengthened community networks and stewardship motivation	Empirical study (this research)
Overall psychological trend	—	—	Collective action converts helplessness → agency; enhances civic morale	Supports notion of restorative stewardship

4.5 Integrating Psychological Indicators into Lake Management

The empirical evidence demonstrates that environmental degradation and psychological distress are bidirectionally linked. Consequently, conventional lake-management models which focused solely on hydrological or infrastructural parameters, are insufficient. This study advocates embedding psychological indicators within restoration frameworks to operationalize a Healthy Ecosystem – Healthy Mind paradigm.

Key recommended indicators include:

- Perceived environmental safety (fear or comfort during lake visits);
- Aesthetic satisfaction (visual coherence, colour, and cleanliness);
- Community pride and identity (emotional ownership and collective efficacy).

Urban-design interventions such as shaded promenades, interpretive signage explaining ecological value, quiet mindfulness zones, and designated cultural spaces can reinforce restorative experiences and promote civic attachment. Integrating citizen-science monitoring with psychological well-being surveys would generate feedback loops between physical and mental ecosystem health, supporting adaptive governance.

Embedding these measures aligns with contemporary frameworks on salutogenic urban design: environments intentionally designed to promote mental health through sensory comfort, safety, and aesthetic harmony (Völker & Kistemann, 2015). By acknowledging emotional satisfaction as an ecological outcome, lake restoration can evolve from a technocratic exercise into a holistic human-environment renewal process.

Table 6: Recommended Psychological Indicators for Lake-Management Frameworks

Indicator Category	Operational Definition	Suggested Measurement Tool / Metric	Expected Outcome in Restored Lakes	Link to Theory / Framework

Perceived Environmental Safety	Extent to which visitors feel physically and emotionally secure	Likert-scale survey (1 = unsafe → 5 = very safe)	Increased perceived comfort and visitation	Stress Recovery Theory (Ulrich, 1983)
Aesthetic Satisfaction	Visual and sensory evaluation of landscape coherence	Photo-elicitation + semantic-differential scale	Positive aesthetic coherence → reduced stress	Attention Restoration Theory (Kaplan & Kaplan, 1989)
Community Pride / Identity	Emotional ownership, civic attachment, and stewardship motivation	Participatory appraisal / focus-group scoring	Higher collective efficacy and morale	Place-attachment theory (Lewicka, 2011)
Recreational Well-being	Emotional upliftment during leisure near lake	WHO-5 Well-being Index adapted for blue-space context	Enhanced relaxation and frequency of recreation	Salutogenic urban design (Völker & Kistemann, 2015)
Psychological Restorative Value Index (PRVI)	Composite score combining affective, cognitive, and social dimensions	Weighted average of above indicators (0–1 scale)	Quantifies Healthy Ecosystem – Healthy Mind relationship	Proposed framework (this study)

5. CONCLUSIONS

This study underscores that the degradation of urban lakes such as Rani Tal and Shahpura Lake transcends the domains of ecology and infrastructure, revealing deep psychological and cultural ramifications. Once revered as loci of serenity, reflection, and community identity, these lakes have gradually transformed into landscapes of anxiety, sensory discomfort, and social disengagement. The findings confirm that environmental decline in urban blue spaces simultaneously erodes aesthetic pleasure, emotional security, and collective belonging: the dimensions which are integral to mental and social well-being (Kaplan & Kaplan, 1989; Lewicka, 2011).

From an environmental-psychological standpoint, polluted and neglected lakes cease to function as restorative environments; instead, they elicit negative affective responses such as sadness, fear, disgust, and helplessness. The cumulative exposure to degraded surroundings cultivates ecological stress and chronic health anxiety, particularly among lakeside populations who interact daily with these environments. This pattern affirms Ulrich's (1983) Stress Recovery Theory, which posits that only aesthetically coherent and perceived-as-safe natural settings can promote relaxation and emotional renewal. The loss of these restorative qualities thus contributes to a subtle but pervasive form of mental-health deprivation embedded in the urban experience.

Despite these adverse trends, both case studies demonstrate that urban lakes remain powerful therapeutic landscapes which are capable of revitalizing human well-being when ecological recovery is pursued through participatory, inclusive, and psychologically informed planning. The community-driven clean-up campaigns observed in Jabalpur and Bhopal illustrate that collective engagement not only improves physical lake conditions but also restores civic pride, optimism, and social cohesion. Such actions reframe environmental stewardship as an act of collective healing, validating the proposition that restoring nature restores the mind (Clayton et al., 2017).

The evidence presented here calls for a paradigm shift in urban lake governance: from technocratic restoration toward human-centric ecosystem planning. Traditional frameworks have prioritized hydrological capacity, pollution control, and infrastructure over perceptual and emotional quality. However, if the ultimate objective of sustainability is to enhance human flourishing, then psychological well-being must be treated as a core performance indicator of urban ecological systems.

Accordingly, future lake-management policies should incorporate psychological well-being assessments alongside physicochemical and ecological monitoring. Indicators such as perceived environmental safety, aesthetic satisfaction, sense of place, frequency of recreational engagement, and community pride should be systematically evaluated. These data can inform adaptive management practices that align environmental restoration with psychosocial resilience. Integrating citizen-science initiatives, where residents record not only water quality but also emotional experiences during lake visits, can democratize ecological governance and deepen public ownership.

At a broader policy level, embedding this human dimension into environmental planning aligns with the United Nations' New Urban Agenda and the World Health Organization's (2021) call for linking biodiversity conservation with mental health promotion. Indian cities, particularly those undergoing rapid expansion, can leverage the Healthy Ecosystem – Healthy Mind model proposed in this study to design psychologically resilient blue-green infrastructures. Such frameworks reimagine lakes not as passive water reservoirs but as living socio-ecological systems that mediate between environmental sustainability and emotional well-being.

In conclusion, the comparative analysis of Rani Tal and Shahpura Lake reaffirms that urban lake conservation is as much about restoring human hope as it is about reviving hydrological function. By merging ecological science with environmental psychology, planners and policymakers can nurture cities that are not only ecologically balanced but also emotionally restorative cities where water once again becomes a source of reflection, connection, and healing.

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