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REVIVING THE RIVER AFTER THE VILLAGE: VERNACULAR ECOLOGIES, POSTHUMAN DEBRIS, AND MEMORY-MAKING ON TÔ LỊCH RIVER IN HANOI VIETNAM

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ABSTRACT

This article analyses the post-ritual ecological restoration of the Tô Lịch River in Hanoi as a case of moral and mnemonic reconstruction in the absence of coherent communities and intact ritual frameworks. Grounded in posthumanist anthropology, affect theory, and vernacular ethics, it challenges prevailing heritage and ecological recovery models that privilege technical remediation or community-based revival. Drawing on 12 months of multisited ethnographic research and 35 semi-structured interviews, the study documents emergent affective practices—including solitary incense offerings, informal shrine maintenance, and light-based ritual simulations—performed by elderly residents, former polluters, migrants, and digital artists. These decentralised acts constitute what is theorised here as a "post-ritual ethics of restitution," in which degraded materialities—waste, ruins, abandoned altars—function as affective archives, eliciting embodied guilt, sensory engagement, and experimental modes of remembering. Technologies such as augmented reality, holographic projection, and QR-mediated deity displays do not simply imitate lost traditions; they create new interfaces of ethical attention and ecological kinship beyond the bounds of formal religious authority. By foregrounding post-communal moral agency, infrastructural memory, and affective reconfiguration of ritual space, the Tô Lịch case redefines restoration as a dispersed and affect-driven process rather than a linear return to pre-collapse conditions. This reframing not only addresses the specific Vietnamese context but also offers comparative insight for global sites where environmental degradation coincides with cultural disintegration, suggesting that sustainable recovery may hinge less on communal consensus and more on the cultivation of affective–material interactions across fragmented social landscapes.

KEYWORDS: Post-ritual Ecology, Vernacular Environmental Ethics, Affective Memory, Urban River Restoration, Posthuman Anthropology.

1. INTRODUCTION

On the full-moon day of the sixth lunar month in 2024 (a time when many Vietnamese visit temples and shrines to offer incense), I stood before a small shrine near the riverhead of the Tô Lịch River under the scorching afternoon sun. The sparse cries of birds occasionally echoed across the air, but the stench from the pitch-black water of the river rose so thickly that it made breathing difficult. Few people entered to burn incense mostly residents from the nearby neighborhood. They said they had grown used to the smell and no longer found it as unbearable as outsiders did. The bell rang faintly. Almost no one chanted aloud. A young man riding past on a bicycle mumbled, "With this stench, no god could possibly return." That scene did not awaken nostalgia in me but instead raised a more immediate question: What happens to ritual landscapes when ecological purity is lost? Tô Lịch was once a central river in the cultural–ritual–productive network of ancient Hanoi, deeply intertwined with craft villages, communal temples, and sacred legends. Today, it is no longer regarded as a river in the usual sense, but as a "wastewater river" its water pitch-black, its banks concretized, its fish gone, its flowers absent, and its edges devoid of conversation. What is unfolding is not merely environmental degradation, but the simultaneous collapse of an indigenous ecosystem and collective memory. This collapse is not merely a loss, but an unnamed moral void. From within that void, a range of spontaneous responses has begun to emerge: from elderly residents quietly cleaning trash around abandoned shrines, to groups of youth reenacting water deity rituals through land-based substitutes. No one refers to these as "restorations" or "cultural conservation." Yet through these small, fragmented acts, an emergent form of vernacular environmental ethics is taking shape not from tradition, but from the aftermath of loss. A form of post-crisis vernacular ethics is being born. This paper proposes that the restoration of the Tô Lịch River cannot be understood through classical heritage frameworks or bio-remediation technologies alone. Instead, it must be approached as a process of posthuman memory reconstruction. This process does not begin with community revival, but with the confrontation of material ruins wastewater, garbage, abandoned shrines as sensory agents through which emotion, technology, and ethics intersect.

I advance three central arguments. First, pollution has not only damaged the physical environment but has also paralyzed the capacity for ritual performance and collective memory. Sacred space can no longer be sensed as it once was, triggering the breakdown of the ritual system that once accompanied the river (see McGraw & Krátký 2017; Trần 2000). Second, the ethical responses from local residents do not stem from an ideological need to "preserve tradition," but rather arise as dispersed affective gestures and silent acts of atonement, deeply rooted in local sensibilities. These responses do not originate from state systems or religious institutions, but from fragmented intersections: a neglected shrine cleaned, a trial ritual performed on broken bricks, or a deity's image projected via digital light (Dang et al. 2023; Perry 2023). Third, we must be cautious with "community reconstruction" models often deployed as feasible solutions. In the case of Tô Lịch, it is not the community that has been reassembled, but emotion fragile and formless—that becomes the nucleus of memory, opening ethical possibilities in the absence of intact communal structures. Heritage, in this view, is no longer a past to be reanimated, but a present to be re-imagined—a present in which what remains is not sufficient to be called a community, yet cannot be dismissed as meaningless (Parui & Raj 2024; Ferrando 2019). Grounded in theoretical frameworks on posthumanism, affective memory, and vibrant matter (Neimanis 2017; Bennett 2020), the Tô Lịch River may be understood as a "re-coding field"—where waste, black water, digital light, and semi-absent memory interact to generate forms of revival unanchored from nostalgia. This article, therefore, does not aim for a "return" but gestures toward a "becoming"—with a river that has lost those who once named it, yet continues to evoke ethical feeling in those who live beside it without inheriting its original memories.

From these theoretical and empirical ruptures arise key questions that call for a reconfiguration of the concept of restoration in the post-ritual and post-community condition:

- Can a river that has lost its founding community and traditional ritual functions be reimagined as a living memory space—not through re-enactment, but through material remnants, fragmented emotions, and post-crisis affective inference?
- Who, in the absence of acknowledged communal agents, is quietly assuming the role of ethical constructors? And what forms—from embodied atonement, semi-ritual recollection to technological simulations—are replacing the sacred structures once upheld by communities?
- And can those residents who once contributed to the river's destruction—now living within

the consequences of ecological and moral collapse—become new ethical agents? If so, what are the affective conditions for a restoration process that requires no formal ritual, yet carries irreducible moral depth?

2. HISTORICAL OVERVIEW OF RESEARCH

Existing research on the Tô Lịch River has examined both its material degradation and the erosion of its cultural–ritual ecology, yet no integrated framework addresses their entanglement. Environmental and hydrological studies since the late 20th century (Nguyen et al. 2007; Nguyen & Nguyen 2018; Thuong et al. 2013; Duc et al. 2007; WHO 2017; Abrahamse et al. 2019) document heavy metal contamination, loss of natural purification capacity, and the river's transformation into a "sewage river," with engineering proposals—flow reinforcement, internal filtration—unable to counter untreated wastewater inflows. Anthropological and urban perspectives reframe Tô Lịch as a dissolving memory ecology. Dao (2021) details how urban concretization erased riverside festivals, crafts, and temple networks, mirroring global cases such as the Klang River (Powell 2023) and Beirut River (Mady 2024), where functional infrastructure displaces memoryscapes (Ballestero 2019; Bonaker 2012; Cho 2010). From a post-structuralist view, such rivers embody "environmental suffering" (Auyero & Swistun 2009) and "ritual ecology" (McGraw & Krátký 2017), with sacred sites physically intact but sensorially void (Knott 2015; Ingold 2021). Conventional "community restoration" models falter when foundational populations have dissolved (Lee & Anderson 2013; Huang & Xu 2025), while digital and infrastructural transformations reshape ecological citizenship (Dedeoglu & Ekmekcioglu 2020). This raises a central question: if rituals cannot be revived, can memory and ethics be reconfigured from material remnants? Emerging work on vibrant matter and affective technologies suggests new pathways. Bennett (2020) and Neimanis (2017) show that polluted water, waste, and ruins can act as ethical agents; Perry (2023) and Pillay et al. (2021) position digital light, online interfaces, and metaverse environments as potential ethical platforms. Digital heritage studies (He et al. 2017; Boboc et al. 2022; Cunha et al. 2022; Wang et al. 2025) confirm AR/VR's capacity to evoke sacred presence. In Vietnam, hologram ritual performances and minimalist digital rites on the Tô Lịch exemplify "post-ritual affective ethics" (Buragohain et al. 2024).

Despite this body of scholarship, three critical gaps remain. First, no research has conceptualised the Tô Lịch River as a post-ritual memory space that demands affective re-coding (Parui & Raj, 2024). Second, there has been no sustained analysis of augmented reality, holograms, and artificial intelligence as ethical interfaces operating in the absence of source communities (Dang et al., 2023; Buragohain et al., 2024). Third, the literature has not yet examined the possibility of re-seeding vernacular ethics through shaman-less rituals in which ruined material is reimagined as a "posthuman deity" via embodied acts of atonement—a process of "affective sacralisation" (Bennett, 2020; Neimanis, 2017). These omissions define the analytical space that this paper seeks to address.

3. THEORETICAL FRAMEWORK AND RESEARCH METHODOLOGY

This study approaches the Tô Lịch River not as a passive ecological entity but as a dynamic field of intellectual, ethical, and affective negotiation shaped by post-ritual, posthuman conditions. Drawing first on philosophical posthumanism, heritage is freed from essentialist ties to ontology, tradition, or origin communities, and re-situated within intermaterial, affective, and ethical relations mediated by post-ritual interfaces (Ferrando 2019; Haraway 2020; Neimanis 2017; Bennett 2020). In this lens, the river becomes "affective matter," emerging from the interplay of pollution, ruin cultures, and spatial-affective communication. The second strand builds on theories of sensory recollection and post-ritual performance to explain how discontinued river rituals—such as sacred songs, water deity offerings, and temple processions—are being re-enacted through simulated forms including holograms, lighting, and augmented reality (Boboc et al. 2022; Cunha et al. 2022; Wang et al. 2025), reframing ritual and ethics as emergent potentials generated by ecological disorder rather than inert residues of the past. The third strand focuses on post-crisis vernacular ethics, interpreting unsystematic and often silent acts by residents as marginal rituals, ethical residues, or affective motions that arise in the absence of sacred rivers (Perry 2023; Parui & Raj 2024; McGraw & Krátký 2017). In this view, simulations become mediators of ethical reflection and affective exchange. Together, these frameworks reposition the Tô Lịch from a polluted water body to be remediated into a relational field where emotion, memory, and atonement take shape in the wake of crisis. Methodologically, the river was selected for its singular place in Hanoi's cultural memory, historically functioning as a water axis linking craft villages, communal temples, and ritual spaces. Its

current condition—both as a target of bio-remediation programs and as a post-ritual space where traditional communities have largely dissolved—provides an exceptional vantage for observing emergent ethical reconstructions. Fieldwork, conducted from September 2024 to May 2025, combined extended participant observation with thirty-five semi-structured interviews across generational, occupational, and ritual-engagement diversity. Twelve exposed sites along the river were surveyed, of which five villages—Nghĩa Đô, Quan Hoa–Quán Đôi, Bái Ân, Cót, and Quan Nhân—were chosen for in-depth analysis due to their retention of visible river segments and concentrated traces of transformed worship. These ranged from solitary incense offerings and simulated chanting to LED deity projections and shrine restorations. The cultural-historical values of these villages, including their historical significance, religious practices, and river-related festivals, are summarized in Appendix A. Likewise, the demographic profiles and behavioral categories of interview participants, including moral emotions, disrupted ritual objects, technological substitutions, and personal atonement acts, are detailed in Appendix B. In the main analysis, these datasets serve as reference points for examining how residents respond to river degradation through memory, technology, and post-ritual ethics. All interviews were conducted in person, lasted between forty-five and ninety minutes, and were recorded, coded, and anonymized according to international anthropological research ethics. Observations and interviews were thematically coded to trace moral emotions toward the river, disruptions of ritual objects, technological substitutions, and personal acts of atonement. This multi-sensorial and performative approach, anchored in embodied posthumanist anthropology, enabled the identification of non-institutional moral responses in which memory is not simply reconstructed but re-coded through ruinous materials, digital interfaces, and post-ritual empathy.

4. RESEARCH FINDINGS

The findings are interpreted as a process of moral–ritual affective reconfiguration within the post-ritual space of the Tô Lịch River. The results respond directly to the research questions and articulate the central scholarly proposition of this paper: whether local ethics can be re-seeded without reconstructing the original community.

4.1. Emergence of a New Moral–Affective Regime

First, observational and interview data reveal the presence of a new moral-affective regime—not rooted in sacred deities or ritual authenticity, but in lived encounters with pollution, rupture, and abandoned materiality. Among the 35 interviewees, over 71% (25/35) reported feelings of "shame" and "guilt" when passing derelict riverside shrines. A resident of Nghĩa Đô described: "Back then, every first and fifteenth lunar day, my family would light incense at the shrine by the river. Now, because of road and bridge construction, the shrine is nearly abandoned, and the river's stench is unbearable—I rarely go anymore. But whenever I pass, I feel a shiver, like I've wronged the deity." [INT-23-VS]. These emotions are not linked to a specific belief system but are affectively diffuse—residual moral sensations still active. A salient code group involves late-stage atonement from residents who had neglected or directly harmed the river. Among 12 riverside interviewees, 8 admitted to previously dumping wastewater or encroaching on riverbanks. A man in Nghĩa Đô confessed: "Everyone did it—just dumped waste into the river. No one said anything. Now we suffer the smell, and our kids live with it…" [INT-02-NG]. A middle-aged woman in Kim Liên recounted: "We demolished a small shrine to expand the kitchen. Looking back now, I feel scared—like we sinned against the river…" [INT-24-VS]. These are not religious confessions but affective losses of moral grounding—where degraded environments erode not only ecology but memory and personhood. Notably, 6 residents near abandoned shrines reported performing unsolicited acts: cleaning trash, restoring incense bowls, offering incense on lunar days. These actions—unwitnessed and unacknowledged—were explained as "for peace of mind" [INT-07-TN], "repaying debts to an old life" [INT-12-TN]. These findings demonstrate not only recollection but a process of re-ethicalization that bypasses formal religion or state structures, emerging instead from lived experience amid decay.

4.2. Individualized Acts and Technological Mediation

Second, emergent moral acts are not collective or communal but individual and dispersed. Field observations recorded 32 instances of voluntary actions: trash collection, altar arrangement, or incense offerings outside formal ritual occasions, in locations such as Kim Liên Shrine, Phú Gia Communal House, and Nghĩa Đô's embankment. These were not linked to structured belief systems but expressed an internalized sense of atonement—where residents saw themselves as severed inheritors of a fallen ethical order. As one young artist who staged a light projection at Láng Temple shared: "I

don't believe in gods. But when the light hit the temple wall, I felt I had to preserve something passed down by the elders." [INT-19-NS]. A key finding concerns the role of technology—especially simulated lighting, video mapping, and QR projections—not as auxiliary tools but as affective interfaces substituting for ritual. Through light projections, deity imagery via QR, holograms, and 3D simulations in Nghĩa Đô (Cầu Giấy), Kim Liên (Đống Đa), and Phú Gia (Thanh Xuân), led by the digital heritage research group at Hanoi Metropolitan University and young artists from Hanoi Television, new possibilities for sacred memory restoration emerged—without the need for full ritual re-enactment. Among these initiatives, three short films were screened in the communal courtyard of Quán Đôi Temple: Reenacting the Water Offering Festival, Restoring the Paper-Making Craft for Royal Edicts at Nghè Nghĩa Đô (Cầu Giấy), and Welcoming the Dragon Boat at Bái Ân (Nghĩa Tân). Each combined 3D modeling with topographic light effects and spatially oriented sound to create immersive visual–auditory environments that evoked ritual affect even in the absence of the original participating community. These films were not merely illustrative; they operated as "post-site memories" where viewers actively co-constructed meanings of the sacred through technological mediation. In this small-scale public trial, the project explored how embodied affect might be reanimated in disrupted sacred spaces, raising a central question: can sacred memory be restored through technological design, or does it remain a simulation lacking moral–affective grounding? NVivo-based visual analysis reinforces the significance of these interventions: at the three lit sites, 18 instances were recorded in which viewers interacted for more than three minutes—pausing, engaging in prolonged gaze, or making solitary offerings—compared with only five such interactions at unlit sites. This notable difference underscores the capacity of light-based interfaces to generate semi-ritual spaces, where emotion is invoked without mobilizing formal communities or traditional ritual structures, and where the sensory engagement itself becomes a catalyst for moral and mnemonic resonance.

4.3. Shifts in Ritual Leadership and Memory Stratification

Additionally, the data reveal a symbolic shift in ritual leadership—from traditional figures like shamans and village elders toward "new agents" such as artists, lighting designers, environmental officers, art students, and some researchers—through their participation in producing and presenting 3D ritual reenactment films. Beyond artists and students, several ward-level cultural officers also played pivotal roles in connecting local residents with experimental light projection activities. As one official from Kim Liên ward explained, "I couldn't get people interested just by talking about heritage. But when we used simulated lighting, they became curious, stopped to watch, and began recalling old memories on their own" [INT-15-CB]. Another case from Láng Thượng revealed how a local officer independently filmed scenes of a dilapidated shrine on his phone and edited them into a short clip, which he screened during a neighborhood meeting as a way to evoke the river's former sacred presence [INT-14-CB]. These hybrid roles—straddling local administration and affective direction—are contributing to the emergence of what might be called "quasi-ritual practices" within fragmented sacred spaces.

Through our fieldwork across residential clusters along both banks of the Tô Lịch River, we observed a notable stratification—not based on spatial geography, but on the demographic architecture of memory. Although residents may live equally close to the river, it is the timing and circumstances of their settlement that determine the depth of memory—not geographic location per se. Long-term residents—most of whom live in areas such as Nghĩa Đô, Kim Liên, or near Quán Đôi Temple—tend to maintain a deep affective bond with the river, where ritual practices such as water deity worship, incense offerings, or ceremonial boat processions once formed a cyclical part of everyday life. Particularly striking are cases in which neighborhood ward heads and folk artisans, formerly involved in organizing riverside festivals, have actively redefined their roles—becoming mediators between sacred memory and contemporary modes of technological expression. In Quán Đôi, a ward leader who also performs traditional drumming recalled: "I knew no one would organize water processions anymore, so I borrowed my nephew's projector and screened scenes of the dragon boat procession on the temple wall—at least so the children could see what their grandparents once did with the river" [INT-30-TT]. Another interviewee reported using personal funds to rent portable lights during full-moon days and festivals, projecting deified river images onto the shrine walls: "There's no organizing committee, no official ritual anymore—but a bit of light makes the place feel less desolate" [INT-31-TT]. These hybrid roles—spanning ritual artisans, neighborhood ward leaders, and cultural officers—should not be seen as

isolated cases, but rather as an emergent intermediary class within the affective moral structure. They represent the nucleus of post-ritual mnemonic reconfiguration: rather than replicating traditional ceremonies, they craft new affective interfaces—where light replaces drums, and projections substitute for river processions. In fragmented spaces where communal ritual has faded, these actors become indispensable "directors of memory," bridging past and present through contemporary modes of expression. To synthesize the observed shifts in ritual leadership and the interplay between actor groups, Figure X presents a hierarchical directional network mapping the flows and relative strengths of moral–affective influence within the post-ritual Tô Lịch River context.

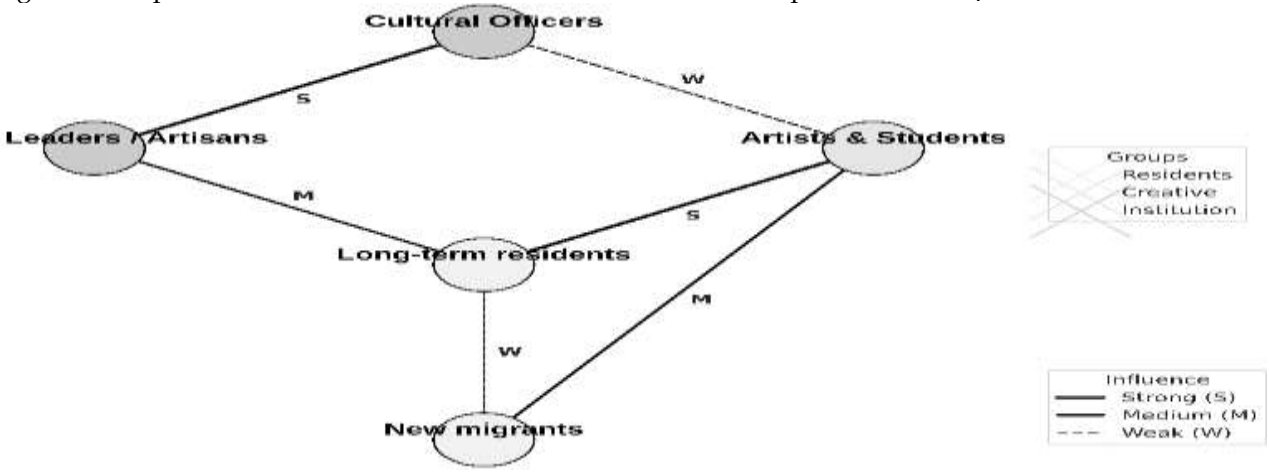

Figure 1: Hierarchical Directional Network (B/W): Moral-Affective Reconfiguration in Post-Ritual Tô Lịch.

As shown, the network makes visible how influence is redistributed from traditional custodians to emerging intermediaries, revealing a reconfigured moral–affective landscape that underpins the subsequent discussion of community memory and engagement. In contrast, newly arrived populations—mainly relocated or recent migrants now living in rental housing or public dormitories in areas like Phú Gia and Khương Trung—often do not share this communal memory of the river. For them, the Tô Lịch appears primarily as a polluted waterway to be avoided or economically exploited, rather than as a once-sacred space. A few younger individuals expressed interest in light-based performances or community art initiatives, but their engagement was largely visual or media-driven, arising from digital aesthetics rather than from personal memory or spiritual attachment—a form of simulated empathy rather than lived experience. In some cases, the response was explicitly negative, with individuals rejecting the revival initiatives as superficial or resource-wasting. This stratified affective landscape reflects not only socio-demographic shifts but also carries profound ethical implications: when a shared mnemonic foundation no longer exists, the transformative reach of gestures such as atonement, remembrance, or moral restoration becomes uncertain. As the projection events at Quán Đôi and the light displays in Kim Liên illustrate, memory can be reconstituted not through instruction or formal education, but through affective acts of sharing enacted within fragmented spaces. In the case of Tô Lịch, the process of post-ritual moral and memorial regeneration cannot presume a ready-made community; instead, it demands the construction of cross-strata "moral resonances," wherein memory is no longer a precondition but emerges as the product of shared affective acts. In interviews, 7 out of 12 local residents could no longer recall the name of the deity once venerated at a nearby shrine, yet they vividly described recent light shows or mural projects. Several newly settled residents along the Tô Lịch River admitted to feeling detached from indigenous religious practices. They were unfamiliar with the history of nearby shrines and had no childhood memories of the area, and thus felt little obligation to participate in upkeep or worship. A woman in her forties, relocated to Kim Liên after zoning changes, stated: "I see a shrine but don't know whom it honors. I'm not originally from here, so I rarely offer incense" [INT-33-MN]. A university student renting in Cầu Giấy added: "People from all over live here now. Everyone's busy. People worship whoever they want. I've never heard anyone talk about the river's history or any gods" [INT-34-MN]. These responses underscore a rupture between current residents and sacred memory, reflecting not merely a cultural crisis but an urban reality marked by the breakdown of

communal structures. They raise critical questions about symbolic substitution: when ethics and memory are no longer anchored in divine names, but in affective gestures—interacting with light, recalling family stories, or pausing before ruins. These dynamics are visually represented in the preceding diagrams and tables, clarifying the relationship between spatial distribution, post-ritual affect, and contemporary moral engagement. Overall, the research does not aim to validate a successful ritual restoration model but to map a dynamic landscape of moral–affective recovery—where ruins, memory, and technology generate emergent zones of ethical possibility. Tô Lịch is no longer a ritual river, but in its post-ritual condition, it becomes a site of atonement, remembrance, and new moral construction—not through collective rites but through bodily resonance with material fragments. These findings also affirm the value of embodied posthumanist anthropology: only by entering spaces presumed spiritually void—polluted, abandoned, misremembered—can one recognize how vernacular ethics endure, not through divine authority, but through memory reactivated by sensation, materiality, and technology.

4.4. Theoretical Commentary

Building on these findings, the following discussion situates the moral–affective reconfigurations observed along the Tô Lịch River within broader debates on post-ritual urban religiosity, affective heritage, and the technological mediation of memory.

4.5. Post-Ritual Ethics and Experiential Recollection: Rebirth in the Absence of Community

The findings of this study demonstrate a decisive departure from conventional frameworks in environmental anthropology and ritual studies that presuppose ritual recovery as contingent upon the reconstitution of original communities and the reinstatement of full ceremonial systems. The Tô Lịch River instead illustrates a process of post-ritual moral construction in which ethical renewal arises from individualised, affectively charged, and spatially dispersed gestures. These acts reanimate both material and moral life from ecological and mnemonic ruins without reliance on intact social structures or institutionalised religion. This trajectory extends the notion of "affective restitution" (Povinelli 2011; de la Cadena & Blaser 2018), highlighting that moral reorientation can emerge from fragmentary, unofficial affective tremors rather than cohesive collective campaigns. Comparable ethnographic cases—such as Tsing's (2015) account of informal moral gestures in post-crisis Indonesian landscapes, or Pandian's (2019) observations of sensory memory in urban riverfronts of South India—demonstrate that small-scale, non-ritualised actions can sustain ethical life in damaged environments long after communal ritual frameworks collapse. The distinctiveness of the Tô Lịch case lies in its post-community condition: traditional riverine populations have largely dispersed; ritual systems are fragmented; deities once central to the moral landscape are obscure or forgotten. Urbanisation since the 1990s—through state-led resettlement, speculative development, and spontaneous migration—has transformed the demographic composition of the riverbanks, erasing the mnemonic continuity on which conventional heritage models depend. Religious practice, where it persists, is idiosyncratic, heterodox, and often improvisational, woven from incomplete memories and personal invention. In such contexts, heritage restoration cannot rely on a shared "mnemonic consensus" (cf. Waterton & Smith 2010). Instead, it must operate through what this study terms affective–material interactions: solitary offerings at neglected shrines, improvised altar repairs, or engagement with technologically mediated ritual simulations. Here, embodied sensations—guilt, shame, nostalgia—supersede doctrinal belief as the primary ethical resource. This reframing challenges functionalist and cyclical interpretations of ritual advanced by Turner (1969) and van Gennep, suggesting instead that ritual can persist in asynchronous, incomplete, and dispersed forms that nonetheless produce moral meaning. The concept of affective resonance is proposed as an alternative to community-centred heritage models. Moral regeneration does not require collective co-presence; it is catalysed by the co-evocation of material ruins, fragmentary memory, technological mediation, and bodily sensation. Those who once polluted, neglected, or forgot the river enter independent yet relational moral processes through acts as modest as solitary incense offerings or pausing before a holographic deity projection. In doing so, they participate in an emergent post-ritual ethics with potential applicability to other global contexts marked by environmental degradation and cultural disintegration—ranging from the Klang River in Kuala Lumpur to the Cheonggyecheon in Seoul—where post-community moral reactivation, rather than communal revival, becomes the core mechanism of heritage renewal.

4.6. Sustainable Recovery Pathways for the Tô Lịch River: Affective Ethics as Infrastructure for Multidimensional Revitalisation

If 5.1 identifies the affective and post-ritual ethical substratum of Tô Lịch's potential revival, 5.2 outlines the infrastructural and cultural pathways through which that substratum might be mobilised into a viable, multidimensional restoration model. The river is more than a polluted urban waterway; it is a heritage landscape materially and symbolically eroded by the logics of urban expedience. Its recovery requires an integrated approach that interlaces ecological engineering, cultural technologies, dispersed participatory practices, and ethically anchored governance. Two decades of interventions reveal the limitations of technocratic and aestheticised strategies: the 2003–2006 dredging and Red River diversion offered short-lived improvements before untreated discharges overwhelmed the flow (Đào 2010); the 2017–2018 riverside greening campaign, lacking resident participation, rapidly decayed and was dismissed as ornamentalism (Phạm H. T. 2017; Lê Tùng 2024); and the 2019 Nano-Bioreactor pilot faltered under persistent wastewater inflows and public scepticism (Hanoi Drainage Company 2019). The common flaw in each was the absence of integration with residents' affective and mnemonic attachments to the river. In response, a viable recovery framework for Tô Lịch must align three mutually reinforcing domains: ecological remediation as a precondition, involving comprehensive interception of wastewater from both banks, centralised treatment at Yên Xá, full dredging of toxic sediments, and controlled inflow of clean Red River water to restore hydrological balance; landscape and mnemonic reconstruction, through redesigning riverbanks to inscribe cultural memory via durable architectural markers, acoustic cues, and subtle lighting at historical ritual nodes, fostering sensory triggers for both long-term residents and newcomers; and technological ritual re-enactment as ethical infrastructure, deploying AR/VR projections, 3D reconstructions of festivals, interactive soundscapes, and holographic deities not as nostalgic replicas but as generative platforms for moral engagement. In this reframing, digital heritage interfaces function as affective contact zones where loss, imagination, and responsibility intersect, enabling the ethics of care to take root without the precondition of communal consensus. This tripartite model advances beyond current ecological heritage paradigms by embedding affective ethics as the infrastructural core. Small-scale, individual gestures—cleaning a shrine, lighting incense, initiating a community projection—are structurally linked to large-scale engineering works, forming a dispersed yet coherent moral ecology. The Tô Lịch case thus reframes restoration not as a linear return to a pre-rupture state, but as the coalescence of fragmented place, memory, technology, and embodied sensation into a sustainable future.

5. CONCLUSION

Cultural restoration in contexts of post-ritual dislocation, community dissolution, and memory rupture cannot rely on reconstructing dismantled models. When traditional rituals no longer operate and communities no longer exist as consensual collectives, restoration—if it is to occur—must be reconstituted from below: from everyday encounters among humans, residual objects, and evocative technologies. It is in this interstitial space that an affective ethical process quietly emerges, not governed by institutionalized belief systems but rooted in internal affect, fragmented memory, and extra-ritual acts of atonement. Drawing on field data, this study identifies an intermediary phase of recovery in which embodied gestures of atonement, recollection, and personal interaction act as the first "ethical seeds," creating pathways for potential ritual rebirth. Should rituals re-emerge, they will not return as replicas of the past but will be reconfigured from surviving affects in the absence of former institutions and belief structures. This moral condition after ritual collapse, developed here as an analytical framework, recognizes unofficial, non-institutional forms of restoration that remain persistent and meaningful. The Tô Lịch case advances environmental anthropology and ritual studies by challenging foundational assumptions of community-based conservation models. While high-profile river restorations such as Seoul's Cheonggyecheon, the Singapore River, or the Ganga in India were implemented with strong state orchestration and retained a measure of ritual or symbolic continuity, Tô Lịch's trajectory unfolds without such scaffolding: minimal public funding, no surviving ritual framework, and a fragmented memory ecology. Its recovery process is therefore not an exception but a critical counterpoint, expanding the scope of ecological heritage models from cohesive community contexts to affective–technological–fragmented conditions that are increasingly common in rapidly urbanizing environments. Amid ongoing governmental plans to redirect water flow, treat pollution, and redesign river landscapes, the findings here underscore the necessity of a parallel strategy centered on affective–ethical recovery. Without an

internalized moral foundation among local residents, physical or technological interventions risk devolving into theatrical displays or culturally disconnected simulations. The study therefore proposes that sustainable ecological regeneration requires an ethical infrastructure grounded in affective resonance, where fragments of place, memory, technology, and inner emotion weave a new moral ecology from ruin. While these insights broaden the theoretical reach of post-ritual heritage studies, the scope of this research also entails inherent constraints. First, the analysis is based on a single case in Hanoi and thus does not yet allow for robust cross-regional generalization. Second, although multi-layered coding and triangulation strengthen the validity of the findings, the data remain temporally specific and cannot yet reflect long-term transformations. Moreover, the conceptual tools of "posthuman divinity" and "embodied affective oscillation," while grounded in clear philosophical premises, require further empirical validation through sustained observation of interactions between people and sacred spatial objects. Future research may extend to other urban rivers in Vietnam or Southeast Asia to compare affective moral models under differing trajectories of community and belief decay, including cases of partial ritual continuity. Longitudinal monitoring of individual acts of atonement—integrated with affective technology design and policy evaluation—could provide a more robust assessment of the sustainability of "ritual-free restoration" models in the face of urban ecological transitions. Ultimately, the Tô Lịch River—though no longer a festival river—has become a site for the emergence of new ethical subjects: lighting artists, music students, elderly passersby lingering near abandoned shrines. Through their singular yet resonant acts, they contribute to a new layer of ecological memory, not aimed at preserving the past but at reviving moral life along the waterway amid postmodern fragmentation. In this light, restoration ceases to be an exercise in mimicking tradition and instead becomes a living, adaptive process—slow, dispersed, but capable of unlocking cultural potential in an era where community, ritual, and memory must be reassembled from fragments.

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REFERENCES

Abrahamse, N., van den Brekel, E., Holland, B., Janssen, P., Keunen, O., & van der Voort Maarschalk, J. (2019). Feasibility study of flushing To Lich River with Red River water through West Lake. https://repository.tudelft.nl/record/uuid:b3b6341a-d9d3-4ebc-af11-b035ae2f66e4

Auyero, J., & Swistun, D. A. (2009). Flammable: Environmental suffering in an Argentine shantytown. Oxford University Press.

Ballestero, A. (2019). The anthropology of water. Annual Review of Anthropology, 48(1), 405–421. https://doi.org/10.1146/annurev-anthro-102218-011428

Bennett, J. (2020). Vibrant matter: A political ecology of things. Duke University Press.

Boboc, R. G., Băutu, E., Gîrbacia, F., Popovici, N., & Popovici, D. M. (2022). Augmented reality in cultural heritage: An overview of the last decade of applications. Applied Sciences, 12(19), 9859. https://doi.org/10.3390/app12199859

Bonaker, A. (2012). Between village and city (Vol. 6). BoD–Books on Demand.

Buragohain, D., Meng, Y., Deng, C., Li, Q., & Chaudhary, S. (2024). Digitalizing cultural heritage through metaverse applications: Challenges, opportunities, and strategies. Heritage Science, 12(1), 295. https://www.nature.com/articles/s40494-024-01403-1

Cho, M. R. (2010). The politics of urban nature restoration: The case of Cheonggyecheon restoration in Seoul, Korea. International Development Planning Review, 32(2), 145–165. https://doi.org/10.3828/idpr.2010.05

Công ty Thoát nước Hà Nội. (2019, August 20). Thử nghiệm công nghệ Nhật Bản làm sạch sông Tô Lịch không mang lại kết quả bền vững. Báo Pháp luật Việt Nam. https://baophapluat.vn/mot-nam-sau-thi-diem-

tai-song-to-lich-ho-tay-cong-nghe-nano-bioreactor-nhat-ban-bay-gio-ra-sao-post346472.html

Cunha, C. R., Mendonça, V., Moreira, A., Gomes, J. P., & Carvalho, A. (2022). Using virtual reality in museums to bridge the gap between material heritage and the interpretation of its immaterial context. In Advances in Tourism, Technology and Systems (pp. 397–408). Springer. https://link.springer.com/chapter/10.1007/978-981-19-1040-1_34

Dang, B. T., Trang, N. T. D., Thao, V. T. P., Dieu, N. T. N., Vo, T. K. Q., Nguyen, N. K. Q., ... & Bui, X. T. (2023). Wastewater pollution in urban canals of Vietnam: Restoration using nature-based solutions. In Regional Perspectives of Nature-Based Solutions for Water: Benefits and Challenges (pp. 127–173). Springer. https://link.springer.com/chapter/10.1007/978-3-031-18412-3_6

Dao, N. T. (2021). Cảnh quan tái phát triển sông Tô Lịch (Doctoral dissertation, Politecnico di Torino). https://webthesis.biblio.polito.it/17187/

De la Cadena, M., & Blaser, M. (Eds.). (2018). A world of many worlds. Duke University Press.

Dedeoglu, C., & Ekmekcioglu, C. (2020). Information infrastructures and the future of ecological citizenship in the Anthropocene. Social Sciences, 9(1), 3. https://doi.org/10.3390/socsci9010003

Duc, T. A., Vachaud, G., Bonnet, M. P., Prieur, N., Loi, V. D., & Anh, L. L. (2007). Experimental investigation and modelling approach of the impact of urban wastewater on a tropical river; a case study of the Nhue River, Hanoi, Viet Nam. Journal of Hydrology, 334(3–4), 347–358. https://www.sciencedirect.com/science/article/abs/pii/S0022169406005488

Ferrando, F. (2019). Philosophical posthumanism. Bloomsbury Publishing.

Haraway, D. J. (2020). Staying with the trouble: Making kin in the Chthulucene. Duke University Press.

He, Y., Ma, Y. H., & Zhang, X. R. (2017). "Digital heritage" theory and innovative practice. International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, 42, 335–342.

Huang, C., & Xu, H. (2025). From indigenous villages to World Heritage Sites: Structural violence in spatial transformation. Annals of Tourism Research, 110, 103880. https://doi.org/10.1016/j.annals.2024.103880

Ingold, T. (2021). The perception of the environment: Essays on livelihood, dwelling and skill. Routledge.

Knott, K. (2015). The location of religion: A spatial analysis. Routledge.

Le Tung. (2024). Đường dành riêng cho xe đạp: Muốn đi phải bê qua rào. VOV Giao thông. https://vovgiaothong.vn/newsaudio/duong-danh-rieng-cho-xe-dap-muon-di-phai-be-qua-rao-d38316.html

Lee, J. Y., & Anderson, C. D. (2013). The restored Cheonggyecheon and the quality of life in Seoul. Journal of Urban Technology, 20(4), 3–22. https://doi.org/10.1080/10630732.2013.855511

Mady, C. (2024). Transformations of the Beirut river: Between temporary and permanent liminality. Urban Planning, 9, 6963. https://research.aalto.fi/en/publications/transformations-of-the-beirut-river-between-temporary-and-permane

McGraw, J. J., & Krátký, J. (2017). Ritual ecology. Journal of Material Culture, 22(2), 237–257. https://doi.org/10.1177/1359183517704881

Neimanis, A. (2017). Bodies of water: Posthuman feminist phenomenology. Bloomsbury Academic.

Nguyen, H. H., & Nguyen, T. H. (2018). Study on creation of water sources supplying the inner river system in Hanoi city with continuous flow for cleaning the aquatic environment. MATEC Web of Conferences, 193, 02012. https://doi.org/10.1051/matecconf/201819302012

Nguyen, T. L. H., Otsubo, M., Li, L. Y., & Higashi, T. (2007). Heavy metal pollution of the To-Lich and Kim-Nguu River in Hanoi City and the industrial source of the pollutants. https://catalog.lib.kyushu-u.ac.jp/opac_detail_md/?lang=0&amode=MD100000&bibid=9296

Nguyễn, V. U. (1994). Hà Nội nửa đầu thế kỷ XX. Hà Nội: Nhà xuất bản Hà Nội.

Nora, P. (1989). Between Memory and History: Les Lieux de Mémoire. Representations, 26, 7–24. https://doi.org/10.2307/2928520
jstor.org+2online.ucpress.edu+2harvarddesignmagazine.org+15scirp.org+15online.ucpress.edu+15

Parui, A., & Raj, M. S. (2024). Sustainable memory ecology, entangled environments, and multimateriality in a post-digital age: A case study of MemoryBytes. Memory Studies Review, 1(aop), 1–20. https://brill.com/view/journals/mesr/1/1/article-p137_009.xml

Perry, S. A. (2023). Embodying affective intra-actions online: Enacting posthuman methods in virtual spaces. Qualitative Inquiry, 29(10), 1012–1023. https://doi.org/10.1177/10778004231163164

Phạm, H. T. (2017, December 12). Năm 2017, quận Thanh Xuân trồng 400 cây bóng mát. Kinh tế & Đô thị.

https://kinhtedothi.vn/nam-2017-quan-thanh-xuan-trong-400-cay-bong-mat-279351
Pillay, D., Charteris, J., Nye, A., & Foulkes, R. (2021). Posthuman COV-llaboration: Enfleshing encounters of connectedness through imaging memory. International Journal of Qualitative Methods, 20, 16094069211050162. https://doi.org/10.1177/16094069211050162
Povinelli, E. A. (2011). Economies of abandonment: Social belonging and endurance in late liberalism (Vol. 48). Durham, NC: Duke University Press.
Powell, L. (2023). Place, people and pollution: An urban ethnography of the Klang River. The University of Western Australia. https://research-repository.uwa.edu.au/en/publications/place-people-and-pollution-an-urban-ethnography-of-the-klang-rive
Thời báo Ngân hàng. (2024, April 12). Hà Nội dự kiến chi 550 tỷ đồng dẫn nước từ sông Hồng vào sông Tô Lịch. https://thoibaonganhang.vn/ha-noi-du-kien-chi-550-ty-do-ng-dan-nuoc-tu-song-hong-vao-song-to-lich-159697.html
Thuong, N. T., Yoneda, M., Ikegami, M., & Takakura, M. (2013). Source discrimination of heavy metals in sediment and water of To Lich River in Hanoi City using multivariate statistical approaches. Environmental Monitoring and Assessment, 185(10), 8065–8075. https://link.springer.com/article/10.1007/s10661-013-3155-x
Trần Quốc Vượng. (2000). Hà Nội nghìn xưa. Hà Nội: Nxb Hà Nội.
Tran, V. Q., & Tran, V. S. (2010). A study of waste water impacts of main factories on water quality of To Lich river, Ha Noi. VNU Journal of Science: Earth and Environmental Sciences, 26(3). https://js.vnu.edu.vn/EES/article/view/1786
Tsing, A. L. (2015). The mushroom at the end of the world: On the possibility of life in capitalist ruins. In The Mushroom at the End of the World. Princeton University Press.
Turner, V. (1969). The Ritual Process: Structure and Anti-Structure. Chicago: Aldine Publishing.
UBND Hà Nội. (2023). Gom toàn bộ nước thải hai bên bờ về nhà máy xử lý, không đổ trực tiếp xuống sông Tô Lịch. Môi trường & Đô thị. https://moitruong.net.vn/cuc-quan-ly-tai-nguyen-nuoc-bo-nn-mt-nut-that-chinh-trong-viec-phuc-hoi-song-to-lich-la-dong-chay-cac-song-qua-ha-noi-da-bi-can-kiet-suy-giam-81658.html
Vietnam News. (2025). Cleaning Tô Lịch River: A long-awaited vision. https://ovietnam.vietnamnews.vn/cleaning-to-lich-river-a-long-awaited-vision-post364139.html
Wang, H., Du, J., Li, Y., Zhang, L., & Li, X. (2025). Grand challenges in immersive technologies for cultural heritage. International Journal of Human–Computer Interaction, 1–22. https://doi.org/10.1080/10447318.2025.2475996
World Health Organization. (2017). Consultation Workshop on Development of a Concept Note for Mobilizing Resources on Climate-Resilient WASH and Wastewater in Viet Nam, Hanoi, Viet Nam, 7–8 December 2017: Meeting report. WHO Regional Office for the Western Pacific. https://iris.who.int/bitstream/handle/10665/272845/RS-2017-GE-76-VNM-eng.pdf?sequence=1.

Appendix A: Cultural–Historical Values of Ancient Villages along the Tô Lịch River.

Village	Historical Values	Cultural–Religious Values	Festivals and Customs	Connection to the Tô Lịch River
Nghè Nghĩa Đô (Cầu Giấy)	Established since the Lê dynasty; renowned for Confucian learning, producing many scholars and doctoral laureates;the craft of making royal ordination papers	Nghè communal house worships Uy Linh Lang (son of King Lý Thánh Tông); presence of văn chỉ (Confucian shrine) reflects educational tradition	Village festival with water-fetching and deity worship	The Tô Lịch River regarded as a sacred water vein linked to the cult of Uy Linh Lang
Quan Hoa – Quán Đôi (Cầu Giấy)	Ancient riverside village by Quán Đôi wharf, once a key trading gateway	Quán Đôi shrine worships river deities; important site of communal ritual life	Water-fetching festival and riverbank rituals	Quán Đôi wharf served both as an economic hub and ritual site for drawing sacred water
Bái Ân (Nghĩa Tân, Cầu Giấy)	Riverside settlement tied to agricultural livelihoods	Bái Ân communal house and pagoda worship local tutelary deities associated with the river	Distinctive water procession with dragon boats on the Tô Lịch	The river was the core of the festival, embodying collective memory
Cót (Yên Hòa, Cầu Giấy)	Formerly Hạ Yên Quyết; famous for bamboo	Cót communal house dedicated to Uy Linh	Annual festival in the third lunar month with ca	The river provided irrigation and served as a

	weaving (cót mats) and ca trù performance	Lang; known as a "village of artists"	trù performances and ritual processions	cultural memory space for festivals
Quan Nhân (Thanh Xuân)	Ancient village within the Nhân Chính cluster; worships the Tô Lịch River deity	Quan Nhân communal house venerates Tô Lịch Giang thần	Water-fetching festival; later replaced the polluted river water with Hội Xuân well water	Typical case of "keeping the deity – changing the vessel": maintaining worship of the Tô Lịch River deity while substituting the sacred water source

Appendix B: Ethnographic Profiles and Behavioral Categories.

Code Type	Code	Frequency
Primary	guilt	25
Primary	nostalgia	18
Primary	disgust	16
Primary	kinship	15
Secondary	fallen statues	12
Secondary	faded shrine signs	9
Secondary	temple lighting	11
Secondary	deity livestream	6
Secondary	solitary incense	14
Secondary	new shrine signage	4

Appendix C: Comparative Table of 12 Field Sites along the To Lich River

No.	Location	Remaining Ritual Expressions	Technological Interventions	Typical Ethical Reactions	Effectiveness / Limitations
1	Nghia Tan	Almost completely lost	Lighting, QR codes, livestream	Indifference, intellectualized response	Aesthetic impact, lacking spiritual depth
2	Nghia Do	Solitary incense offerings	QR simulation, 3D light projection	Fuzzy recollection, absence of belief	Visual effect only, no collective memory
3	Bai An	Ongoing incense ritual	Hologram, video mapping	Ancestral empathy, temporal confusion	Deep memory evoked but hard to replicate elsewhere
4	Kim Lien	Obscured ritual relics	LED landscape lighting	Aesthetic resistance, seen as artificial	Limited influence, perceived as mere decoration
5	Lang Thuong	Folk Buddhist devotional practices	Projection with Buddhist sermon	Mild emotion, no resonance	Neutral outcome
6	Khuong Trung	No ritual traces	None	Apathy, river seen as wastewater channel	No effect
7	Khuong Dinh	Monthly incense offerings	Community television, audio system	Light nostalgia, localized bonding	Localized impact, not scalable
8	Phu Gia	Small active shrine	Video projection of worship scenes	Simulated empathy, aestheticized response	High potential, risk of commodification
9	Kim Giang	Former shrine erased	Decorative lighting, festival QR code	Symbols unrecognized, spiritual meaning unclear	Clearly limited, symbolic confusion
10	Quan Doi	Former water procession remembered	None implemented	Strong sacred perception among elderly residents	High potential, needs preservation
11	Cau Giay	Spontaneous incense offerings	Landscape mapping	Weak affective connection, lacking mythic context	Short-term impact, unstable
12	Thanh Liet	Water deity shrine still present	None, currently neglected	Nostalgic longing, hope for restoration	High potential, currently overlooked