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Flowing Through Time: An Epistemological and Ontological Examination of River Futures within Urban Landscapes

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Abstract

This article examines the complex relationships between rivers and human societies, touching on historical, cultural, symbolic, and spiritual aspects. It contrasts modernist science and indigenous worldviews using Causal Layered Analysis to explore and anticipate the essence and function of rivers in future cities. As the first series of a trilogy on river epistemologies, ontologies and urban futures, it emphasizes the rivers' dual nature of sustenance and destruction, their roles in shaping cultural identities, and their impacts on urban development futures. This paper seeks to explore the intricate connections between rivers and the evolution of urban spaces, offering a reflective narrative on their influence throughout history, their present significance, and their potential future purpose. Through a blend of diverse perspectives, this piece aims to highlight the profound relationship between rivers and urban existence, underscoring their enduring influence across time and space.

Keywords

Rivers, Indigenous, Science, Urban Landscapes

Introduction

This article explores diverse perspectives on rivers and their evolving connections with cities, covering historical, cultural, symbolic, spiritual, developmental, indigenous, scientific, and decolonial viewpoints. These perspectives shape how communities envision the future of cities. The Causal Layered Analysis (CLA) was used to study and synthesized existing literature and the author's experiences to generate initial scenarios of river futures in urban landscapes.

This piece reflects the author's personal experiences and learnings. His ethnolinguistic background, shaped by his Ilocano ethno-linguistic heritage, influences his perspectives on indigeneity, geography, and the interplay between rivers and urban landscapes. His cultural identity, values, traditions, and language inform his views on the future (*masakbayan* - the future as an experiential verb and reflective practice), the indigenous (emphasizing ancestry and relationality), rivers (as life-sources and community hubs), and cities (as shared spaces for community action).

This first part of a three-part series combines the author's personal reflections and literature review, examining modernist science and indigenous perspectives on rivers. Subsequent parts, which he aims to publish later, will delve into colonial, capitalist, decolonial, and Global South viewpoints on rivers and river-city interactions. This piece highlights the contrasts and complementarities on how modern science and indigenous knowledge systems perceive and interact with rivers. It does not claim to be comprehensive or universal but attempts to review the literature and use Causal Layered Analysis to anticipate possible river futures within urban landscapes.

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Stillness and Outbursts

“They are what we could not be, can never be looking far and distant, always their hearts beating to the pulse and body of the earth” (Padhi, 2017, p.74)

Rivers are as intimate as life and death. They are ancient and timeless and have for billions of years mirrored our planet’s boundless existential rising and falling. They are, in a state of pure being “beating to the pulse and body of the earth” (Padhi, 2017). Rivers are intrinsically, both literally and metaphorically, interweaved with the nature of life and death. While the river gives, it also takes away. As it drowns with its currents, it also has the potential to devastate economies, obliterate cities, take human lives, and harm the health of entire communities (Winsemius, et al., 2013). Throughout history, numerous human tragedies have occurred like the spread of various water-borne diseases exacerbated by polluted and contaminated rivers that led to localized outbreaks of severe public health concerns. Many of the battles and military confrontations were also waged near and along rivers. They have served as locations for military operations due to their strategic significance in defense, counterstrategy, resources, and mobility. Many conflicts have been fought over access of water rights in regions where rivers traverse multiple cities and nations and where the rate of precipitations are increasingly decreasing due to severe drought and climate change (Hipel, et al., 2014).

Rivers though for the most part of human history are profoundly linked with life and regeneration metaphors. The depiction of rivers in folk and civilizational literature, mythology and indigenous culture symbolizes the flow of life itself. Like the meandering and serpentine river of Brisbane, or the long and intriguing landscapes of the Laoag River, human societies go through different stages of challenges and evolution. In Hinduism for example, the Ganges River symbolizes renewal and the purification of one’s soul. The river is so sacred that cremation rituals at its banks offers moksha. In many cultures, rivers metaphors are associated with transition and transformation. In nature, they are seen to be expressions of mother nature’s quiet stillness and violent outbursts.

Free-Flowing Rivers: Its Diverse Origins and Limits

One of my college professors once said that no two rivers are exactly alike. I interpreted her statement with scientific, historical, metaphorical, and socio-environmental significance, seeing it as an invitation to explore the dynamics and tensions of climate change. She emphasized understanding the significant, long-term impacts of human-induced alterations to Earth’s climate patterns, affecting ecosystems, biodiversity, and human societies in diverse ways. She stressed the need to analyze climate change impacts from context-specific viewpoints, considering the Global South (extreme weather vulnerability, food insecurity, water stress, health impacts, biodiversity loss) and the Global North (economic losses, health risks, water scarcity, Arctic ice melting). These two "rivers" of climate impacts, one in the South and one in the North, differ significantly.

South Korean futurist Seong Won Park's metaphor of the Tangerine Tree captures this idea: “A tangerine turns hard when it crosses the water. When a tangerine tree from the South is planted in the North, it produces different fruit” (Cruz, Sweeney, & Ghahfarokhi, 2016). Park uses the North-South comparison to highlight differences in futures studies. The North emphasizes the indeterminate and processual nature of the future, focusing on diverse possibilities and outcomes shaped by curated processes, fostering innovation and creativity. In contrast, the South values interconnectedness across past, present, and future, emphasizing social, cultural, spiritual, linguistic, and natural contexts that support inclusive dialogues and honor sustainability and diversity. Here, the future reflects shared community values and aspirations.

Just as no two rivers follow identical pathways, futures studies in the North and South also evolve and adapt over time. Rivers, with their twists and turns, symbolize complexity and dynamism. While rivers may share similarities, they rarely exhibit complete linearity, and their origins and anatomy do not align identically.

The origins of rivers from different perspectives are fascinating. I will now review existing literature to explore varied epistemological and ontological positions, examining what informs our understanding of rivers, our beliefs about them, and why rivers exist in the world.

Geological and Hydrological Origins

From a scientific epistemological perspective, our understanding of reality relies on rigorous methods and empirical evidence. Studying rivers through data acquisition and analysis are key to exploring the natural world. Rivers' historical and geological significance dates back to the Archean Epoch (4 to 2.5 billion years ago) when liquid water emerged. Despite limited data on river origins and networks, their formation is believed to be due to tectonic, volcanic, climatic, and astronomical factors (Babkin, 2009). Human impact as well has significantly altered river surfaces, networks, and broader environments (Shiklomanov, 2009).

Simple, Attractive, Constrained

Rivers have carved valleys, canyons, and floodplains and plays a crucial role in regulating water cycles and replenishing groundwater reserves vital for sustaining life and ecosystems. In the last two centuries, human activities and societies have increasingly impacted rivers. Most major rivers today are now constrained and altered for anthropogenic purposes for the simple reason of powering perpetual growth and free markets through infrastructures like dams, channels and reservoirs (Cook, 2019). According to Wohl (2019), river engineering has distorted our perceptions of natural river ecosystems, affecting decisions on restoration and rehabilitation. He suggests we've mistaken human alterations for natural processes and forms.

Perceptual and Epistemic Limits of the Scientific View

Current scientific views rivers as complex systems, yet emphasizes objectivity, suggesting human control over nature. This fosters a superiority over the environment. Empiricists aim to model reality, not fully understand it, overlooking subtler aspects of human experience like art and love. Thus, scientific episteme may fall short in addressing existential questions, leaving much of the natural experience unexplored. (Kuhn, 2020). Now this seems to require me to ask the question about the links between Western epistemology, capitalism and the scientific paradigm. Ongoing contemporary debates on the objectivity, impacts, and limitations of science suggest that Western epistemologies, capitalism, and science are deeply intertwined. Roy (2020) argues that Western science is deeply connected with colonialism and imperialism and its relationship with capitalism, which began during the Industrial Revolution, gave birth to the idea of modernist science. Today, scientific advancements are driven by market demands, emphasizing profit maximization and commodification of resources (Smith, 2018). This perspective views rivers as malleable, extractable assets. The dynamic relationship between Western epistemologies, capitalism, and science now emphasizes technological solutions for economic growth, often at nature's expense. While they are epistemologically separate and distinct, they remain cooperative, enhancing each other's understanding of knowledge and value.

Rivers as a Mechanical Puzzle and Malleable Objects

The metaphorical depiction of rivers as mechanical puzzles— as complex systems to decipher and solve—or as malleable objects that are subject to manipulation and control, highlights the perspective rooted in the belief that through modern science, humans can systematically unravel the secrets of nature. This viewpoint implies that by understanding the mechanics, utility, and potential uses of rivers, humanity can assert control over them to fulfill human desires. Science, seen as the means to dominate nature, empowers individuals to manipulate rivers according to their will.

The underrepresentation of non-Western and indigenous epistemologies in the modernist scientific discourse highlights the dominance of Western positivist thinking and marginalization of indigenous knowledge (Gasparatou, 2017). Viewing nature and rivers as mechanical assets to drive economic growth raises questions about treating them as extractable resources. The future of rivers depends on whether we adopt a singular, linear, and reductionist perspective.

The View from the Indigenous

“Can you imagine a world where nature is understood as full of relatives not resources, where inalienable rights are balanced with inalienable responsibilities and where wealth itself is measured not by resource ownership and control, but by the number of good relationships we maintain in the complex and diverse life-systems of this blue green planet? I can.” (Wildcat, 2013, p.515)

According to Filipino philosopher Leonardo Mercado (2016), each society's unique culture shapes its perception of reality. Viewing human nature as competitive and resource-driven, as Hobbes (2018) suggests, leads to seeing rivers as strategic assets for survival. In this view, rivers provide water, food, and transportation, serve as natural barriers, and are seen as territories to exploit and sources of conflict. From a Hobbesian and Western standpoint, rivers are competitive, conflict-prone territories for individual or state survival.

Indigenous epistemologies offer a contrasting perspective, viewing knowledge as deeply rooted in place and extending beyond human activities (Grincheva, 2013). This perspective emphasizes introspection and engagement with inner spaces, intertwining inner essence with the natural world (Grincheva, 2013; Sarkar, 1987). Indigenous knowledge is personal, oral, experiential, holistic, and spiritual, often conveyed through narratives and metaphors. For instance, the precolonial Filipino (Maharlika) origin story of Malakas (Strong) and Maganda (Beautiful) illustrates this perspective vividly.

Maharlika: The Great Creation

The Maharlika creation myth of Malakas (Strong) and Maganda (Beautiful) reflects Filipino cosmology's deep connection with nature (Eugenio, 1994). The story tells of the mythical bird Sarimanok, representing both the divine and nature, opening a bamboo stalk to reveal Malakas and Maganda, the first humans. This emergence from bamboo signifies humanity's origins rooted in nature, highlighting the inseparable bond between humans and the natural world. Nature is seen as the source of strength and beauty for all life forms, fostering a relational, spiritual, and experiential worldview. This myth continues to influence present-day Filipinos, emphasizing the interconnectedness of nature, humans, and other living beings. Figure 1 shows an image of the pre-colonial Filipino (Maharlika) creation myth, Malakas at Maganda, depicting the dawning of humanity nested in nature. The image provides a foundational perspective on the relationship between humans and nature in pre-colonial Filipino culture, highlighting the interconnectedness essential to understanding epistemological narratives in this context.



Fig. 1: An image depicting the dawning of humanity nested in nature in the Maharlika (pre-colonial Filipino) Creation Myth, Malakas, at Maganda. OpenAI, 2024.

All Things Exist in Relatedness

Indigenous knowledge while diverse share some intertwined concepts that shape their understanding of knowledge (Austin & Hickey, 2011). Indigenous epistemologies offer alternative pathways of constructing and understanding knowledge. As shown in Figure 2, the diagram provides a visual representation of Indigenous Epistemology, highlighting some of the worldviews that Indigenous communities share based on a literature review. The circular design of the diagram, created by the author, suggests a holistic and interconnected worldview, emphasizing the intrinsic unity and balance that characterize Indigenous perspectives. This framing is crucial for understanding how Indigenous epistemologies promote a sense of unity and interconnectedness with the natural world:

- **Relationality.** The physical, cosmic, spiritual realms, along with humans, animals, insects, plants, land, water, and air, are all interconnected, forming an integral part of the web of life. They engage in reciprocal relationships that nurture and sustain the balance and harmony of the physical, mental, and spiritual worlds (Alfred & Corntassel, 2005). In this context, knowledge is not human-centric, nor the future centered on human interests. For indigenous peoples, reality is fundamentally about relationships, and these relationships constitute their reality. To paraphrase Wilson (2018), relationships do not merely shape reality, they are reality. Indigenous worldviews stem from an understanding that “we are all related” (Absolon,2020).
- **Place-based:** Indigenous perspectives reject the colonial notion of "wilderness," viewing nature as home rather than a separate entity. Nature is integral to indigenous knowledge systems and identities, and they are seen as a tangible and lived experience – a space for belonging (Eichler & Baumeister, 2021). The geography holds cultural and spiritual significance, demanding care and respect. Nature is not to be exploited or seen as hostile but rather as part of a socio-ecological network where humans and non-humans coexist (Clement, Levis, et al., 2021).
- **The Sacred and the Spiritual:** Across indigenous cultures worldwide, certain natural areas such as mountains, forests, and rivers are revered as sacred sites (Bakht & Collins, 2017). They are cherished as places of special

spiritual significance and healing, implicitly and explicitly tied to indigenous spirituality (Cladis, 2019). A moving example from a New Zealand court decision illustrates this connection well:

“The most damaging effect of the diversions on Maori has been on the wairua or spirituality of the people. Several of the witnesses talked about the people 'grieving' for the rivers. One needs to understand the culture of the Whanganui River iwi [tribe] to realise how deeply ingrained the saying ko au te awa, ko te awa, ko au [I am the river, the river is me] is to those who have connections to the river. ... Their spirituality is their 'connectedness' to the river. To take away part of the river ... is to take away part of the iwi. To desecrate the water is to desecrate the iwi. To pollute the water is to pollute the people.” (Ngati Rangi Trust v Manawatu-Wanganui Regional Council, 2004).

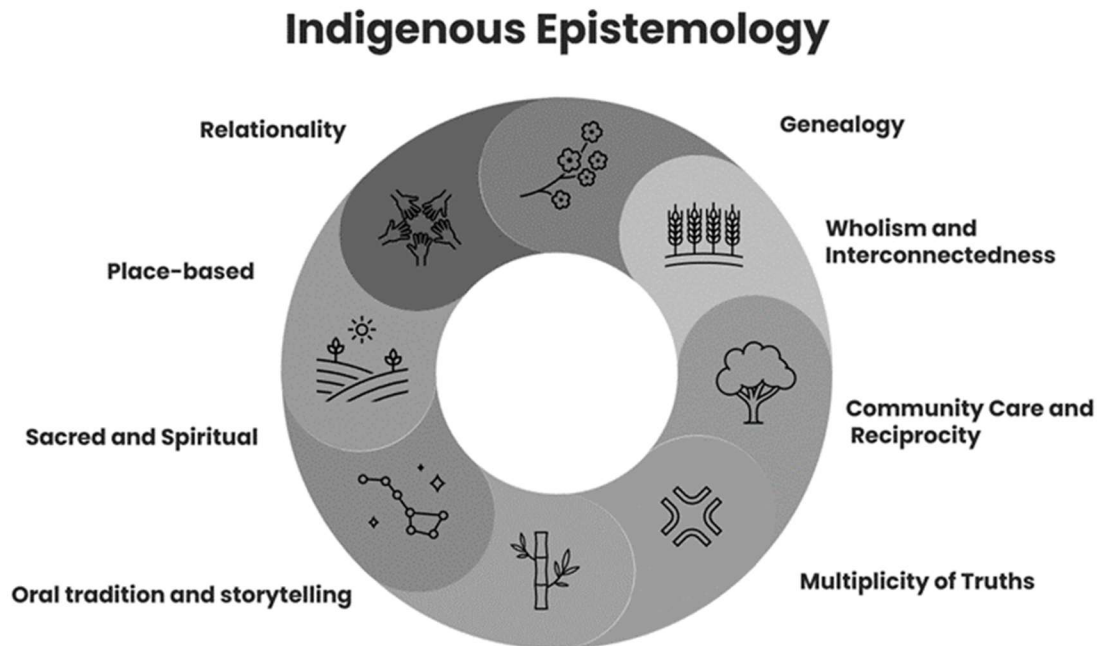


Fig. 2: A visual representation of Indigenous Epistemology created by the author highlighting some of the worldviews that Indigenous communities share based on a literature review. The diagram is circular suggesting a holistic and interconnected worldview.

- Oral traditions and intergenerational storytelling play a central role in indigenous knowledge transmission. This collective narrative, inherent to cultural heritage, encompasses a spectrum of knowledge, philosophies, and practices guiding indigenous societies in their interactions with nature. For example, the Mamanwa Indigenous People of Basay, Samar in the Philippines, have community elders who serve as crucial knowledge keepers and leaders. Their observations of nature's signals enable them to anticipate and communicate environmental changes effectively. Storytelling ensures the preservation of cultural identity while facilitating knowledge acquisition (Cuaton & Su, 2020). Through experiential processing and collective memories, indigenous communities translate knowledge into action. The practical application of knowledge within indigenous cultures through storytelling plays a pivotal role in knowledge dissemination (Ingold, 2000). In a post-colonial context, storytelling becomes a tool for cultural and political activism, enabling indigenous peoples to reclaim their narratives and identities (Cornassel, Chaw-win-is, & T’lakwadzi, 2009).
- Genealogy in indigenous knowledge systems encompasses spiritual, cultural, and environmental connections, shaping perceptions of reality. Ancestors are seen as guiding spirits for the present and future (Neeganagwedgin, 2013). It acknowledges historical traumas from colonization that influence genealogical

legacies (Mahuika & Kukutai, 2021). José Rizal's "The Council of the Gods" emphasizes the continuity of the past into the future (Zanker, 2023) and the importance of ancestral memory in shaping identity. The Filipino proverb "Ang taong hindi marunong lumingon sa kanyang pinanggalingan ay hindi makakarating sa kanyang paroroonan" highlights the need to understand one's roots to achieve future goals (Cruz & Parreno, 2022).

- Wholism and interconnectedness are foundational in Indigenous philosophies worldwide, including those of the Americas, Maori, and Australian Aboriginal Nations (Morcom, 2017). These concepts are deeply ingrained in Filipino (Maharlika) culture, reflected in *kapwa* (shared identity), *pakikipag-kapwa* (compassion), *bayanihan* (communal unity), *kagandahang loob* (altruism without expecting anything in return), *kalikasan* (harmony with nature), *anito* (ancestral worship and the interconnection of the physical and spiritual worlds), and *pamumuhay* (living out these values) (Mercado, 2016). Absolon (2020) noted that Indigenous communities emphasize a wholistic approach to life, understanding it as circular, cyclical, and relational.
- Community Care and Reciprocity. The spirit of generosity and community care is evident in Indigenous rituals and traditions. These "rituals of belonging" promote giving rather than acquiring. In traditional Indigenous cultures, wealth was measured by generosity, not possessions. The concept of reciprocity is deeply connected with kinship, emphasizing the interconnectedness of humans and the natural world (Manley, et al., 2022). Principles of reciprocity, such as "Ayni" in Chile and "Utang na loob" in the Philippines, reflect a broader reciprocal relationship between humans and nature.
- Ayni, rooted in Andean indigenous philosophy, fosters balanced relationships through giving and receiving. Utang na loob emphasizes gratitude and reciprocity, maintaining harmony with nature and community bonds. Similar practices are found in Malay, Indonesian, and Thai cultures, highlighting the universal value of reciprocity across indigenous traditions (S. Cruz, personal communication, April 9, 2024; Mulder, 2000).
- Multiplicity of Truths. Epistemological heterogeneity is evident in the diverse stories and perspectives practiced and shared by indigenous communities, showcasing a profound tolerance and respect for epistemic diversity. This view of the multiplicity of truths suggests that knowledge and reality are understood to be relative, as truth exists in multiple forms.

In Indigenous ways of knowing, truth is not just about factual accuracy; it is shaped by relationships and connections. Unlike the singular notion of truth in many Western philosophies, Indigenous truth is inherently plural and heterogeneous. It involves a complex interplay of culture, nature, values, languages, identity, the sacred, the land, history, and lived experiences. Truths are based on experiences and are often expressed through metaphoric and symbolic languages. These languages help Indigenous peoples make sense of the world and illuminate their understanding depending on the context. Trust, in Indigenous contexts, has its own unique positionalities (Prete & Lange, 2021).

Well-Grounded Rivers, Well-Grounded Futures

Within the discussed indigenous epistemological perspectives, rivers are recognized not merely as resources for extraction but as living, life-sustaining entities closely tied to the community's cultural, spiritual, and physical well-being (Rasolt, 2020). Rivers, viewed as kin and entities with inherent rights, are revered and cared for due to their sacred nature. Their spiritual significance builds connections between communities and their ancestors, heritage, languages, lands, identities, and the cosmos (Whyte, et al., 2018). They act as natural pathways that deepens our understanding of the world, and its sacredness symbolizes our reciprocal bond with nature. An unhealthy river indicates a disharmony with it. It impacts not only the place but also the spiritual and health of the community. A well-grounded river embodies the interrelation of all realms of life—physical, cosmic, and spiritual. It possesses agency, shaping contemporary Indigenous environmental activism, and carries divinity as a symbolic route to spiritual liberation (Ramirez, 2020; Buettner, 2023). Figure 3 provides an interconnected design illustrating key concepts related to rivers from an indigenous perspective. Developed by the author, it highlights the holistic and relational approach indigenous culture have toward rivers. Unlike a scientific or purely resource-based perspective, it emphasizes the cultural, spiritual and communal connection that indigenous peoples maintain with rivers. Understanding this is crucial for appreciating the depth and diversity of indigenous knowledge systems and their

potential contributions to sustainable river-city interactions and management.

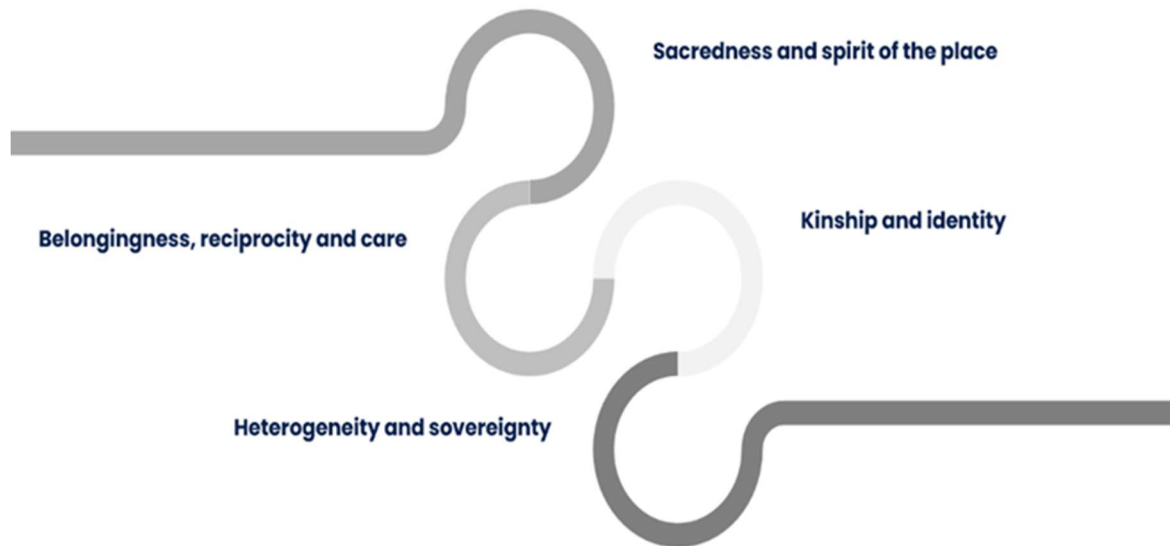


Fig. 3. A holistic, interconnected perspective of indigeneity, highlighting the profound relationships and values associated with natural entities like rivers. This epistemic map illustrates how indigeneity might perceive a river as more than just a body of water, but as a living entity – fluid, intertwining and reflecting interconnectedness.

Flowing Essence

For Indigenous peoples, rivers are the lifeblood of Mother Earth, stretching from source to outlet. Interference with these vital networks, through pollution or degradation, is deemed an offense against nature (Rasolt, 2020). Rivers, in their ceaseless flow: embody the spirit of the places they flow through, representing kinship and linking us to our ancestors and all life nurtured by their waters. Central to community identity, rivers are vital spaces that demand honor and respect for their sacred nature. As sanctuaries, they preserve ancestral knowledge and biodiversity, bridging past, present, and future. Emphasizing intergenerational belonging, rivers symbolize balance and harmony essential for reciprocity. They invite us to value diverse truths, reflecting a deep relationship with the natural world. Recognizing rivers as living entities with legal rights is crucial for their protection and the well-being of future generations (Barkham, 2021). Acknowledging rivers' sovereignty offers the potential for repairing society-river relationships and decolonizing river governance (Fox, et al., 2017).

Vessels of Memories and Worlds

“The river is us; the river is in our veins” (Fox, et al., 2017, p.521)

Rivers, akin to the veins in our bodies, hold collective memories. They serve as living archives embodying the essence of time, space and human experiences. In the flow are their myths, stories, tragedies, and triumphs of past generations. Rivers are vessels of polycentric life worlds that sustain life forms fostering diverse ecosystems and ancestral wisdom. In the realm of epistemes, rivers symbolize the diversity of indigenous knowledge systems and heterogeneity of perspectives that thrive across cultures.

The Limits and Constraints of the Indigenous Worldview

The Indigenous worldview faces numerous challenges due to historical marginalization and ongoing struggles for recognition. Indigenous knowledge is often appropriated and overlooked, hindered by colonial legacies and power dynamics. Here are some key limits and constraints: land dispossession hampers access to ancestral territories, hindering the continuation of traditional practices and eroding knowledge systems; violent colonization disrupted self-determination, leading to ongoing struggles for sovereignty and knowledge preservation; colonial legal and political systems often fail to recognize Indigenous rights and sovereignty; and urbanization, globalization, and digital culture threaten the transmission of indigenous knowledge across generations.

Despite these challenges, there's a growing appreciation for the value of indigenous knowledge systems offering hope for healing and building a better future. Table 1 presents a summary of the differing perspectives on rivers from a modernist science view and an indigenous viewpoint. It covers aspects such as the basic definition of rivers, root assumptions, human relationships with rivers, key notions of rivers, major metaphors, and their roles within urban landscapes. The modernist science view focuses on rivers as systems of water flow and extractable resources with an anthropocentric relationship, while the indigenous viewpoint sees rivers as living entities, ancestors, and sources of spiritual and cultural significance, emphasizing reciprocal care and stewardship.

Table 1. A summary of the differing perspectives on rivers from a modernist science and indigenous viewpoint.

Concepts, Relationships and Roles	Modernist Science View	Indigenous View
Basic definition of rivers	Systems of water flow that transports it from one place to another including water cycle processes.	Living entities integral to a community’s social, cultural, and spiritual life.
Root assumptions	Natural laws govern the behavior and characteristics of riverine systems.	All things exist in relatedness. Rivers are sacred, it is the abode of spirits and ancestors.
Human relationship with rivers	Rivers are crucial for human survival. Rivers are extractable, computable, and curatable information, assets and resources. Anthropocentric relationship	Relationship of care and stewardship. Rivers provides sustenance and life thus must be respected and cared for future generations. Reciprocal relationship
Key notions of rivers	They are predictable and can be modeled to a reasonable degree of accuracy. Rivers are data streams. Rivers can be managed sustainably.	They are kin. They are ancestors. Humans must give back by ensuring the purity of its water and river health. They are sacred. They are sovereign entities with rights.
Key metaphors	Mechanical Objects, Malleable Assets, Data Streams, Conveyor Belts of Development, Intelligent Rivers	Lifeblood, Ancestors, Veins of the Earth, Sources of Ancestral Wisdom, Carriers of Stories and History through time and space.

<p>Rivers within Urban Landscapes</p>	<p>Rivers as open, smart and dynamic systems for city innovations that promise aesthetic, educational, biodiversity, and interactive natural experiences. A core and vibrant aspect of urban life. A natural landmark. City resilience and adaptation.</p>	<p>Rivers as core or as a central element of future city infrastructures and designs respecting community identities, the rivers natural flows and ecosystems. Rivers emerge as cultural and spiritual centers and spaces. Riverbanks designated for storytelling, ceremonies and cultural histories. Enhance accessibility to the river for cultural and spiritual activities and preserving its ecological integrity. River health monitoring.</p>
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River Epistemes: A Causal Layered Analysis

The Causal Layered Analysis was used to synthesize and analyze the key insights extensively discussed above and develop potential anticipatory imaginaries of river futures from an indigenous, science, and as complimentary epistemes. This presents a case for a transformative shift in our approach to river stewardship within urban landscapes. It accentuates the alternative that rivers are living entities. Table 2 provides a summary of how different epistemologies perceive and interact with rivers and its futures. Each offers insights into the multifaceted relationships, interpretations, and futures of rivers.

A River Reborn: Kinship and Sovereignty in River Governance

In a future where rivers are acknowledged as sovereign beings, communities undergo a profound transformation in how they govern and interact with their natural surroundings. This new paradigm begins with freeing rivers from being seen merely as resources. This paradigmatic shift is based on a deeper understanding and reverence for rivers as living entities with inherent rights, crucial for addressing the interconnected environmental, cultural, and spiritual crises of the era. (Berge, 2022; Benohr, et al., 2018; Pelizzon, 2018).

Litany

The movement for river emancipation gains global traction, advocating for a radical shift in societal perspectives and governance structures. Legal personhood is granted to rivers, ensuring their protection and well-being. This monumental transition challenges conventional views and emphasizes the importance of recognizing rivers as critical members of the community, essential for the health and cohesion of both people and the environment.

Systems

Decolonized river-urban governance emerges as a cornerstone of this renaissance. The systemic overhaul dismantles colonial legacies that have long disassembled communities from their rivers. Indigenous wisdom, once marginalized, is reincorporated into governance structures. Community elders, or panglakayen, serve as knowledge keepers, guiding respectful interactions with rivers and ensuring that traditional knowledge and care practices are revived and respected.

Table 2. Causal Layered Analysis: A Comparative Analysis of Rivers from Indigenous, Modernist Science, and Confluence of Epistemes Perspectives.

Causal Layered Analysis	Indigenous Episteme	Modernist Science Episteme	Confluence of Epistemes
Litany	<p>Rivers emancipated.</p> <p>Decolonized river-urban governance.</p>	<p>Simple, attractive, stable river systems.</p> <p>Rivers through science are governable. They are a controllable, reproducible, and manageable resources and assets.</p>	<p>Rivers as an observable crisis.</p> <p>Rivers are deteriorating at the physical, ecological and existential levels.</p>
Systems	<p>Community care and reciprocity.</p> <p>Community elders as knowledge keepers.</p> <p>Rivers as sovereign persons can restore and society-rivers relationships.</p> <p>Ceaselessly flowing river waters.</p>	<p>Models of river realities to reengineer it and optimize its purpose and function for economic growth and resilience.</p> <p>Create a mechanical blueprint to control, exploit and extract river ecosystems potentials and services.</p> <p>Tamed river waters.</p>	<p>Rivers are exploited as resources.</p> <p>River health or illness are manifestations of a larger ecological crisis (moral, ethical, spiritual).</p> <p>Political, governance and legal systems have sidelined ecological stewardship and are slow to recognize them as non-human entities with rights.</p>
Worldviews	<p>The river is us; the river is in our veins.</p> <p>River is kin. River is sacred.</p> <p>Rivers as living entities.</p> <p>Rivers are carriers of our stories, our ancestral memories.</p>	<p>Rivers like nature are wild, it must be controlled, managed and tamed.</p> <p>Human alterations as substitutes to natural processes of conserving and preserving.</p> <p>Rivers as resources and objects for sustainable growth and development.</p>	<p>Rivers are life.</p> <p>They are not mere ecological units.</p> <p>The complexity of ecosystems is both empirically grounded, and ethically and metaphysically informed.</p>
Myth/Metaphor	<p>Veins of Collective Memories.</p> <p>Vessels of Polycentric Worlds.</p>	<p>Mechanical Puzzles.</p> <p>Malleable Objects</p>	<p>Earth's Lifelines</p>

Inclusive governance models thrive, combining contemporary legal frameworks with ancient indigenous practices. Landmark cases around the globe set precedents by recognizing rivers as legal persons. These legal

victories encourage a holistic approach to river management, ensuring diverse voices, particularly those of indigenous communities, are heard and respected. (McKibbin, 2023)

Worldview

A profound transformation in worldview accompanies these systemic changes. Rivers are no longer seen as mere waterways but as sacred, living entities. This outlook acknowledges the interconnectedness and reciprocity between humans and rivers, fostering a deep sense of kinship and responsibility. Communities come to understand that the health of rivers is directly linked to their own well-being, prompting a collective commitment to protecting and nurturing these vital lifelines. “The river is us; the river is in our veins”. This mantra becomes a guiding principle, reflecting the intrinsic bond between humans and rivers. The sacredness of rivers is celebrated through rituals, stories, and community practices that honor their life-giving essence. (Lasco, 2021; Sullivan, 2018).

Myths/Metaphors

Rivers, as carriers of our stories and ancestral memories, embody the metaphor of veins of the Earth. They are seen as the lifeblood that sustains and nourishes the planet, landscapes and hearts of communities and people. This deep connection is both physical and spiritual, reinforcing the idea that rivers are kin.

The concept of rivers as vessels of polycentric worlds emerges, highlighting their role as connectors of diverse perspectives and ways of being. Rivers are not just natural entities but also cultural and spiritual ones, holding within them the myriad experiences and histories of the communities they touch. This polycentric view celebrates the multiplicity of realities and emphasizes the value of respecting and integrating diverse viewpoints. (McDaniel, 2022; We Are Water; n.d).

Modernist Science: Taming the Wild Rivers

In a world driven by the persistent advance of science and technology, rivers have transformed from untamed natural entities into controllable, reproducible, and manageable resources. Governed by advanced engineering and technological proficiency, rivers are perceived as imperative factors for economic growth and sustainable development. This scenario envisions a future where rivers are no longer wild forces of nature, but finely engineered systems curated to meet human needs and aspirations.

Litany

Through a scientific and economic perspective, rivers are tapped as valuable regenerative assets to be controlled, optimized, and exploited. The primary goal is to harness river systems to support steady growth, reinforce urban development, and sustainability. Technological progress and engineering breakthroughs are pivotal in tapping into the potential of these water systems, illustrating a larger trend of treating nature as a resource for human benefit. (Bowker & Bergstrom, 2017; American Rivers, n.d.).

Systems

The systemic roots of this scenario trace back to the era of industrialization and the rise of technological innovation. Economic models prioritize growth and prosperity, frequently sacrificing environmental preservation. This worldview rests on the belief in humanity's capacity to manipulate and regulate natural systems through scientific inquiry and technological progress. Governance structures and policies incentivize resource utilization and extraction, sidelining conservation and the intrinsic value of natural ecosystems (Yuko, 2023).

Worldview

In this narrative, nature is seen primarily to serve human aspirations for growth. This perspective often underestimates the complexities of ecological systems, disrupting their balance in the pursuit of efficiency and utility. It presupposes a dichotomy between humanity and nature, with the former exerting dominion over the latter. Human-engineered systems and technologies are seen as capable of replacing or enhancing natural processes, leading to urban management practices that disrupt ecological equilibrium (Kopnina, et al., 2018).

Myth/Metaphors

Metaphors in this scenario depict rivers as mechanical puzzles to be solved and malleable objects to be controlled and shaped for human needs. This reinforces the myth of human supremacy over nature. In this rationalist and scientific paradigm, humans are portrayed as the masters of nature, wielding their intellect to bend the natural world to their will. These metaphors suggest that any natural system can be reengineered for optimal efficiency and utility. This narrative supports the belief in technology as a universal solution to environmental and economic challenges (White, 2019; Merchant, 2020).

Confluence: Honoring Rivers as Life-Giving Entities**Litany**

Here, the world faces the glaring consequences of climate change through the lens of our rivers. Once thriving, these waterways now bear witness to a tale of degradation. Physically, they shrink and degrade, tainted by exploitation and disregard. Existentially, the essence of rivers, intertwined with histories, cultures, and spirituality, fades into obscurity. This crisis is a poignant reflection of a broader ecological crisis, urging a transformative reimagining in our relationship with nature (World Economic Forum, 2021). Amid the crisis, a global movement begins to take shape. Inspired by new ecological insights, activists, scientists, and policymakers rally around the concept of rivers as Earth's Lifelines. This movement challenges the dominant mechanistic worldview, advocating for a profound shift in how humanity relates to rivers.

Systems

The crisis roots itself in colonization, enmeshed within political and legal frameworks that sideline ecological stewardship; that fails to acknowledge rivers as living entities entitled to sovereign rights. Mired in bureaucracy and short-term agendas, governance structures neglect ecological and ethical imperatives, exacerbating the plight and revealing a disconnection from life's interconnected web (Whyte, 2018; EHN, 2021). However, governments worldwide start to recognize the sovereignty of rivers. New laws and policies grant rivers legal personhood, ensuring their rights are protected. Ecological stewardship becomes a cornerstone of governance, with long-term sustainability taking precedence over short-term exploitation.

Worldview

A mechanistic, anthropocentric worldview underpins river exploitation, perceiving them solely as conduits for human use, devoid of inherent value. This contrasts sharply with a holistic view recognizing rivers as vital components of the biosphere, imbued with empirical and ethical significance. Acknowledging their complexity and interdependence underscores rivers' health as a barometer for the planet's well-being (Wohl, 2018; Pearson, 2024). With this, education systems incorporate the intrinsic value of rivers into curricula, fostering a deep ecological consciousness in future generations. Art, literature, and media celebrate the symbiotic relationship between humans and rivers, reinforcing the narrative of mutual respect and interdependence.

Myth/Metaphor

Reimagining our bond with rivers, Earth's Lifelines emerge as a potent metaphor. They depict rivers as the planet's lifeblood, indispensable not only for biodiversity but as vessels of history, culture, and identity. Evoking ancestral reverence, this myth urges us to honor rivers as living beings with rights, fostering a symbiotic relationship with nature rooted in profound respect. As cities embrace their rivers as sacred entities, they forge a symbiotic relationship with nature (Jackson, 2023; Pelizzon, et.al., 2021; Earth.Com, 2024). In this transformed world, rivers flow freely and purely once more, embodying the interconnectedness of all life on Earth. The narrative of Earth's Lifelines has not only saved the rivers but has also redefined humanity's role as stewards of the natural world.

River Futures within Urban Landscapes

In contemporary urban settings, rivers are increasingly recognized as open, intelligent, and dynamic systems that fuel city innovations. These waterways go beyond being mere sources of water, serving as crucial data streams that offer various benefits such as aesthetic beauty, educational value, biodiversity, and interactive natural experiences to urban life. As essential components of city infrastructure, rivers are celebrated as natural landmarks that greatly enhance city resilience and adaptation. Urban planners develop flexible and adaptive river management strategies to accommodate changing river conditions in this future.

From an indigenous worldview, rivers are much more than parts of urban infrastructure; they are sacred entities essential to cultural and spiritual identities. They are viewed as central to community life, with their natural flows and ecosystems being respected and protected. Rivers act as cultural and spiritual hubs, providing spaces for storytelling, ceremonies, and the preservation of cultural histories. This perspective ensures that rivers continue to meet the spiritual and cultural needs of the community, fostering a profound sense of belonging and reciprocity. Monitoring river health from this standpoint is not solely about maintaining ecological balance but also about honoring the river as a living entity. It is a practice based on respect and care, ensuring the river remains a vibrant and integral part of the community's spiritual and cultural fabric. The natural world is crucial part of the river-city future conversation.

Conclusion

The discussion of river futures in urban landscapes can be enriched by integrating modern science and Indigenous perspectives. Modern science views rivers as resources to be controlled and exploited for human benefit, driven by economic incentives and technological means, leading to their commodification. In contrast, the Indigenous view sees rivers as living entities with rights, deeply connected to community culture, spirituality, and history. This perspective emphasizes care and stewardship, with riverbanks serving as spaces for cultural preservation. Combining scientific methods with Indigenous wisdom offers a holistic approach, balancing progress with cultural, spiritual, and ecological preservation. Integrating modern science and Indigenous knowledge offers rich opportunities for futures research in river and urban sustainability. It can guide researchers in exploring river restoration, conservation, urban planning, participatory governance, and sustainable resource management, leading to more inclusive futures for rivers and cities. Balancing technological advancements with ecological sustainability and cultural respect is achievable.

Just as two rivers, modernist science and Indigenous knowledge, come from different epistemic landscapes, they can converge and merge downstream. Flowing together, they offer new insights into how nature, rivers, and cities interact in a world aspiring for sustainability and regeneration. As James Watkin (n.d.) once remarked, a river carves through rock not because of its strength, but because of its relentless persistence.

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