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YAMUNA RIVER PROJECT

NEW DELHI URBAN ECOLOGY

Iñaki Alday and Pankaj Vir Gupta

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Peter Debaere, John Echeverri-Gent,
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Joseph Brookover Jr

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AN ESSENTIAL FUTURE

The Yamuna River Project (YRP) aims to help the city of New Delhi and its citizen stakeholders reimagine and transform the sacred, yet polluted Yamuna River as it flows through India's capital. The Yamuna River Project confronts the dilemmas of Delhi's urban reality, with a precise, analytical, multi-disciplinary, research-based methodology. This approach facilitates a dynamic collaboration between the intellectual speculations generated within a University and their application for a range of knowledge partners governing a city, including municipal authorities, political leaders, citizens' advocates and non-government organizations.

As one of the most rapidly urbanizing mega-cities in the developing world, New Delhi confronts serious challenges, revealing inadequacies in planning, urban design, and social equity. These limitations are emerging at a time of economic uncertainty and ecological fragility. As a result, the citizens of the world's largest democracy live amidst unprecedented environmental degradation. Existing governance structures have been hard pressed to keep up with the pace of the complex, rapidly evolving dynamics of climate change. Toxic air and septic waters are simply collateral damage in this circumstance. Overburdened public health systems are fraying as more citizens are exposed to the adverse consequences of these environmental ills in daily life. These millions continue to suffer, often silently, as they inhabit, without recourse, these imperfect urbanites.

Governance

Political leadership, limited by the relatively brief tenure of elected office, and challenged by the pace of change, often resorts to political grandstanding. In New Delhi, policy-making often seems at an impasse, unable to conceptualize a systematic, long-term urban vision for the humanity that constitutes a city. Governments, confronting the limitations of five-year long electoral cycles, often default to short-term solutions, perpetuating an illusory construct of urban progress. Increasingly, the call for "smart cities", automated and propelled by artificial intelligence, is seen as a panacea. Over the past decade, it has become increasingly evident that no single entity—elected or appointed to 'lead' the city—has the experience to 'resolve' rapid urban degradation. In fact, it has become evident that the existing structure of urban governance may be part of the problem. That is, governance structures that are designed to operate with a historically limited mandate, are now being asked to address novel problems that demand both agility, and cross-disciplinary functionality. A plethora of municipal agencies, often working at cross-purposes, without accountability, fail to address the synthetic nature of the city. Thus, agencies tasked with water-supply and sewage treatment have little to do with entities that manage solid waste management; development authorities entrusted with planning housing and work-space, consistently fail to estimate the growth of the city, condemning millions of people to forage for a foothold in squatter settlements lacking even the most basic amenities; public transportation administrators fail to synchronize existing and new multi-modal transport systems.

Within this fragile equilibrium, active engagement with best-practice models for identifying, synergizing, and upgrading urban systems, governance and ecology, has never been more critical.

The River

The Yamuna River is a living ecological entity with her own seasonal cycle of flow, complex hydraulic dynamics, and shifting floodplain territory. For centuries, the river has existed as a significant geographic presence within the northern Indian landscape. In myth and in religion, in prose and poetry, in song and in lore, the Yamuna has been immortalized as a primordial Goddess. For centuries, the river constituted not just the defining axis, but also the ecological and agricultural

lifeline of the many settlements preceding present day Delhi. It is impossible to imagine the city of Varanasi without the illuminating presence of lamps adorning the Ganga; or to disengage the Holkar capital of Maheshwar, famous for its weavers and looms, from its anchor on the banks of the Narmada, where the rising humidity provides an atmospheric condition perfect for blending cotton fiber with silk, creating the famed Maheshwari silk. Delhi and the Yamuna were once so conjoined. Even today, the sandstone walls of Mughal era monuments abutting the floodplain reveal watermarks of the Yamuna. But all this is in the past. Long gone are the days when the citizens of Delhi swam, fished, and strolled freely on the banks of the Yamuna.

In this age, characterized by geologists as the Anthropocene—when patterns of human settlement are significant influencing forces on environment and climate—urban populations in mega-cities have far exceeded the carrying capacity of their designed infrastructure. In New Delhi, the Yamuna has been reduced to a poorly managed sewage drain, absent both from the urban landscape and from the public imagination. The fight for citizens' survival inflicts even deeper damage to an already fragile ecological circumstance. Urban development justified in the name of civic prosperity is often misleadingly defined in opposition to environmental security. In the hardscrabble urbanity of the present India megacity, there is little room for the ecologically sacred.

The Diagnosis

Originating in the Himalayas, and emerging from the Yamunotri glacier, the Yamuna River negotiates dams and barrages, irrigating thousands of acres of agricultural land, before it flows into New Delhi. North of Delhi, the volume of fresh water in the Yamuna is able to dilute organic matter and fertilizers, absorbing pollution from pesticides and agricultural runoff, while maintaining a level of dissolved oxygen capable of supporting aquatic life, birds, and vegetation. However, the river receives an unholy welcome upon her arrival in Delhi.

At the Wazirabad barrage, all of the Yamuna's water is dammed and diverted, partially quenching the capital city's insatiable thirst. Just after this Barrage, the Najafgarh Drain—formerly the perennial Sahibi River—provides the only flow to the Yamuna, bringing with it, sixty percent of the river's total pollution load. Comprising of untreated sewerage, solid waste, industrial and chemical effluent, and urban detritus, the flow of the Najafgarh drain depletes the water of all oxygen content, rendering it incapable of supporting any form of life.

The quality of the water is not in fact the problem. Billions of dollars have been invested in large water-based infrastructure projects, without achieving any substantial success in cleaning the river. Polluted water is the consequence and an indicator of 150 years of urban evolution, an empirical measure of the last fifty years of rapid, largely unplanned growth, and, in summary, of severe social and environmental inequality in the city. As Rana Dasgupta points out in his essay, British rule changed the historic relation between Delhi's population and the water, transforming both a sacred and a secular interface, into a commodity of uncertain origin. From inhabiting the many 'ghats' that lined the river, and offering an unobstructed experience of civic and religious life amidst the Yamuna river, Delhi's population grew detached from the river, receiving a poorly regulated, often contaminated, and, at best, intermittent supply of precious water, through an intricate maze of pipes and meters. A water mafia sprung into action, quickly monetizing an opportunity to drill illegal wells, pump unregulated water, and supply tankers to a parched populace.

Delhi's citizens are now completely detached from their river, only part of a larger detachment from the formerly shared consciousness of public space, and, in fact, from the concept of a 'commons'. This detachment is the underlying cause of Delhi's environmental dilemma. The Yamuna river, perceived as an incarnate Goddess, is incapable of supporting physical life.

The legal protections offered to the Yamuna (and to the Ganges river), entrusted with the rights of living entities, fail to deter the agencies that poison them. This contradiction reflects the dilemmas of a complex society, confronting a critical moment of exponential population growth, social inequality and convoluted municipal governance. The perennial flows of raw sewage from the capital city into the Yamuna, are simply a reflection of the inequity of a city without planning,

with a severe lack of infrastructure. Thus, the floodplain of the Yamuna reveals urban slums of unprecedented density, without any provision for the safe supply of drinking water, nor for sewerage treatment, without education and health facilities. This disenfranchised population, encroaching upon the floodplain, scraping a meager livelihood from the margins, suffers again from an unrelenting cycle of monsoon floods.

The restoration of a healthy equilibrium between the river and the city is also a matter of survival. India faces the consequences of climate change on enormous scale, with monsoon floods killing thousands of people every year, and causing significant damage to urban infrastructure, ruining lives and livelihoods. The consequences of a one hundred-year flood event—likely to occur more frequently with increasing global warming—will be devastating. Urban sprawl, fueled by the lack of planning, has reduced the available forest cover; ecological and agricultural area per inhabitant in the National Capital Territory of New Delhi has shrunk dramatically in the past few decades. The reduction of forested area, diminished local food production and poor soil permeability, has created a social and ecological crisis of extreme urgency. The effects of climate change are seen not only in more recurrent floods, but also in droughts and heat island effects with substantial impact on the most vulnerable populations.

Many Municipal agencies, as well as social and environmental organizations continue working in Delhi to reverse this situation. The Delhi Jal Board (Delhi Water Authority), confronting a mammoth task of creating infrastructure for water and sewerage treatment, has, for the first time, started to integrate urban design and planning strategies in its development manifest. The Delhi Government has taken a critical first step in consolidating a few of the agencies that deal with water, flood control, irrigation, and environment, under a single-point leadership structure. The Ministry of Water Resources may now be considering the empowerment of a Yamuna River Development Authority, streamlining the complexity of governance of water and rivers.

The Methodology

The Yamuna River Project has sought to engage this dilemma with a multi-faceted approach. Applying broad based, intellectually diverse, research experience, the Yamuna River Project has forged a credible partnership with existing governance structures, and established a paradigm for influencing significant remediation policies. Developing a transparent, collaborative and open-source methodology, the project functions as a critical front for the confluence of academic leadership, with cultural, environmental, and political systems of governance.

The project methodology questions and investigates the causes and origins of Delhi's environmental situation from many perspectives—historic, social, technological and cultural. A critical element of this approach is the commitment to the development of a vision, a conceptual framework, to explore potential avenues for transformation. This vision reimagines the urban environment, evaluating and testing ecologies that facilitate sustainable urban growth and accountable governance. Finally, the Yamuna River Project proposes speculations: holistic interventions that define systematic urban strategies, and generate new typologies that respond to the specificity of Delhi. The thesis of this approach postulates that 'water is the consequence', reflecting the ethos of the present urbanity.

The breadth of this methodology is only possible in the context of an independent research university, acting as a multidisciplinary think tank. As pointed by George Steiner (Universitas, 2013), the pivot of the university is its intellectual and civic freedom, and this capacity to engage in independent excellence, remains unfettered by the utility of the knowledge so produced. The university has an almost infinite capacity to add and combine disciplines and areas of expertise, therefore developing innovative interdisciplinary connections. Institutions like the University of Virginia are thus multicultural by nature, nimble enough to deploy academic resources across diverse cultural environments.

On the other hand, contradicting or complementing Steiner's vision, today's leading universities feel the urgency of engaging with the most critical issues of our time, extending their reach and

collaborating beyond the campus. The implication on these urgencies requires dealing with the complex issues and the difficulties of management and implementation. To that end, multidisciplinary teams become key, ranging from abstract and very specific areas of knowledge to disciplines that engage naturally with politics, social dynamics, design, or planning.

The intellectual apparatus for the Yamuna River Project encompasses multiple and interrelated points of view: ecology and culture, history and infrastructure, economics and design, are some of the many combinations explored. The vision for the planning, and creation of dynamic public spaces emerges as a conclusion drawn from detailed investigations of the physicality of the city fabric, and the armatures of governance, culture, religion, ecology, public health or infrastructure. Conceptualized as systems, the layers of complexity of the city and its ecological territory, are intertwined as a "design methodology."

The Vision

The dilemmas of New Delhi—or for that matter, any Indian or global megacity—a critical level of air and water pollution, scarcity of affordable housing, acute shortage of community space, are not radically different from the dysfunction of some European river cities only a few decades ago. Although Delhi and the Yamuna represent an acute urban crisis, this is only one of the many similar crises on the planet, in which a lack of planning, rapid growth and climate change redounds as a lack of basic infrastructures and cultural attachment. The resulting social inequality is dramatically visible in the ecology of an environment that once was the reason for the city to exist—its rivers—and in the pollution of the most precious substance for life—its waters.

The remedy for New Delhi's defiled Yamuna, and her once sacred waters, will need to holistically address the causes of pollution, and redress the inequality within the city. The Yamuna River Project seeks to foster this change. We recognize a basic fact of the Anthropocene era—the cities that we design and make now, are the cities that we shall inhabit in the future and with which the planet itself shall have to live. It is present day human intent and intervention that shall ensure the sustainability and survival of the future city—a city predicated on our ability to secure ecology from our own advances. We therefore equate social prosperity with ecological stewardship. The Yamuna and all its tributaries, the flows and the floodplains, are the base for reformulating Delhi's commons. They are to become the public space and ecological spines of the new socio-ecological structure of the city.

As co-founders of the Yamuna River Project, we have marshaled the resources of the University of Virginia and forged an innovative collaboration with the Delhi Jal Board, generating meaningful solutions for the crises afflicting the Yamuna River. Developing a transparent, collaborative, and open-source methodology, the Yamuna River Project functions as a critical front for the confluence of academic leadership, and cultural, environmental, and political systems.

We are optimistic that many restorative opportunities are latent in the neglected space of interaction between River and City. What if the Yamuna River floodplain may be reimagined as an urban nucleus, communicating a value system that situates the capital city within its original riparian ecology? In this sense, the Yamuna River Project is entrusted with the task of redefining a sanctuary within a megacity. As Dan Ehnbohm's essay so eloquently suggests, the new reality of the Yamuna River would, once again, be tethered to an awareness of the sacred, celebrated in image and in song. In a world where we have vanquished nature, the river city relationship would be an inseparable ethical identity. The citizens of the city would make a commitment to secure and nourish the river—making her sacred again—and New Delhi would forge another identity, a commitment to a new ecology.

EPILOGUE

Keshav Chandra

Former CEO Delhi Jal Board

Rivers don't die quickly. A stream of water that nurtures civilizations loses its life only because civilizations fail to fulfill their obligations towards it. The Yamuna, which found a place in the Hindu pantheon is today living the curse of an insensitive economic development of several decades. Delhi, which built many empires on the banks of this river over centuries, is at its wit's end today to see the moribund state of its life-giver.

Where has the city gone wrong? In the last four decades when Delhi broke its shackles and started to emerge as an economic giant, slow growing hinterland fueled the influx of population to the unprepared city. Delhi was continually found wanting to cope with this humongous in-migration. Scores of new settlements mushroomed in a totally unplanned manner, severely compromising the essential services meant for safe and healthy urban living. Wastewater generated by thousands of unplanned colonies found its way to the river through more than two hundred natural drains crisscrossing the city. Not only the Yamuna became terminally polluted, but also the entire hydrology of the city feeding the river became toxic.

Endeavors to rejuvenate the ailing Yamuna have been undertaken in the past in the name of the Yamuna Action Plan I, II, and III. However, these action plans failed to translate into the intended objective to clean the river and had an almost negligible impact on the overall hydrology of the city. The reason behind this glaring failure is more than apparent. All these plans tried to situate the solution in the realm of stark engineering projects ignoring the important urban planning aspect altogether. While increasing volumes of sewage were brought to the newly build wastewater treatment plants, the aggregated hydrology of the city remained completely untouched. Today the glaring reality that urban planning needs to be resurrected and given the center stage in the river cleaning effort has become evident. At the same time, it is also apparent that the gargantuan task of cleaning the river along with the entire hydrology can't be handled by any one institution alone. It needs to collaborate, co-operate and bring in the expertise unavailable to the city agencies locally.

The Delhi Jal Board has realized the immense potential in collaborations with local and global expert institutions. It has signed a Memorandum of Understanding with the University of Virginia - a globally acclaimed research institution, with an outstanding urban expertise. This partnership has infused a new and refreshing dimension to the river cleaning effort. Delhi's largest watershed - the Najafgarh Drain and its basin, have been selected for the intensive scrutiny and detailed planning. This book illustrates some of the chosen projects from a gamut of a vast array of projects which emerged as a product of this planning exercise. The untiring effort of Professor Iñaki Alday, Professor Pankaj Vir Gupta, students and faculty at the University of Virginia, Shri Radheahyam Tyagi, Shri V K Gupta, Shri Vikram, Ms. Mriganka Saxena, and officers of the Delhi Jal Board has made this fabulous book a reality. A sure and certain step is afoot, and we all hope that this journey will stop only when the Yamuna gets its turtle back in its waters.

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As one of the most rapidly urbanizing cities in the developing world, New Delhi confronts enormous challenges of urban and social equity at a time of profound economic and climatic uncertainty.

As a result, the citizens of the world's largest democracy live amidst extreme environmental degradation. Existing governance structures have been hard pressed to cope with the pace of the complex and rapidly evolving dynamics of economic and climate change.

Toxic air and septic waters are simply collateral damage in this circumstance. They are the indicator of complex urban problems that need a holistic and multidisciplinary approach.

The Yamuna River Project aims to help the city of New Delhi and its stakeholders reimagine and transform the sacred, yet polluted, Yamuna River by offering a research-based solution for dysfunctional river-city environments.



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