

YRP

YAMUNA RIVER PROJECT

ANNUAL REPORT 2018 - 2019



YRP

YAMUNA RIVER PROJECT

The Yamuna River Project is an inter-disciplinary research project seeking to study the revitalization of urbanity and ecology of riverine and coastal cities which began with the Yamuna River in New Delhi.

New Delhi—as the capital city of the world’s largest democracy, with a population of almost twenty million—faces an unprecedented challenge: its sacred river, the Yamuna, is one of the most polluted in the world. The entire quantum of fresh water flowing into New Delhi is redirected to fulfill the fresh water requirement of the city. From the Wazirabad barrage where it enters the capital city, to the Okhla barrage where it exits, the Yamuna consists of only treated and untreated sewage and other toxic effluent. The water is rendered “dead”, with zero oxygen, posing serious health hazards to the citizenry of New Delhi.,

This has become an unprecedented and urgent crisis of ecological inequality and a serious threat to the health of the entire population. It can only be reversed by sustained remedial action, encompassing all the complex components of the city: social, cultural, health, economics, ecology, public space, public facilities, housing, governance, and infrastructure.

The Yamuna River Project aims to be a catalyst for the urgent recovery of the Yamuna and its tributaries, building a publicly accessible body of information and expertise, and developing multi-disciplinary visions of what an alternative future would be. This collaborative methodology has been evolving as a study of urban ecological imbalances which can be applied to other river cities around the world.



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DIRECTORS' MESSAGE

The Yamuna River Project, now in its sixth year of research and advocacy, offers a template for urban remediation, focusing on emerging mega cities in the global south. In the face of acute challenges posed by factors as complex and daunting as climate change, limitations of essential natural resources - clean water and clean air, inadequate urban design and a rapidly growing urban population, the Yamuna River Project proposes research based academic collaborations as a leadership mandate for long-term solutions.

Beginning with the ecology of the Yamuna River in New Delhi, the project proposes a powerful synergy between India's capital city and its lifeline – the Yamuna River. Developed as a multidisciplinary project, it encompasses the following areas of research: water, infrastructure, health, environment, urban design, social sciences, economics, humanities and arts. After five years of study, a clear conclusion has emerged: contaminated ecology – such as the Yamuna's waters in Delhi - is an indicator of deeper and more complex urban problems, with the most pressing being urban inequality in the city.

The first phase of the Yamuna River Project, from 2012 to 2015, explored the disjunction between ecology and urbanity in New Delhi, India. Mapping the existing capacity of infrastructure, mobility networks, housing (formal and informal), and civic amenities, the project began to construct a narrative for the enormous challenges to be addressed by a consortium of partners. The conclusion from this exercise was clear: civic, economic, academic and diplomatic agencies will need to collaborate in an unprecedented and innovative manner, developing methodologies with a reasonable prospect for both

implementation and on-ground success.

The second phase of the Yamuna River Project, from 2016 to 2018, advanced the research and design propositions for sites along the most polluted stretches of the Yamuna River in New Delhi such as the length of the toxic Najafgarh Drain, as well as along the urban edges of the most sub-drains, spewing untreated effluent into the river. Complementing the urban design and architectural investigations, a multi-disciplinary team of academics from the University of Virginia (Environmental Scientists, Political Scientists, Business and Finance experts, Art Historians, and faculty in the Humanities) began establishing an academic armature of paradigm solutions that could be deployed to commence any exercise in ecological and urban remediation. This phase developed significant public engagement for the project, with a series of exhibits and public lectures in India, in Europe, and in the United States.

In 2019, we are commencing the third phase of the project, enlarging the scope of the academic territory and collaborating with new partners, to address larger questions emerging from this study of urban dysfunction: how should established and emerging urban centers in India, and in other cities in the global south, evolve a strategy for urban remediation, while incorporating issues of equity and democracy, of technology and poverty, and of ecology and urbanity?

Our academic platform - based on inquiry and analysis, continues to collaborate with significant partners in government (including multi-lateral agencies and diplomatic partners), in the private sector (industry

and corporate support) and in civil society (community, citizen and activist groups). Our diplomatic partner – The Embassy of Spain in India – has made tremendous progress in terms of project outreach to several political leaders in many Indian states. This stage of the project aspires to advance the focused and tangible goals for rethinking rapid urbanization in terms of social equity, ecological sustainability and the democratic process of urban upgrades. Our research offers guidelines for the implementation of pilot projects that may serve as a study for the recovery of urban ecology, and for the restoration of the natural systems such as polluted water sources and river systems.

Over the course of the past three years, the Yamuna River Project has succeeded in giving the University of Virginia an unprecedented platform in India for recognition of its research prowess. The former President of the University – Teresa Sullivan, and the Provost - Thomas Katsouleas, as well as Dean Ila Berman of the School of Architecture and Dean Ian Baucom of the College of Arts and Sciences, had an opportunity to visit India, and engage with the political and academic leadership of India at the highest levels. For our students and faculty, this project has succeeded on multiple levels. For example, establishing a new pedagogy for research and design, enabling high visibility for our skill sets as thinkers, and offering much needed international experience for study and travel for our academic community.

We are delighted to welcome Tulane University as a knowledge partner with the University of Virginia, enabling us to expand new research, posit future perspectives, and advance the potential of interdisciplinary,

inter-institutional and international collaboration. We hope to consolidate the critical academic leadership necessary for addressing the confrontation between rapid urbanization, environmental fragility, and social inequity in urban areas. In developing an empirical methodology based on collaborative research, the project could prove essential in alleviating some of the most pressing humanitarian and ecological urban crises across the global south.

Inaki Alday
Pankaj Vir Gupta
Brian P. Owensby

DIRECTORS



IÑAKI ALDAY

Co-Director, Yamuna River Project
Dean and Koch Professor of Architecture, Tulane University School of Architecture
Founding Principal, aldayjover arquitectura y paisaje
ialday@tulane.edu

Iñaki Alday was Chair of Architecture at the University of Virginia School of Architecture from 2011 - 2016. Since 2016, he has been the Co-Director of the Yamuna River Project, the first pan-university grand challenge project at the University of Virginia. In July of 2018, Alday joined the Tulane University School of Architecture as Dean. Both in the academic appointment and in the design practice of aldayjover arquitectura y paisaje, Iñaki Alday promotes a new attitude in front of the professional and academic challenges on the transformation of our environment. He believes that the role of Architecture and Architects is interdisciplinary and integrates scales, that there are new non-traditional programs as hybrid infrastructures, and in the necessity of establishing new social and environmental ethics are some of today's challenges that need to be met with a global vision.



PANKAJ VIR GUPTA

Co-Director, Yamuna River Project
Professor of Architecture, University of Virginia
Founding Principal, vir.mueller architects
pankaj@virmueller.com

Pankaj Vir Gupta is Professor of Architecture at the University of Virginia and Co-Director of the Yamuna River Project. With a Bachelor of Science in Architecture from the University of Virginia (1993), and a Master of Architecture from the Graduate School of Architecture at Yale University (1997), Gupta practices as founding principal at vir.mueller Architects in New Delhi since 2003. Gupta is a registered architect, licensed to practice in the United States, and as a member of the Council of Architecture in India. He has received awards from the American Institute of Architects, the Foundation for World Education, the George Nakashima Foundation for Peace, the Graham Foundation for Advanced Studies in the Fine Arts, and the Fritz-Höger Award for Excellence in Brick Architecture. Pankaj Vir Gupta has taught at University of New Mexico, Arizona State University, the University of Texas at Austin, the School of Architecture and Planning in New Delhi, and the Center for Environmental Planning and Technology Ahmedabad.



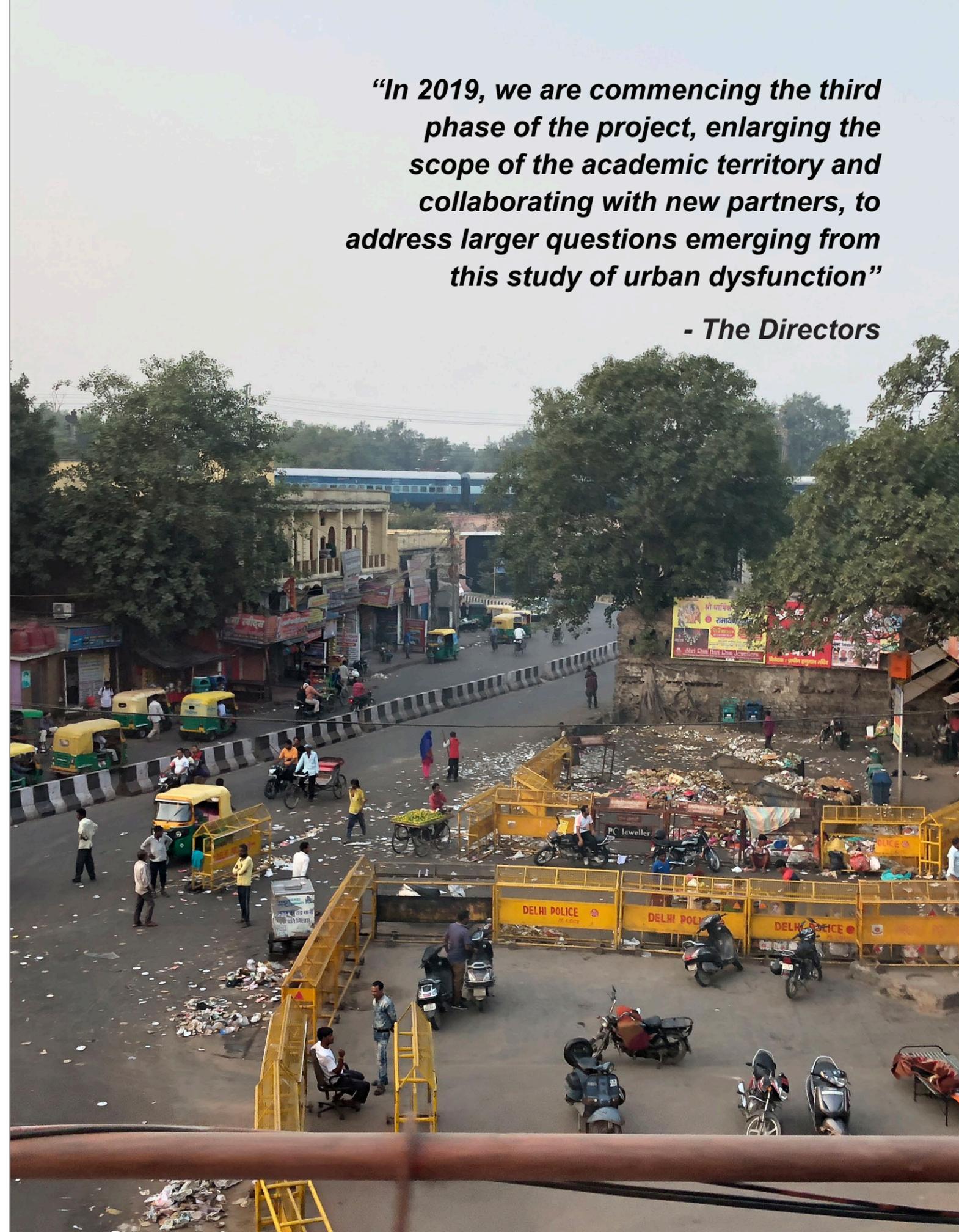
BRIAN OWENSBY

Co-Director, Yamuna River Project
Director, Center for Global Inquiry & Innovation, University of Virginia
Professor, Corcoran Department of History, University of Virginia
bpo3a@virginia.edu

Brian Owensby is professor of history in the Corcoran Department of History at the University of Virginia. His scholarly work has ranged from social and political history in nineteenth and twentieth-century Brazil, to legal and imperial legal history in seventeenth-century Mexico. He is completing a book on the transformation to an economy of gain in the context of the encounter between Europeans and indigenous people in colonial Paraguay. The working title is 'Ambivalent Transformations in the Land without Evil'. Owensby is also an attorney and practiced corporate law in the 1980's.

“In 2019, we are commencing the third phase of the project, enlarging the scope of the academic territory and collaborating with new partners, to address larger questions emerging from this study of urban dysfunction”

- The Directors



ADVISORY COUNCIL



THOMAS KATSOULEAS
Executive Vice President and
Provost, UVA

As executive vice president and provost of the University of Virginia, Thomas C. Katsouleas oversees the University's teaching and research activities. He directs the academic administration of the eleven schools, the library, art museums, public

service activities, numerous University centers, and foreign study programs. Provost Katsouleas served as dean of the Pratt School of Engineering and professor of electrical and computer engineering at Duke University from 2008–2015. He earned a B.S. in 1979 and a Ph.D. in physics in 1984, both from UCLA. He joined the University of Southern California faculty as an associate professor in 1991, becoming full professor in 1997. There he served as associate dean of engineering and vice provost of IT services. Provost Katsouleas is a fellow of both the American Physical Society and the Institute of Electrical and Electronics Engineers (IEEE).



IAN BAUCOM
Dean of the College of Arts and
Sciences, UVA

Ian Baucom came to the University of Virginia after serving 17 years in Duke University's Department of English as a professor and as the director of the John Hope Franklin Humanities Institute. Since arriving at UVA in the summer of 2014, Dean

Baucom has led a series of initiatives within the College and Graduate School of Arts & Sciences. He is overseeing an ambitious hiring campaign that, in the midst of a generational turnover of esteemed faculty, aims to bring upwards of 200 new tenured and tenure-track faculty to the College. Baucom is emphasizing the importance of recruiting at the highest level of excellence and enhancing the faculty's diversity to build on the College's historical strengths and to ensure its future for generations of students to come. Baucom is also guiding the College's efforts to revise its undergraduate curriculum for the first time in four decades, starting with the new curriculum pilot that will launch in the 2017-18 academic year. In addition, he is working with the College's leadership team to develop creative initiatives in global, digital and cross-disciplinary studies.



STEPHEN MULL
Vice Provost for Global Affairs, UVA

Ambassador Stephen D. Mull is Vice Provost for Global Affairs at the University of Virginia. In this role he is the primary lead on global relations at the University, responsible for developing a strategic vision, designing outreach, and overseeing international activities. Steve will

oversee institutional development of global partnerships and develop a wide array of services, programs, experiences, and strategic partnerships that promote global imagination within the university community. Mull has served in a broad range of U.S. national security positions, most recently as Acting Under Secretary for Political Affairs at the U.S. Department of State, working as the day-to-day manager of overall regional and bilateral policy issues, and overseeing the bureaus for Africa, East Asia and the Pacific, Europe and Eurasia, the Near East, South and Central Asia, the Western Hemisphere, and International Organizations.



ILA BERMAN
Dean, School of Architecture, UVA

Berman received a bachelor of architecture with high distinction in 1983 from Carleton University in Ottawa, Canada, where she graduated top in her class and received the Lieutenant Governor of Ontario Medal for Design. She went on to earn a Master of Design

Studies degree in 1991, followed by her Doctor of Design in 1993 in architectural history, theory and criticism, both from Harvard University's Graduate School of Design. Berman is an architect and theorist whose research explores the relationships between contemporary culture and the manifold material and spatial practices in architecture, urbanism and landscape. In addition to her teaching and administrative duties at Tulane, Berman founded and directed the URBANbuild program, a multi-scaled two-year program facilitated by a HUD grant to support the urban rehabilitation and revitalization of New Orleans in the aftermath of Hurricane Katrina. She was also involved in multiple university-community partnerships that included her appointments on the Cityworks Board of the American Institute of Architects and the Mayor's Bring New Orleans Back Commission.



RUSSELL KATZ
Architect, Developer, Managing
Director of MOMIDC

Architect and developer Russell Katz is the Managing Director of MOMIDC, a real estate firm focused on the design, development, ownership and management of environmentally conscious properties in the Washington, DC region. Russell is

driven by the belief that environmentally sustainable, beautifully designed projects can be financially successful. He guides MOMIDC's selective project choices and oversees the operation of the firm's portfolio, which currently includes 350,000 square feet of multifamily residential, retail and office space, as well as 185 acres of conserved woodlands.



DEBJANI GANGULY
Director, Institute of Humanities and
Global Cultures
Professor of English, UVA

Debjani Ganguly is Professor of English and the Director of the Institute of the Humanities and Global Cultures (IHGC) at the University of Virginia. She works in the fields of world literature, post

colonial studies and South Asian Studies. Her research interests include the contemporary Anglo-phone novel, literary forms in the new media age, literature and human rights, caste and Dalit studies, language worlds in colonial/post colonial South Asia, and Indian Ocean literary worlds from 1750-1950. In recent years, Debjani has researched the links between globalism, information technology, ethnic violence and humanitarian connectivity through the genre of the novel, the result of which is a book with Duke UP entitled "This Thing Called the World: The Contemporary Novel as Global Form" (2016). She is the author of "Caste, Colonialism and Counter Modernity" (2005) and co-editor of "Edward Said: The Legacy of a Public Intellectual" (2007) and "Rethinking Gandhi & Nonviolent Relationality: Global Perspectives" (2007). She co-edits with Ato Quayson and Neil Ten Kortenaar The Cambridge Journal of Post colonial Literary Inquiry.



JOHN ECHEVERRI-GENT
Associate Professor, Politics, UVA

John Echeverri-Gent's books include The State and the Poor: Public Policy and Political Development in India and the United States (University of California Press, 1993) and Economic Reform in Three Giants: U.S. Foreign Policy and the USSR, China, and India (Transaction, 1990) which he co-edited. His published articles focus on the political economy of development and comparative public policy. He currently completing a manuscript entitled "Politics of Markets: Political Economy of India's Financial Market Development in Comparative Perspective". He serves as treasurer of the American Institute of Indian Studies and as a member of the editorial board of Political Science Quarterly. He has chaired the American Political Science Task Force on "Difference and Inequality in Developing Societies."

University. Before coming to UVA in 1996, Karen was a Research Associate at the University of Copenhagen and the National Environmental Research Institute in Denmark. Since 2004, McGlathery has served as Director of the Virginia Coast Reserve Long Term Ecological Research (VCR LTER) program, based at UVA's Anheuser-Busch Coastal Research Center on Virginia's Eastern Shore. She also is a member of the Science Council and Executive Board of the National LTER Program. The VCR LTER program is one of 25 in the nation funded by the National Science Foundation to study long-term change in marine and terrestrial ecosystems. A specialist on effects of environmental change, including climate, sea-level rise, eutrophication and species invasions in coastal marine ecosystems.



KAREN MCGLATHERY
Lead Principal Investigator, Virginia
Coast Reserve LTER
Director, Resilience Institute
Professor, Department of
Environmental Sciences, UVA

Karen McGlathery is a Professor of Environmental Sciences. She received her B.S. from Connecticut College and her Ph.D. from Cornell

University. Before coming to UVA in 1996, Karen was a Research Associate at the University of Copenhagen and the National Environmental Research Institute in Denmark. Since 2004, McGlathery has served as Director of the Virginia Coast Reserve Long Term Ecological Research (VCR LTER) program, based at UVA's Anheuser-Busch Coastal Research Center on Virginia's Eastern Shore. She also is a member of the Science Council and Executive Board of the National LTER Program. The VCR LTER program is one of 25 in the nation funded by the National Science Foundation to study long-term change in marine and terrestrial ecosystems. A specialist on effects of environmental change, including climate, sea-level rise, eutrophication and species invasions in coastal marine ecosystems.

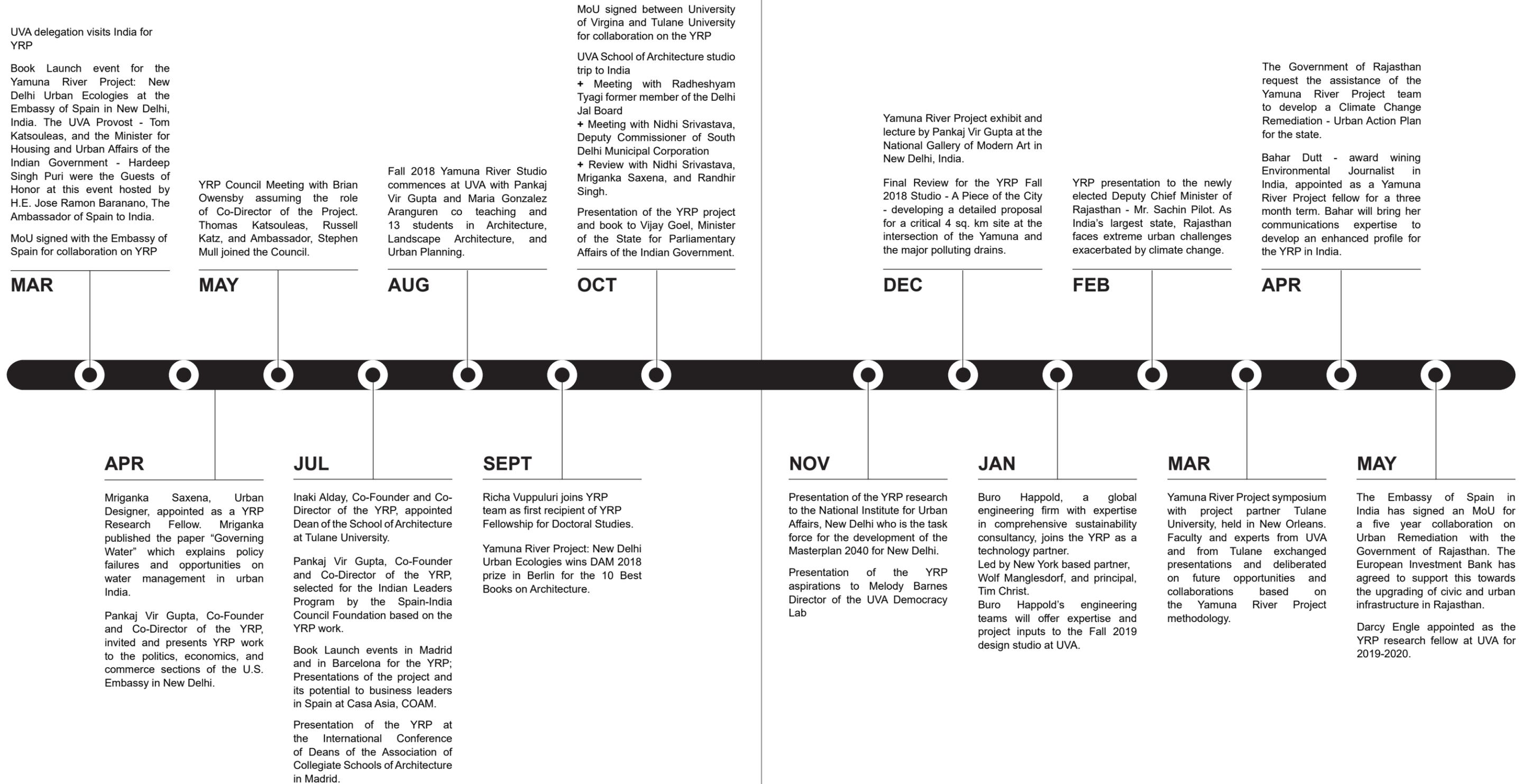
“The Yamuna River Project is an outstanding example of the potential, and one might even say the obligation, of public universities in this increasingly global age. By promoting cooperation across disciplines and borders, our students and scholars in the Project are proving themselves to be extraordinary knowledge partners for both policymakers in India and the broader community around the world in common efforts to clean up the world’s water supply. ”

- Ambassador Stephen Mull

*Vice Provost for Global Affairs
University of Virginia*

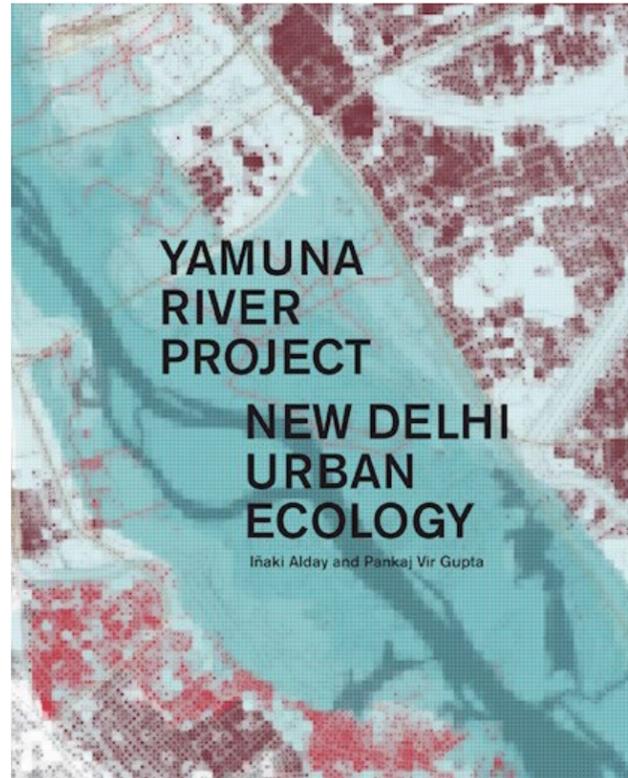


2018 - 2019 CALENDAR OF EVENTS



BOOK LAUNCH

The book launch for the publication, Yamuna River Project: New Delhi Urban Ecology, by UVA School of Architecture faculty Iñaki Alday and Pankaj Vir Gupta, published by Actar (Barcelona and New York), was held on April 27th, 2019. The publication presents the result of more than five consecutive years of focused research initiatives and designs from The University of Virginia School of Architecture and other university collaborators towards the revitalization of New Delhi's water bodies. In collaboration with the Delhi Jal Board, The Yamuna River Project is an interdisciplinary research program, proposing to revitalize the ecology of the Yamuna River in New Delhi, and creating vital urban links with the Yamuna river, as it flows through India's capital city. The event was hosted by His Excellency José Ramón Barañano, Ambassador of Spain to India, and Tom Katsouleas, Provost at UVA at the Embassy of Spain in New Delhi. The Chief guest was Hardeep Singh Puri, the Minister of State for Housing and Urban Affairs, Government of India. The launch was a huge success, with major media outlets like India Today, Business Standard, and Outlook India reporting on the event.



From left to right: Pankaj Vir Gupta, YRP Director, His Excellency José Ramón Barañano, Ambassador of Spain to India, Tom Katsouleas, Provost at University of Virginia, Hardeep Singh Puri, Minister of State for Housing and Urban Affairs, Govt. of India, Iñaki Alday, YRP Director



Hardeep Singh Puri, Minister of State for Housing and Urban Affairs, Govt. of India, speaking at YRP book launch in New Delhi



His Excellency José Ramón Barañano, Ambassador of Spain to India speaking at YRP book launch in New Delhi

BOOK RECOGNITION

The Frankfurt Book Fair and Deutsches Architekturmuseum, otherwise known as DAM, have awarded the International DAM Architectural Book Award for the tenth time in 2018. This highly respected prize is one-of-a-kind in honoring the best architectural books every year.

Ninety-six architectural and art book publishers from all over the world accepted the joint invitation to participate. A jury made up of external experts and representatives of DAM met to select the year's ten best architectural books from 238 entries. They based their decision on criteria such as design, content, quality of material and finishing, innovation, and topicality.

This year the external jury was comprised of Bernd

Kuchenbeiser, a designer; Vladka Kupska, from the Book Fair Frankfurt; Dr. Annette Ludwig, Director of Gutenbergmuseum / Mainz; Martin Seelinger, architect and treasurer of the Society of Friends of DAM; Jan Wenzel of Spector Books; and Stefanie Zoche, photographer.

The internal jurors were Andrea Jürges, Deputy Director of DAM; Dr. Annette Becker, curator DAM; Christina Budde, education curator DAM; and Oliver Elser, curator DAM.

UVA Provost, Thomas Katsouleas, described the project as the single largest, multi-disciplinary study at the University of Virginia.



“This book, with its in-depth analysis and excellent graphics, drawings and charts, is both a highly site-specific examination and a very useful and readable guide on how to approach similar challenges in other mega cities.”

- DAM Jury

Roca Gallery

Roca Gallery, a collective based in London writing on architecture, urbanism, and sustainable design included the YRP book on its list of inspirations in 2018.

<http://www.rocagallery.com/the-yamuna-river-project>

COLLECTIVE BLOG

Collective Blog is an art, architecture, and design group based in Spain which featured the Yamuna River Project book and book launch event in an article in 2018.

<http://www.collectiveblog.net/yamuna-river-project-arquitectura-medio-ambiente/>

thethirdpole.net

UNDERSTANDING ASIA'S WATER CRISIS

The Third Pole is a multilingual platform dedicated to promoting information and discussion about the Himalayan watershed. The group discussed the YRP book launch, and project through a feature article.

<https://www.thethirdpole.net/en/2018/05/17/will-the-new-yamuna-river-project-clean-up-the-river/>

DAM DEUTSCHES ARCHITEKTURMUSEUM

As mentioned on the previous page, the YRP book was honored by being selected as one of the 10 winners of DAM Architectural Book Award out of 238 submissions. This award was announced at the Frankfurt book fair.

<https://www.domusweb.it/en/news/gallery/2018/10/10/the-best-architecture-books-of-2018.html>

World Architecture Community

The YRP book was honored through being included in a selection of notable architecture books by the editors of World Architecture Community, an global platform for architectural competition.

<https://worldarchitecture.org/architecture-books/?section=book-details&id=142571>

METALOCUS

Metalocus is a platform focusing on art, architecture, and science, based in Spain which featured both the Yamuna River Project and the YRP book in an article in mid 2018.

<https://www.metalocus.es/en/news/presentation-yamuna-river-project-inaki-alday-and-pankaj-vir-gupta>

DownToEarth

The Third Pole article was republished on DownToEarth, an online magazine focusing on global issues from economics and health to wildlife and science.

<https://www.downtoearth.org.in/news/water/will-the-new-yamuna-river-project-clean-up-the-river-60578>

PUBLIC IMPACT

The Yamuna River Project has been committed to communicating our research and engaging the public realm in a transparent manner. During the 2018-2019 year, this effort resulted in several discussions, exhibits, and public events in India, Spain, and the US.

The research has received substantial media coverage, and the Yamuna River Project book was published in 2018. The YRP is working with research fellow Bahar Dutt to develop a robust communications strategy for the project in India to raise awareness about the project and connect the project with key organizations working on similar ecological issues in the South Asia region.

MEDIA COVERAGE

NPR
The Wall Street Journal
Virginia's Public Radio
The Millenium Post
Press Trust of India
India Today Education
The Asian Age
Hindustan Times
Hindustan Times Online
ABC Sociedad
The Hindu Business Line
Business India
UVA Today
The Times of India
The Indian Express
Business Standard
Governance Now
The Pioneer
Archdaily
The Economic Times
Metalocus
The Guardian
Flussbad Berlin



<https://www.npr.org/2016/05/11/477415686/can-indias-sacred-but-dead-yamuna-river-be-saved>



<https://www.archdaily.com/880683/next-cities-institute-designing-global-urban-futures>



Delhi | Mumbai | Kolkata | London

<https://www.asianage.com/metros/delhi/290317/djb-ties-up-with-us-varsity-for-yamuna-project.html>



<https://news.virginia.edu/illimitable/greater-good/river-runs-through-it>



<https://economictimes.indiatimes.com/blogs/et-commentary/learning-from-the-pools-deep-end/>



<https://www.business-standard.com/article/pti-stories/dda-working-on-comprehensive-plan-for-yamuna-rejuvenation-pu->



<https://www.lavanguardia.com/vida/20180623/45347427123/dos-arquitectos-plantean-recuperar-el-rio-indio-yamuna-para-aca->



https://www.abc.es/sociedad/abci-salvacion-para-yamuna-201809090133_noticia.html

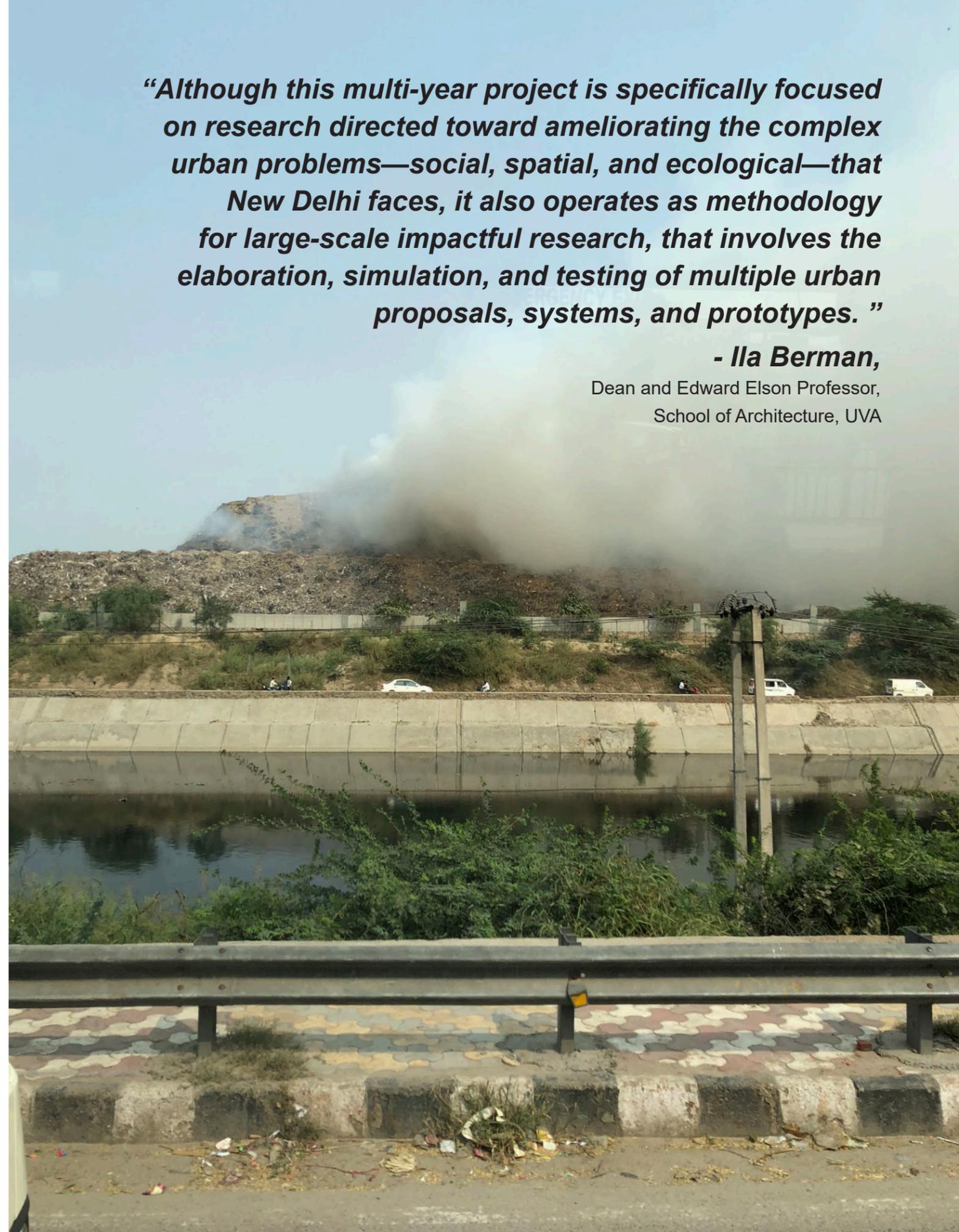


<https://www.theguardian.com/world/2017/jul/07/indian-yamuna-river-living-entity-ganges>

“Although this multi-year project is specifically focused on research directed toward ameliorating the complex urban problems—social, spatial, and ecological—that New Delhi faces, it also operates as methodology for large-scale impactful research, that involves the elaboration, simulation, and testing of multiple urban proposals, systems, and prototypes.”

- Ila Berman,

Dean and Edward Elson Professor,
School of Architecture, UVA



EVENTS

ART ADDA, NATIONAL GALLERY OF MODERN ART NEW DELHI, 11.30.18

The National Gallery of Modern Art (NGMA), New Delhi, and Ministry of Culture, Government of India in collaboration with the Embassy of Spain in New Delhi hosted the artistic project “PhY” on the Art Adda platform, with the presence of His Excellency José Ramón Barañano, Ambassador of Spain to India and Ritu Sharma, Director of National Gallery of Modern Art. ‘Art Adda’ is a cultural platform for art lovers, artists, art connoisseurs, students, and teachers to meet, discuss, share ideas, and knowledge as well as interact on various aspects and elements of arts in our society. The event reflects on the need to act urgently and decisively, seeking the active engagement of both local and international actors in the effort to rejuvenate our water sources.



YRP Director, Pankaj Vir Gupta, and Ritu Sharma, Director of National Gallery of Modern Art

ARCHITECTURAL FOUNDATION COAM / COAC MADRID and BARCELONA, 06.16.18 - 06.20.18

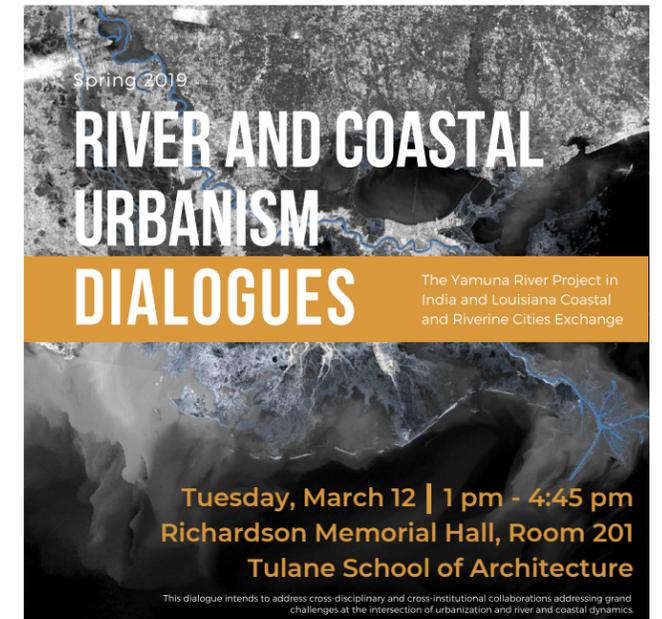
The Spain-India Council Foundation and Casa Asia Madrid hosted the Ambassador of Spain in India, His Excellency, José Ramón Barañano, and the co-directors of the YRP, Iñaki Alday and Pankaj Vir Gupta. There they presented the Yamuna River Project to selected Spanish public institutions and companies. The event first took place in Barcelona at College of Architects of Catalonia (COAC) on the 16th of June and later reoccurred in Madrid on the 20th of June. Here they explained the severity of issues surrounding India's capital city. For instance, in 2028 there will be no water for the city which is deemed to reach 30 million people by that date. Further, was a discussion on the Yamuna River Project's holistic and comprehensive solutions for sustainable urban development, environment, housing, and public spaces, which has the potential to impact the lives of more than 20 million people.



YRP Directors, Iñaki Alday and Pankaj Vir Gupta, with His Excellency José Ramón Barañano, Ambassador of Spain to India presenting YRP to institutions and companies in Madrid

RIVER AND COASTAL URBANISM DIALOGUES NEW ORLEANS, 03.12.19

In March of 2018 the YRP participated in the River and Coastal Urbanism Dialogs at the School of Architecture at Tulane University. For the last six years the YRP, at UVA, has been pioneering an innovative urban research project, examining one of the most pressing urban crises in the world: the city of New Delhi and it's urban and riparian ecologies. Based on a recently signed MoU between Tulane and UVA, the YRP is now in the process of redefining it's methods to understand how it may be applied in other urban situations. The dialogs discussed interventions in response to issues surrounding water, riverine, and coastal territories. The discussions informed new methods of inquiry in different disciplines, creating potential opportunities for important cross-disciplinary and cross-institutional collaborations.



YRP Director, Iñaki Alday speaking at the River and Coastal Urbanism Dialogues at Tulane University, School of Architecture



RESEARCHERS



MICHAEL ALLEN
Assistant Professor, Department of Religious Studies



ERIC FIELD
Director of Information Technology, School of Architecture



PETER DEBAERE
Associate Professor, Darden School of Business



DANIEL EHNBOM
Associate Professor, Department of Art History



GUOPING HUANG
Assistant Professor, Department of Urban and Environmental Planning



WU-SENG LUNG
Professor Emeritus, Department of Civil and Environmental Engineering



ANDREW MONDSCHN
Assistant Professor, Department of Urban and Environmental Planning



BALA MULLOTH
Assistant Professor, Batten School of Leadership and Public Policy



SPENCER PHILLIPS
Lecturer, Environmental Economics



SHANKAR NAIR
Assistant Professor, Department of Religious Studies



MATT REIDENBACH
Associate Professor, Department of Environmental Sciences



MRIGANKA SAXENA
Yamuna River Project Fellow, 2018



VICTORIA SHEN
Assistant Professor, Woodrow Wilson Department of Politics



BAHAR DUTT
Yamuna River Project Fellow, 2019



RICHA VUPPULURI
Yamuna River Project Fellow for Doctoral Studies

STUDENT RESEARCHERS

ABEER SAHA
Ph.D., History

DARCY ENGLE
M.Arch., Yamuna River Project Fellow

KATHERINE RUSH
M.Arch., Yamuna River Project Fellow

HANA THURMAN
B.A. of Environmental Science
YRP Research Assistant

PRIYANKA PARACHOOR
M.L.Arch., YRP Research Assistant

RESEARCH PROJECTS

ANDREW MONDSCHIEIN
SCHOOL OF ARCHITECTURE
DEPARTMENT OF URBAN & ENVIRONMENTAL PLANNING

DELHI COGNITIVE MAPPING



In the cities of the developing world, the same path or neighborhood may represent walkable access to opportunities, a forced march through toxic air, or both, depending on individual and community context. Thus, while transportation researchers attribute significant benefits to walking, the same facets of cities that increase walking rates, such as high densities and convenient access to destinations, have also been found to exact a toll in terms of safety, exposure to emissions and noise, and mental well-being. In Delhi, India – with neighborhoods along the Yamuna River as our focus –

We investigate how daily travel and environmental hazards such as air emissions, water quality, and noise, intersect to shape individual well-being across the region's neighborhoods.

We use an online cognitive mapping survey tool to collect, map, and analyze the effects of mobility, the environment, and well-being, as they are distributed socio-spatially across the city. The survey and cognitive mapping tool allows respondents to associate experiences and perceptions with places on a digital map. Preliminary results from a pilot comparing the US and India show a significant relationship between daily travel, perceived environmental quality, and wellbeing. The results from Delhi will help identify important points for intervention in the urban environment, providing information on how and who within a community will benefit from urban transportation and design initiatives.

ABEER SAHA
COLLEGE OF ARTS AND SCIENCES
CORCORAN DEPARTMENT OF HISTORY

HISTORICAL ANALYSIS OF YAMUNA DEVELOPMENT



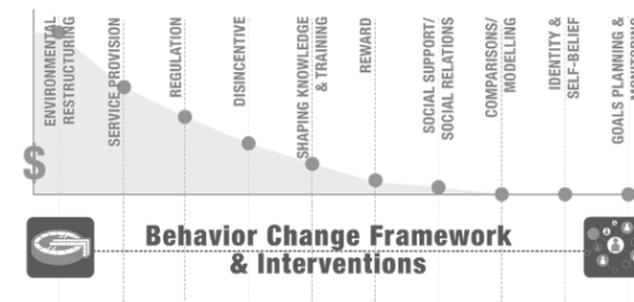
In the 1950s, the river Yamuna in Delhi was still a place to go swimming on a regular basis. Even as late as the 1970s, many residents of India's capital would bring picnics and spend the day on the banks of the river. In recent times, however, as Sarandha Jain exhorts: "the [Yamuna] water that leaves Delhi is not even fit for animal[s]." Seemingly abandoned by the millions who worship its divinity, estranged from those who depend on its waters, Delhi's Yamuna has become one of the most toxic rivers on earth. But how did it get to be this way and why was nothing done to save it from this fate?

This research will consider the urban developments that took place in Delhi, along the Yamuna, and the legislation of India's Water Prevention and Control of Pollution Act in the post-colonial period.

By studying Delhi's historical newspapers for developments on the Yamuna, this project will be sensitive to the social and cultural valence that the Yamuna has taken on in public discourse since India's independence from British Raj. This paper will demonstrate that the current state of the Yamuna is not simply the result of inefficient bureaucracies and overloaded water treatment facilities, but is tied up with the priorities and narratives of capitalist development. Therefore, no technical fix alone will be sufficient to revive the Yamuna to its previous vitality. What will emerge, through this study, is a synthetic narrative of Yamuna's place in Delhi over the past sixty years; exploring the ways in which the Yamuna is both seen and unseen in the lives of the millions that live by it.

RICHA VUPPULURI
SCHOOL OF ARCHITECTURE
PHD CONSTRUCTED ENVIRONMENT & BEHAVIORAL SCIENCE

BEHAVIORAL FRAMEWORK IN URBAN INFRASTRUCTURE



In the case of New Delhi, local governance systems are responsible for infrastructure delivery, yet the political processes for creating such infrastructure are often unidirectional. Grassroots efforts to mediate the urban-planning process and cultivate collective agency thus often fail. The premise of the research is that urban visions to revive the river fail because there is a lack of integrated effort towards transforming socio-cultural and professional behaviors.

This research intends to integrate socio-behavioral approaches in urban infrastructure planning practices, specifically focusing on the issue of urban water management in rapidly developing cities.

The study asks two questions: (1) can behavior shifts in decision-making processes at the local level bridge the implementation gap between visions and outcomes for urban infrastructures? (2) What interventions drive action at the individual, community, and stakeholder levels? The research proposes a behavioral framework, outlining interventions in response to the condition of the Yamuna, ranging from restructuring the physical environment to building social capital. An initial scoping analysis of the current and ongoing efforts over the past twenty-five years shows a lopsided emphasis on restructuring the physical environment through large capital engineered solutions. However, there is a dearth of efforts that reward positive outcomes, create social agency and reinforce social support within communities and stakeholders. The behavioral framework will be used as a working model to engage expert and local feedback, diving deep into the decision-making processes and identifying change agents in balancing the urban ecosystem.

SHANKAR NAIR
COLLEGE OF ARTS AND SCIENCES
DEPARTMENT OF RELIGIOUS STUDIES

RELIGIOUS REPRESENTATION OF THE ENVIRONMENT



This project aims to utilize the Yamuna River Project grant for two separate enterprises, both related, in different ways, to the Yamuna River and issues of broader environmental concern in South Asia. The first is an article-length study of four versions of the famous Hindu tale, the Rāmāyaṇa. Three of these Rāmāyaṇas were composed by Hindus, and one was authored by a Muslim poet, spanning four different South Asian languages. I compare and contrast these four versions of the Rāmāyaṇa, examining the varying ways that the four poets aestheticize the natural landscape (rivers, forests, clouds, etc.) in pursuit of different moral ends.

The aim is to better grasp historical modes of South Asian moral reflection upon the environment in order to better communicate present-day environmental crises to contemporary South Asians.

The second project is the formulation of a new undergraduate seminar, "Islam, Science, and the Environment." This course will survey the history of the natural sciences within Islamic civilization, with a particular emphasis upon environment-related discourses. The Yamuna River will serve as a recurring case study throughout the seminar. The course is on schedule to be taught for the first time in Spring 2020, and then again in Spring 2021.

MATT REIDENBACH & HANA THURMAN
COLLEGE OF ARTS AND SCIENCES
DEPARTMENT OF ENVIRONMENTAL SCIENCES

STORMWATER MANAGEMENT MODELING



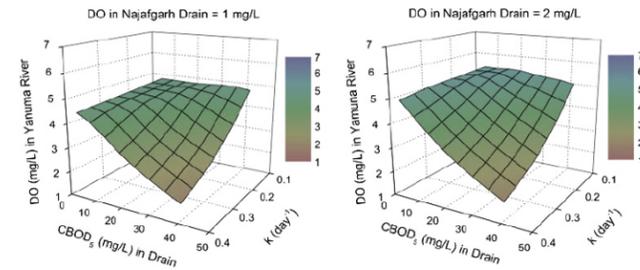
Delhi's rapidly-growing population has led to a depletion of water quality and quantity in the Yamuna River and associated groundwater system, making it important to understand the city's hydrology. We are using EPA's SWMM (Storm Water Management Model) to model the flows of storm water in Delhi. SWMM is a dynamic rainfall-runoff simulation model, and is particularly useful for modeling urban systems. The model routes runoff from Delhi's major sub catchments through the city's extensive drainage system and then through the Yamuna River, and utilizes GIS-based inputs such as elevation and land cover.

This research is being used to determine Delhi's current water resources and to predict how changes in climate, infrastructure, or other factors will alter the city's future hydrological system.

The data gathered through this research project will provide a conclusive report which can be presented to government officials and this information can be further incorporated into student and faculty research projects through the YRP.

WU-SENG, LUNG
SCHOOL OF ENGINEERING AND APPLIED SCIENCE
DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

YAMUNA RIVER WATER QUALITY MODELING



The water quality modeling study began in the fall of 2015. A comprehensive data gathering and analysis effort was completed in October 2015, having identified data gaps for the modeling effort. In the meantime, a preliminary water quality model of a 25-km length of the Yamuna River near Delhi was completed. A trip to Delhi took place in January 2016 to fill the data gap with additional data from the Central Pollution Control Board (CPCB) of the Indian government for model calibration use.

The Najafgarh Drain is the single most significant source of pollutants (i.e. BOD) to the 25-km stretch of the Yamuna, responsible for the water quality deterioration near Delhi. The study has since expanded the model to include the Najafgarh and its supplemental drain, called for in the MoU signed in July 2016 between UVA, and Delhi Water Board.

A comprehensive sampling effort to collect field data in the Drains was conducted in spring 2017, providing additional data to calibrate the model. Figure 1 shows that 90% reduction of the BOD (the main pollutant from domestic wastewater in the Delhi area) would be needed to raise the DO levels to meet the water quality standard of 4 mg/L in the river.

GUOPING HUANG
SCHOOL OF ARCHITECTURE
DEPARTMENT OF URBAN & ENVIRONMENTAL PLANNING

SPATIAL DATA ANALYSIS



The urbanity of Delhi is a complex knot where varied degrees of formal and non-formal infrastructure are intertwining, making it challenging to see and understand how these systems work together.

The current research focuses on how to bring geographical level system thinking and spatial thinking to understanding Delhi's complexity through a series of nested-scale spatial analyses.

Great effort has been made to develop rich spatial data sets for investigations into the urban structure, transportation service, and landscape ecological pattern. Acquired or developed new data sets include 2001 census data, improved multi-modal transportation network, bus stops, drainage map, normalized difference vegetation index data from Landsat, land use map, and more. These new data sets have been constantly added to <https://gis.arch.virginia.edu/Yamuna/> website for visualization and to be further used by students and researchers working on urban India projects across the University and beyond.

VICTORIA SHEN
COLLEGE OF ARTS AND SCIENCES
DEPARTMENT OF POLITICS

AIR QUALITY POLICY REFORM



Recently, Delhi notoriously became the world's most polluted city after going off the charts of the Air Quality Index (50-100), registering at 999. This is a critical factor of urban life to study as air pollution in India is responsible for the deaths of 1.5 million people every year. For perspective, this is the fifth largest killer in India - resulting from chronic respiratory diseases and asthma. Currently, much of this pollution in Delhi comes from motor vehicle emissions, Badarpur Thermal Power Station, crop burning, fires at Bhalswa and other major landfills, and a lack of monitoring and reaction by authorities.

Under the umbrella of the Yamuna River Project, this project, entitled "Air Pollution Governance in Indian Cities," seeks to uncover the incentives that contribute to urban air quality in India and derive policy insights into curbing rampant air pollution.

These derivatives can be presented to officials of Indian cities as opportunities to save their citizens from the pollution which is currently suffocating their citizens. Pictured is an air quality monitor in New Delhi from February 2019.

BALA MULLOTH
BATTEN SCHOOL OF LEADERSHIP AND PUBLIC POLICY
DEPARTMENT OF PUBLIC POLICY

REVITALIZING THE YAMUNA RIVER: SOCIAL ENTREPRENEURSHIP APPROACHES



New Delhi, India's capital city, with a population of almost twenty-two million faces a daunting challenge: It's sacred river, the Yamuna, is one of the most polluted in the world. In fact, within the city limits, the Yamuna is primarily constituted by treated and untreated sewage and other toxic effluents. The water is rendered "dead" with zero oxygen, thus posing serious health hazards to the citizens of New Delhi. Might there be a way to cleanup and revitalize the river plain using social entrepreneurial approaches?

In this project, we propose to study the key ingredients required for creating and nurturing a social entrepreneurship and innovation based ecosystem in the region. The methodology employed is qualitative in nature and draws on evidence based in interpretative interviews as well as direct and indirect observations.

Using case examples of five socially driven ventures in the region, we examine how they impact the local community in a manner that opens up new frontiers for positive social change. In doing so, these social entrepreneurs create value by introducing technology innovations that solve problems while creating new opportunities for organizations and communities involved with the Yamuna river cleanup efforts.

MICHAEL ALLEN
COLLEGE OF ARTS AND SCIENCES
DEPARTMENT OF RELIGIOUS STUDIES

SACRED RIVER, MODERN METROPOLIS: MAPPING RELIGIOUS SITES ALONG THE YAMUNA IN DELHI

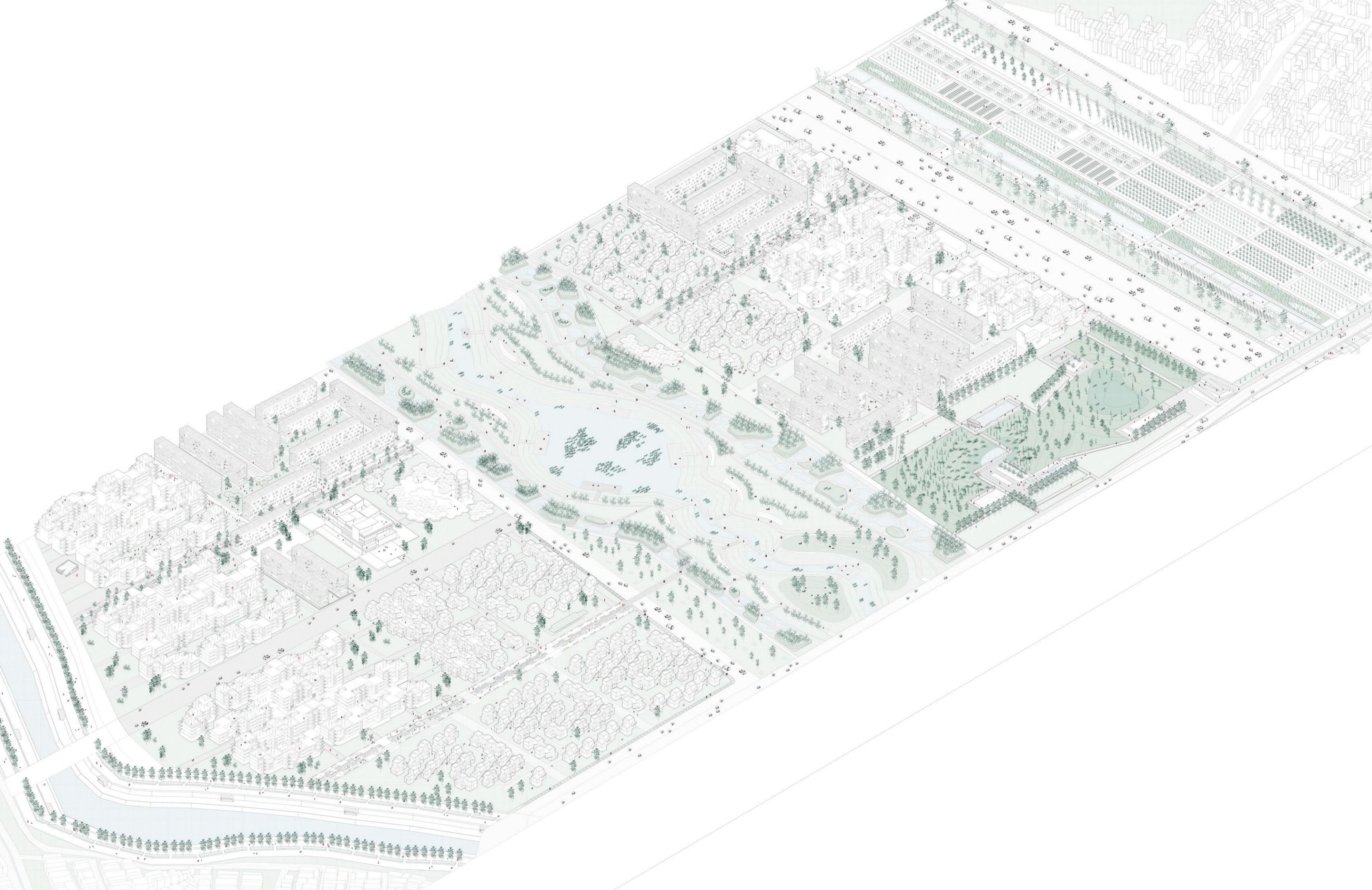


The Yamuna River is the second largest tributary river of the Ganges and the longest tributary in India. The Yamuna, also known as the Goddess River, has a high religious significance within the communities which surround it as it is connected to beliefs surrounding Krishna, a major Hindu deity, and is found in other religious Hindu texts. This significance results in location of several religious sites along the Yamuna River, many of which are undocumented.

The goal of the project is to better document the religious sites and further understand the roles of those who manage and visit these religious sites.

The first phase of the project will involve mapping, photographing, and documenting the diversity of the religious sites. These typologies include but are not limited to temples, mosques, ashrams, and shrines from Hindu, Muslim, Sikh, and Buddhist religions. The second phase of the project will investigate the role of the Yamuna as it interacts with the visitors and caretakers of these religious sites. As the recording of these sites continues the geotagged documentation will be embedded into a map and uploaded to internet to increase the accessibility of these religious spaces.





SCHOOL OF ARCHITECTURE RESEARCH STUDIO



DARCY ENGLE
Master of Architecture, 2019
Urban Design Certificate, 2019
Yamuna River Project Fellow



KATHERINE RUSH
Master of Architecture, 2019
Yamuna River Project Fellow



ANDREW HELMBRECHT
Bachelor of Science in Architecture,
2019



MENNEN MIDDLEBROOKS
Master of Urban and Environmental
Planning, 2019
Master of Public Policy, 2019
Urban Design Certificate, 2019



CHRISTIAN KOCHUBA
Master of Landscape Architecture,
2019



HANGYU SHI
Master of Landscape Architecture,
2019



YASMIN BEN LTAIFA
Bachelor of Science in Architecture,
2019



KIMBERLY CORRAL
Bachelor of Science in Architecture,
2019



CONG NIE
Master of Landscape Architecture,
2018



JING HUANG
Master of Architecture, 2019



YOUSEF ALMANA
Bachelor of Science in Architecture,
2019



KRISTEN VON BAMPUS
Bachelor of Science in Architecture,
2019



JONATHAN CHU
Bachelor of Science in Architecture,
2019



MARIA GONZALEZ ARANGUREN
Lecturer, School of Architecture,
Co-Instructor of Yamuna River
Project Research Studio

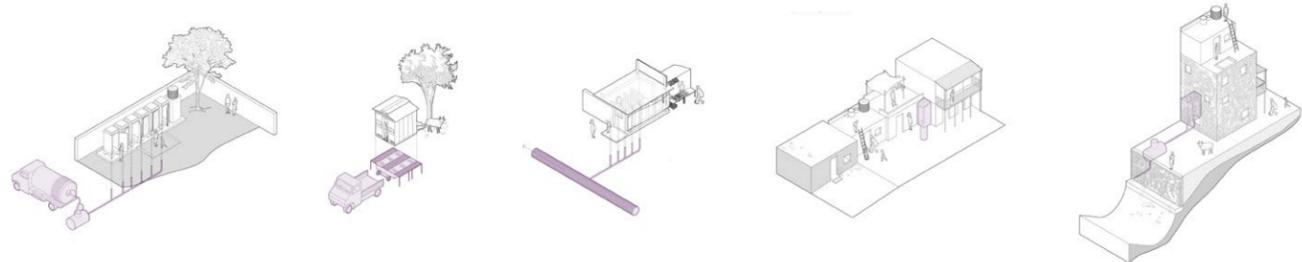


PANKAJ VIR GUPTA
Professor, School of Architecture
Co-Instructor of Yamuna River
Project Research Studio

ARCHITECTURE, LANDSCAPE ARCHITECTURE AND URBANISM PROJECTS

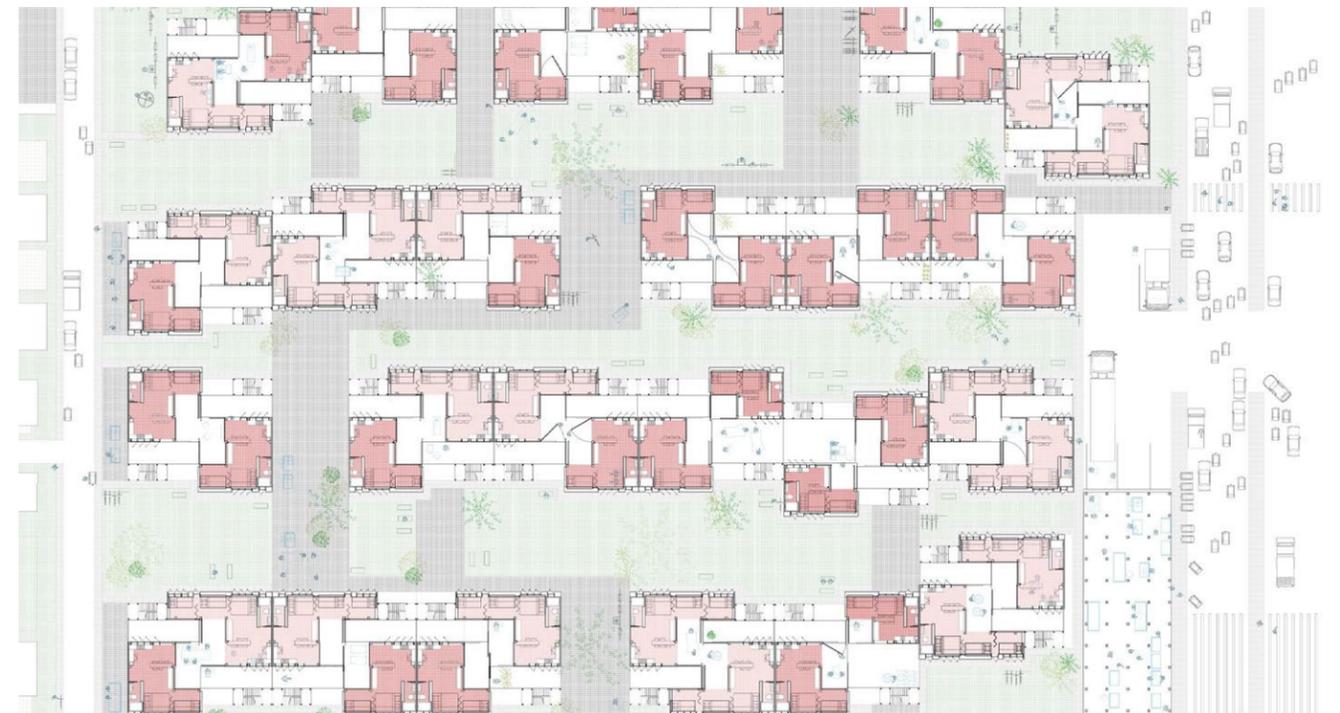
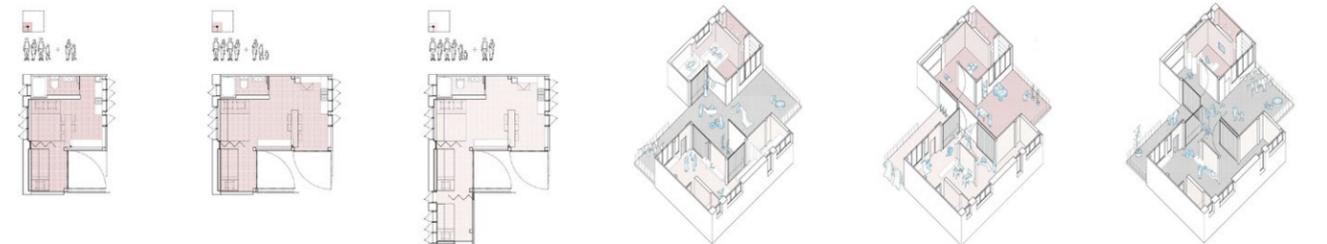
BATHROOM INFRASTRUCTURE DARCY ENGLE

One of the primary contaminants of the Yamuna River in Delhi is fecal matter. This pollution comes to the river as a result of a lack of bathroom infrastructure. In response to this issue, the research conducted throughout the project began by identifying locations where there is the greatest need for bathroom infrastructure. In analyzing these locations, scales and types of bathrooms were designed for these typical urban scenarios. The overarching goal of the designed interventions is to provide new solutions to public bathrooms while bringing them closer to the people who need them most.



MIXED USE SOCIAL HOUSING KATHERINE RUSH

The goal of this project is to propose a new form of high density living: one that emphasizes sharing of spaces between neighbors and flexibility of program throughout the day. Stackable furniture and unfolding beds and partitions allow users to customize their spaces effortlessly. Gradients of privacy are now fully in the control of the resident, and though the units themselves are quite compact, terraces and a flexible, shareable central space provide ample space for a vibrant lifestyle that blends living, working, and socializing. This flexibility allows for commercial activity and living to function symbiotically.



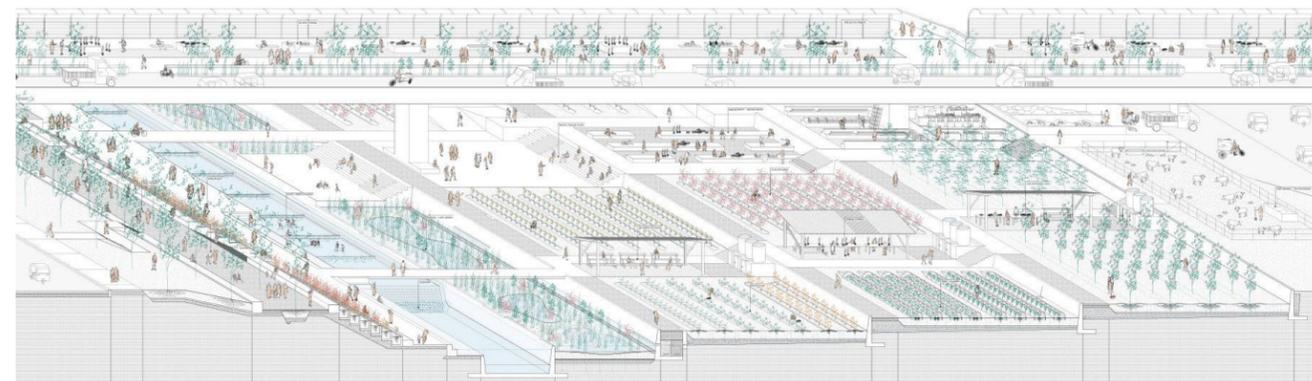
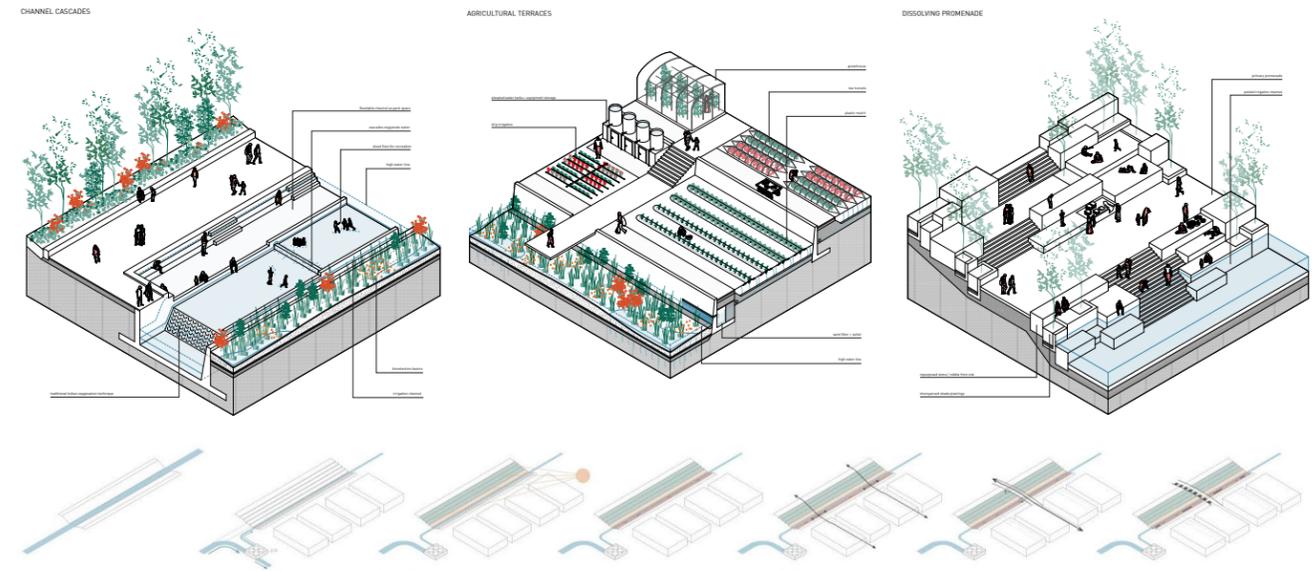
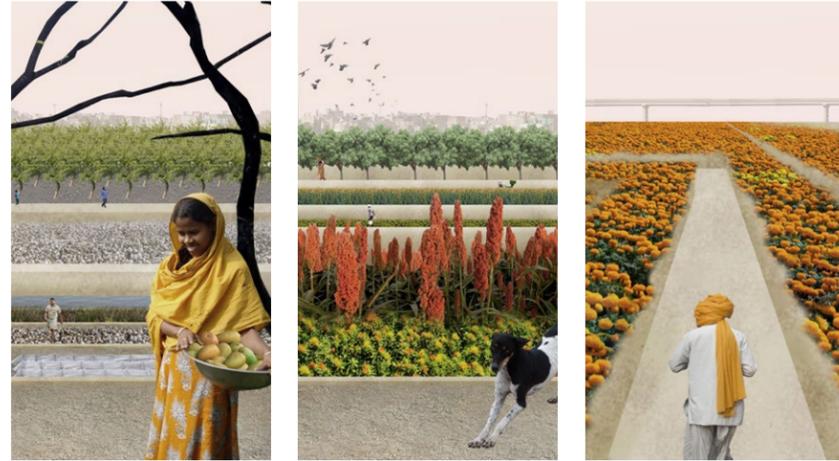
YRP

YAMUNA RIVER PROJECT

AGRICULTURAL GHATS

CHRISTIAN KOCHUBA

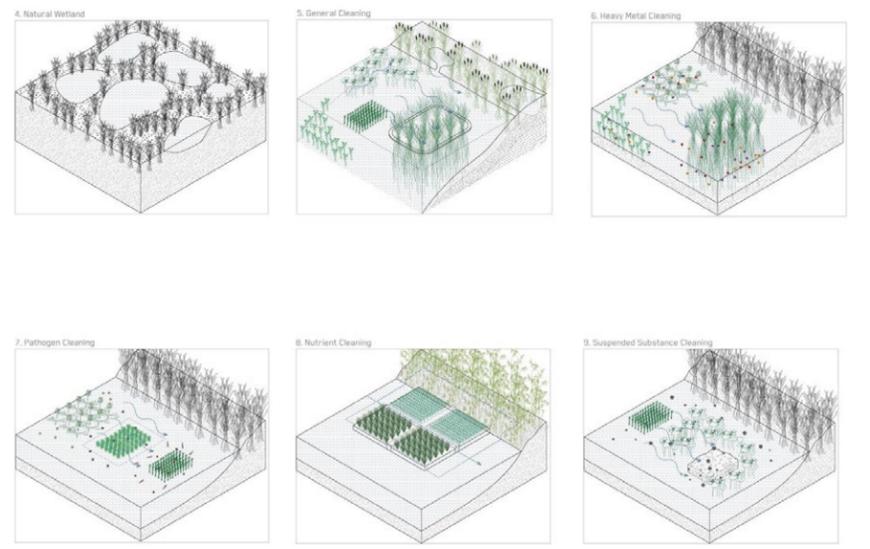
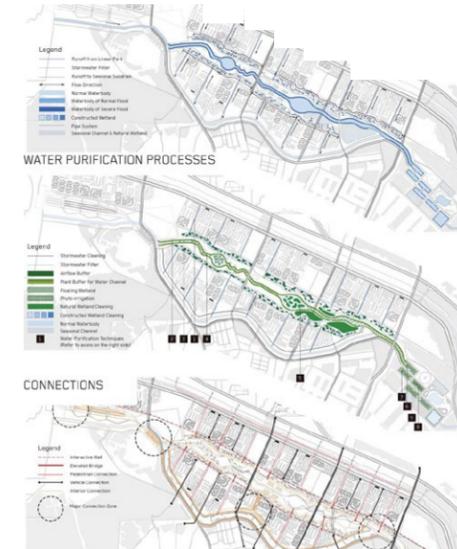
The project imagines a Delhi which has a powerful and sustainable relationship with its food, its soil, and its river. A entire community which prospers as farmers increase healthy yields through agricultural best practices, and residents interact daily with their local productive ecologies. Conceptually partnering with a variety of Delhi's governmental departments, universities, and NGOs which seek to provide education and resources to Indian farmers, this is a proposal for a new type of productive park. Re-imagining an emptied drain corridor, the space is a place for clean organic agriculture to be displayed.



WATER REMEDIATION PARK

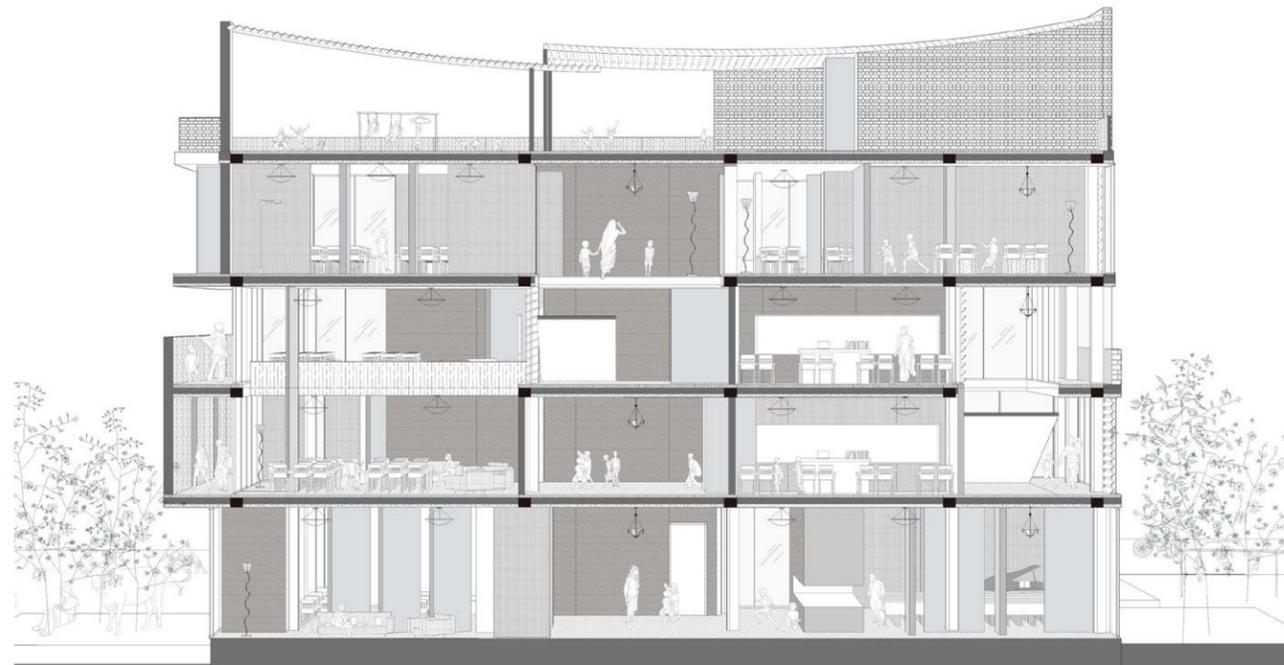
CONG NIE & HANGYU SHI

This project proposes an urban-scale park based on the existing wetlands and valley-like topography. The park is continuously supplied by treated sewage water from the new STP with the capacity of 700 MGD water while collecting and treating stormwater runoff as well as regulating monsoon floods. Concentrated cleaning processes utilizing abandoned oxidation ponds will guarantee overall water quality before it feeds the Yamuna River. The Park is also considered as a mediator that connects Yamuna River with the city and brings livable public space to surrounding communities with multi-functional use.



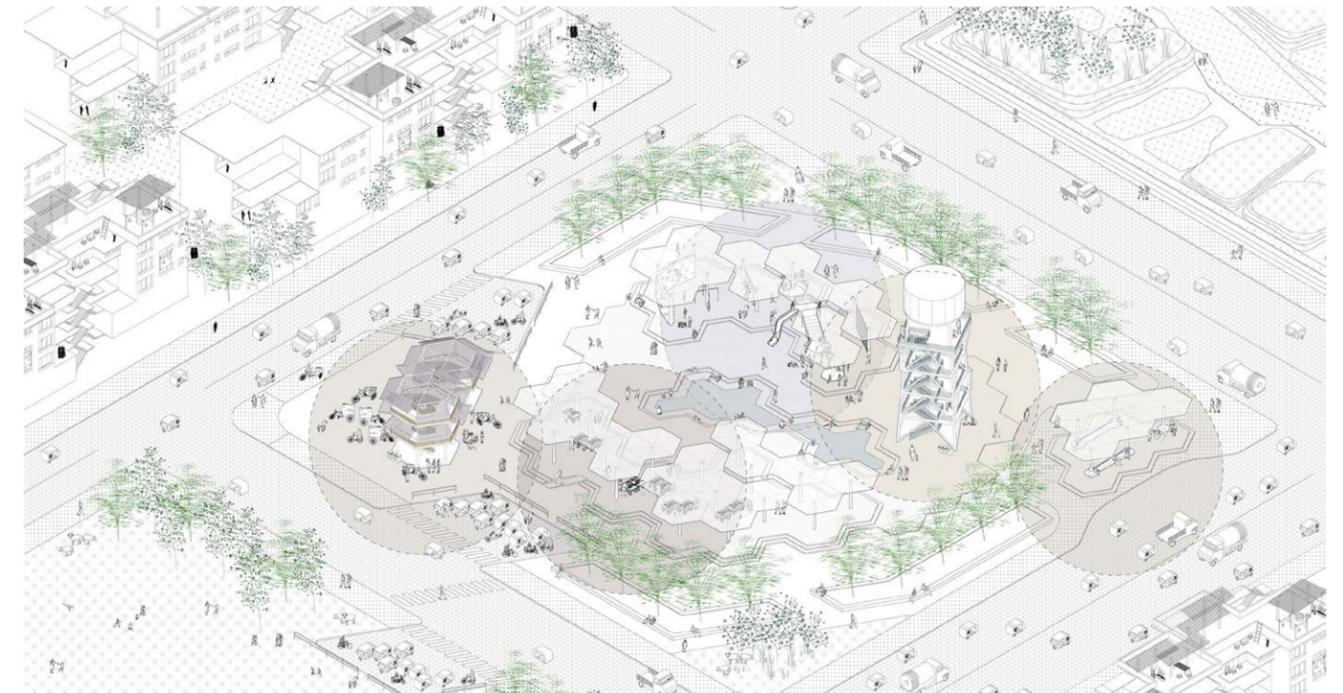
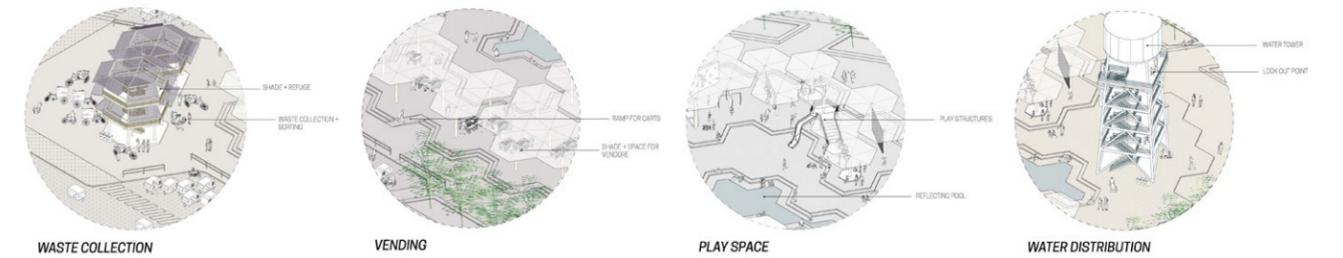
SCHOOL & PUBLIC LIBRARY JING HUANG

In Delhi, access to public libraries and quality education can be difficult to attain. This project aims to serve children during the school day, and adults in off hours. The school doubles as a public library, and features ample public space that can be used for informal gathering, additional educational workshops, classes, and socializing. Together with a system of cultural pavilions strategically located along the river, the aim is to invite people to gather, learn, play, and interact with the river in a more direct, educational way.



HYBRID PUBLIC SPACE KRISTEN VON BAMPUS

Currently in New Delhi, public space is something which is not planned or designed into the urban fabric. Therefore, locations where the public gather are often also considered something else; a curb on a street, a vacant lot, a site waiting for development. This project is a proposition to offer the characteristic of open space, but design features which could be used by its surrounding community. These elements include; a small shop, shade from the sun, seating, play areas, and a place for water distribution. Each of these elements can be added or subtracted to increase or decrease the footprint of the public space.



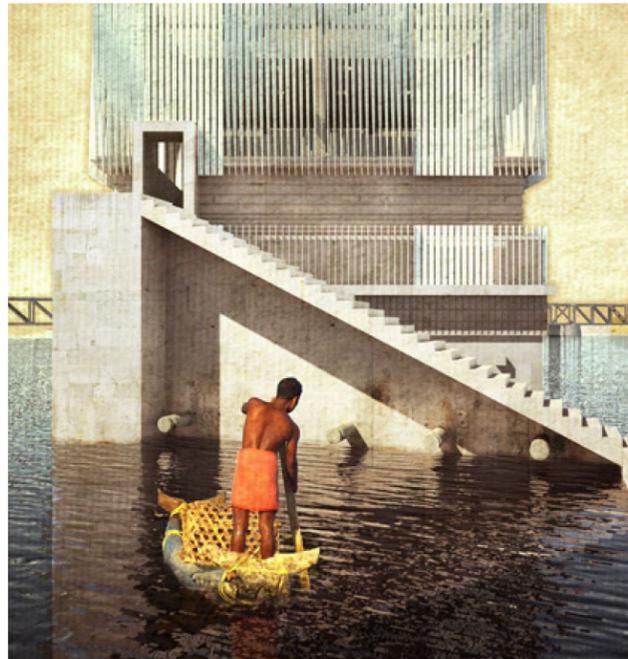
STUDENT PROJECT AWARDS

HONOR AWARD AND FEATURED PROJECT
JOSEPH BROOKOVER JR., M. ARCH 2016

RE-CENTERING DELHI: CULTURAL TRANSECT FOR INDEPENDENT INDIA

In 2016, Joe received the Honor Award from the American Institute of Architects, Virginia Chapter for the Unbuilt Awards for his project with the Yamuna River Project studio "Re-Centering Delhi: Cultural Transect for Independent India". His project looks to give new identities, memories, and relationships to central New Delhi through the re-examination of the 1920's masterplan.

In addition to the Honor Award, Joe's project was featured on KooZ/Arch: A Visionary Platform for Architecture running out of Architectural Association in the UK. This platform features student work with strong conceptual bases and which is represented in a unique and interesting way.



HONOR AWARD
VIDA SHEN., M.L. ARCH 2018

HYBRID INFRASTRUCTURES: SEWAGE TREATMENT AND MARSH REGENERATION

In 2018, Vida received the American Society of Landscape Architects, Virginia Chapter, Honor Award for her project "Hybrid Infrastructures: Sewage Treatment and Marsh Regeneration". This project addresses one of the most critical ecosystems in Delhi which faces serious waste and water quality issues in conjunction with the Coronation Pillar Sewage Treatment Plant which dumps effluents and dirty water into the marsh. Vida's project proposes a hybrid sewage treatment system to feed the drying marsh and supply the drain and Yamuna River with clean water while also reconnecting the city to the marsh. Constructed wetlands are used to restore the decaying marsh, replenish the surrounding water bodies and aquifer, thus providing people with a multi-functional wetland as a new public space.



HONOR AWARD
DARCY ENGLE., M. ARCH 2019

APPROACHING SANITATION: A TYPOLOGICAL RESPONSE TO THE STUDY OF BATHROOM INFRASTRUCTURE IN DELHI, INDIA

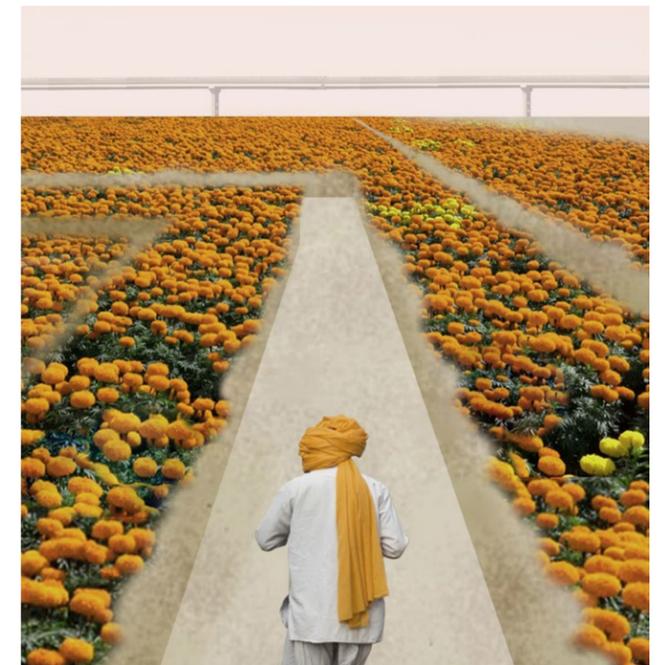
In 2019, Darcy's project was selected by the platform World Architecture Community to receive the Student Architecture Honor Award. Darcy's project began by understanding where pollution to the Yamuna River was coming from, specifically focusing on human waste. The project then identified typical locations where there is the greatest need for bathroom infrastructure. In looking at these locations, scales and types of bathrooms were designed for the unique urban scenarios which appeared in these locations. For instance, some were designed to be affixed to existing rooftops in dense urban villages, whereas others were designed for underused parks and vacant lots. In each case, the bathrooms would fit within the existing infrastructure, bringing them closer to those who need them the most.



STUDENT AWARD
CHRISTIAN KOCHUBA, M.L. ARCH 2019

AGRI-GHATS: NEW DELHI'S EDUCATIONAL AGRICULTURAL SPINE

In 2019, Christian's project was selected as a student award recipient to be honored at the SARANY design awards ceremony on June 18, 2019 where he will receive an excellence, honor, or merit award. His project imagines a Delhi which has a powerful and sustainable relationship with its food, its soil, and its river. A entire community which prospers as farmers increase healthy yields through agricultural best practices, and residents interact daily with their local productive ecologies. Conceptually partnering with a variety of Delhi's governmental departments, universities, and NGOs which seek to provide education and resources to Indian farmers, this is a proposal for a new type of productive park. Re-imagining an emptied drain corridor, the space is a place for clean organic agriculture to be displayed.



YAMUNA RIVER PROJECT ENGAGEMENT

2

ACADEMIC INSTITUTIONS

In 2019, the YRP expanded to Tulane University to broaden and strengthen its reach as a global research project.



6

YEARS OF RESEARCH

The 2018-2019 academic year marked the third year of the Yamuna River Project as a pan-university project after three years of being based at the school of architecture.



6

UVA SCHOOLS ENGAGED

YRP currently engages with six schools at the University of Virginia. These include; the School of Architecture, the Darden School of Business, the Frank Batten School of Leadership and Public Policy, the College of Arts and Sciences, and the McIntire School of Commerce.



10

ACADEMIC DEPARTMENTS

Within the schools, eleven academic departments are engaged. These include Architecture, Landscape Architecture, Urban and Environmental Planning, Religious Studies, History, Environmental Sciences, Politics, Business, Commerce, and Policy.



67

FACULTY ENGAGED

Over the course of the six years, the YRP has engaged 67 faculty across the university through reviews, courses, research projects, research trips, symposia, and more.



14

FUNDED RESEARCHERS

The YRP is currently funding 14 unique research projects being performed by faculty and of the eleven engaged departments and outside researchers from India and the United States.



163

STUDENTS ENGAGED

Over the course of the six years of the Yamuna River Project, 163 students have been engaged through a variety of courses from research studios at the School of Architecture to thesis and capstone projects from students across the University.



8

RESEARCH TRIPS TO INDIA

The Yamuna River Project has facilitated eight research trips to India. The research studio from the School of Architecture has taken a 10 day research trip to India as part of its course for the past five years. Three summer research trips have been facilitated open to students across grounds.



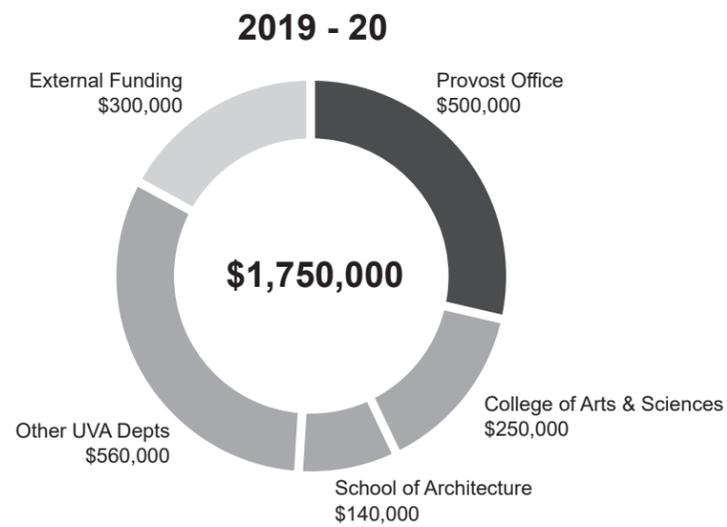
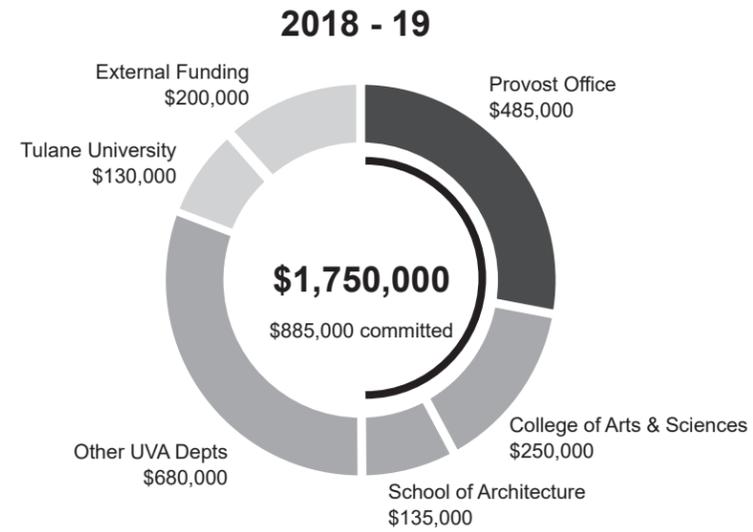
124

STUDENTS TRAVELLED TO INDIA

The research trips have taken 124 students to India. The students are joined or engaged by current YRP researchers before, during, and/or after their trip to India to further enhance and enrich their engagement with the YRP.



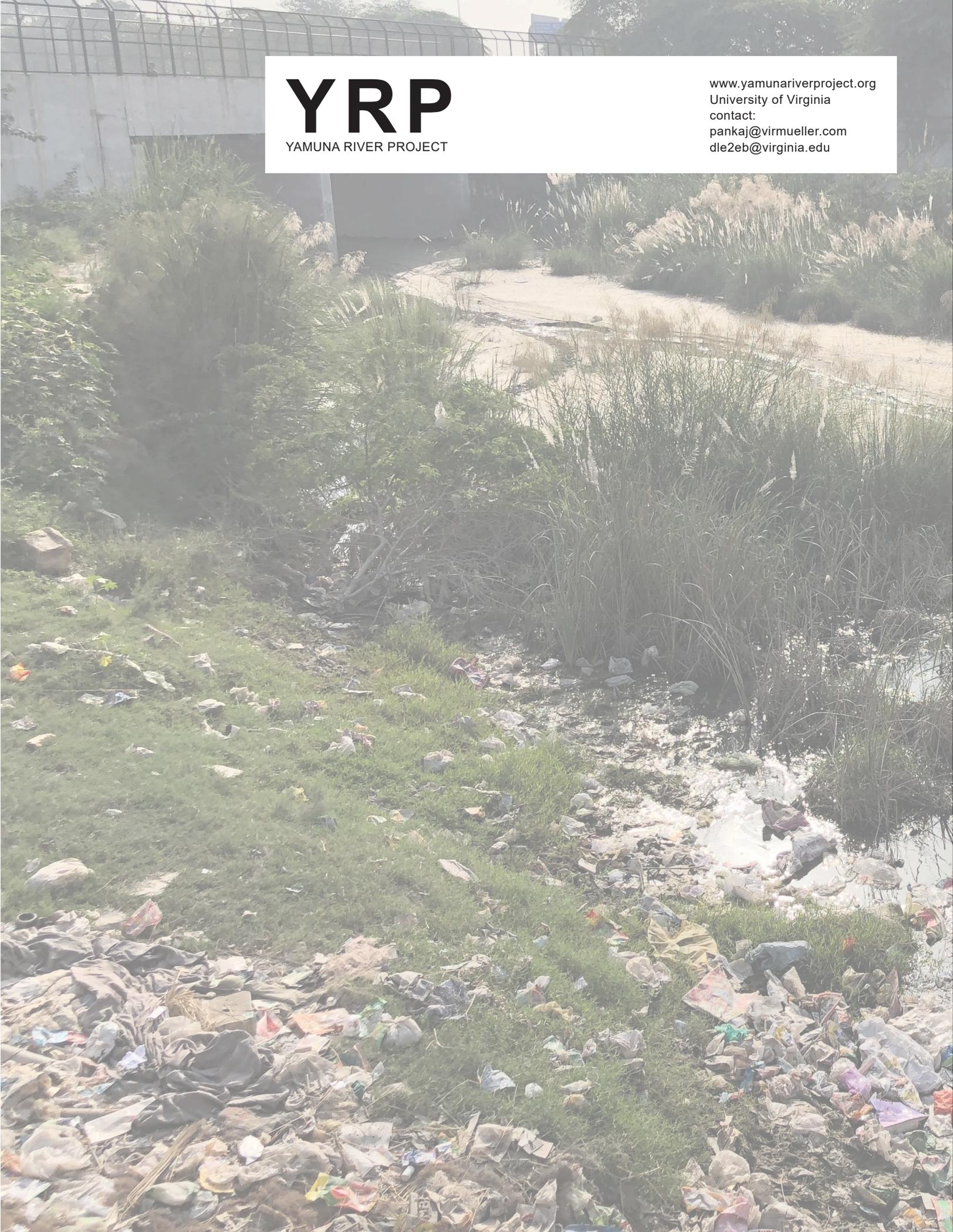
FUNDRAISING AND BUDGET



ACKNOWLEDGEMENTS

The Yamuna River Project would specifically like to thank and recognize the Katz Family Foundation for their continuous annual support towards the architecture research studio for travel and related expenses.



The background image shows a riverbank with a concrete bridge structure in the upper left. The foreground and middle ground are dominated by a large, messy pile of trash, including plastic bags, crumpled paper, and other debris, scattered across a grassy area. In the background, there are tall grasses and a body of water, possibly a river or stream, with a sandy or light-colored bank. The overall scene suggests environmental pollution and the need for a cleanup project.

YRP

YAMUNA RIVER PROJECT

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