Princeton-USP Partnership Initiatives / STAGE 2

São Paulo as Fluvial Metropolis:
Infrastructure, Meta-projects, Imagined Futures and the City as Home

This initiative seeks to invite faculty and students from various disciplines at the Princeton Environmental Institute (PEI) and the School of Architecture of the University of São Paulo (FAU USP) to form a research network to elaborate an environmental approach to the design of fluvial infrastructure in urban and suburban areas of New York and Sao Paulo.

The research network will work in parallel meeting twice a year for the next three years alternating between Princeton and São Paulo. The six meetings, organized as conferences / workshops including faculty and students, will focus on the precedents, context, and potentials of the Waterway Ring for São Paulo as Fluvial Metropolis, a recent project that proposes a far-reaching intervention: a 106 miles long waterway ring that seeks to radically re-organize the growth of South America's largest metropolis. A meeting of the Princeton and USP research team members where the work plan was discussed took place in Princeton on November of 2013, funded by a Small Seed Grant from the Council for International Teaching and Research.

The São Paulo Metropolitan Waterway Ring Project is a network of rivers, reservoirs and an artificial canal. This initiative started more than 20 years ago as a master's research project, followed by a PhD thesis by Alexandre Delijaicov.
Recently, the São Paulo Metropolitan Waterway Ring Project has caught the attention of São Paulo’s State and Municipal spheres (2009 and 2012 respectively). It has been widely reported on most major newspapers and television, selected for architectural exhibitions, lectures and has received several awards. The project has been presented and discussed at GSD Harvard, University of Florida, and at Humboldt-Berlin University in Germany. The project has clearly overcome the boundaries of the academic environment, showing at the same time its potential, relevance, and importance in expanding the role of the university in the Brazilian context. The project is now being developed by the research group Fluvial Metropolis led by Alexandre Delijaicov at FAUUSP.

At Princeton, Mario Gandelsonas, the lead of the Princeton team, will contribute to the research network with his expertise as the director of the Center for Architecture, Urbanism and Infrastructure for the last six years where he conducted research urban infrastructure with a particular focus on the couplings of water, energy and digital infrastructure. He will also coordinate with the research network the findings of the joint FAUUSP / Princeton studio that he will be teaching for the next two years as well as the new PEI/ARC course on the environmental humanities he will be teaching with Bruno Carvalho, a member of the Princeton research team. The relationship with Princeton is highly attractive to FAUUSP due to the experience of Mario Gandelsonas who will be leading the local group and the close geographic proximity of the Delaware and Erie Canals, which is a focus of the USP team. The network aims to add historical, theoretical, and cultural dimensions to the scientific, technological, and policy aspects of São Paulo’s Waterway Ring project. It will discuss comparable interventions involving the transformation of urban infrastructure and its effects on urban space and form bridging the environmental sciences, the social sciences, architecture, the arts and the humanities in innovative ways.

From Princeton’s perspective,
Taking the Hidroanel as the case study of a long-term interdisciplinary research network acknowledges the increasing impact of so-called BRIC (Brazil, Russia, India and China) countries and megalopolises of the Global South in our environmental challenges, as well as in the devising of new urban solutions.

From USP’s perspectives,
This long-term interdisciplinary research presents an opportunity to theorize and develop the São Paulo as a Fluvial Metropolis across both disciplinary and national boundaries and check its validity in a broader scenario. The research provides an opportunity to discuss and assess proposals through courses and research on Sao Paulo and New York metropolitan contexts.

Work Plan and Rationale / A new educational model
The proposal of a network based at the Princeton Environmental Institute (PEI) and the Faculty of Architecture of the University of São Paulo (FAU-USP) seeks to leverage the newly established relationship between Princeton University and the research/academic community at the University of São Paulo by creating a new interdisciplinary educational model.
The research network based at the Princeton Environmental Institute (PEI) and the Faculty of Architecture of the University of São Paulo (FAU-USP) will serve as an important component of several initiatives at both institutions, currently at different stages of development: 1) a joint studio at the Princeton School of Architecture/FAU-USP and 2.1) a new course at the Princeton Environmental Institute, Environmental Challenges, Urban Solutions, co-taught by Mario Gandelsonas and Bruno Carvalho and 2.2) a new summer internship program. 3) two new courses at FAUUSP Graduate Program one co-taught by Alexandre Delijaicov and Angelo Bucci and another by Cristina Leme.

1. The network builds off of current collaborations between the School of Architecture of the University of São Paulo (FAU-USP) and Princeton’s School of Architecture, connected to a Brazil Studio on the Fluvial Metropolis led by Mario Gandelsonas at Princeton, in parallel with a Studio led by Alexandre Delijaicov, Cristina Leme and Angelo Bucci at FAU-USP. Both are design-based research studios focusing on the São Paulo Waterway Ring Project and will begin to generate data for the future interdisciplinary research network. The Princeton studio that started in the Fall of 2013 and visited the Hidroanel site, will travel annually to São Paulo. The USP Studio will travel annually to Princeton starting in 2014. This three-year project is funded, on the Princeton side, by the CITR (Council for International Teaching and Research). The USP Studio is currently raising funds to sponsor the FAU-USP students’ trip to Princeton in 2014.

2.1 The research network will provide expertise and contacts for the joint-course on the environmental humanities, to be taught for the first time in the spring of 2015 by Mario Gandelsonas and Bruno Carvalho. This project was recently funded with a Grand Challenges Grant by PEI. This interdisciplinary course will consider the Fluvial Metropolis as a case-study, and aims to incorporate lectures by USP faculty involved with the research network. A group of 15 Princeton undergraduates will travel to São Paulo in the spring of 2015.

2.2 Currently several Princeton undergraduates/year conduct environmental research on wildlife, conservation, eco-system services, climate, land use, water scarcity, and the spread of infectious disease at the Mpala Research Center, in Kenya. A similar arrangement exists with the Bermuda Institute for Ocean Sciences (BIOS) where undergraduates have opportunities to develop in-depth understanding of marine ecosystems. The educational model at play in Africa and Bermuda would be extended to South America (São Paulo, Brazil) per this proposal. Students will have an opportunity to study the environmental challenges and develop urban solutions within the context of the Hidroanel as a major urban infrastructure project dealing with energy, water, waste, food and mobility. Undergraduate internships will be established with faculty participating in the PU/USP research collaborative committed to participating in this project and serve as mentors.

3. Two new courses at FAUUSP Graduate Program, one co-taught by Alexandre Delijaicov and Angelo Bucci and another by Cristina Leme.

**Programmatic Goals**

PEI seeks to establish a multi-year research program with a focus on urban water infrastructure to address major global environmental challenges of the 21st century
related to urban development and to train a cohort of students who are interested in focusing on those challenges. Programmatically, PEI and the School of Architecture seek to establish sequences of undergraduate learning experiences that dovetail and enrich the student’s disciplinary training by organizing coursework, course related field excursions, and research fellowships in the summer months that inspire intellectual growth and problem solving, all culminating in independent field research for the senior thesis. The funding will seed mentored fellowship experiences in Brazil. These experiences will complement the new ENV/ARC/URB/LAS course (Environmental Challenges, Urban Solutions) with benefits for advancing a pathway of intellectual exchange involving Princeton and USP faculty and students. It is expected that, once established, this will pave the way for expanding the number of collaborative relationships involving faculty and students from both institutions, as well as on-going mentoring of undergraduates studying urban and environmental challenges in Latin America.

Graduate students including participants in the Princeton Energy and Climate Scholars (PECS) – an interdisciplinary group interested in energy and climate – may also be drawn to participate in the Princeton-USP partnership, with benefits for making connections and research collaborations. By way of background, the PECS travelled this past summer to Pune, India where they presented their activities and engaged in discussion about energy efficiency projects with graduate students and researchers at Indian universities. We can envision a future PECS field trip to São Paulo that would coincide with a conference and provide opportunities for exposure and dialogue involving graduate students and faculty from both institutions.

More generally, we believe that the partnership will help to enhance the intellectual life of PEI, by strengthening the program’s ties to architecture, urbanism, the environmental humanities and Latin American studies. At same time, it enhances the internationalization of FAU-USP by involving Princeton faculty working in various disciplines. The different fields of inquiry of the Princeton faculty can help to add historical, theoretical, phenomenological, cultural and other dimensions to the project. It will also further contribute to the internationalization of Princeton’s environmental studies and urban studies programs, by setting up a blueprint for sustained flows between the two institutions, where USP scholars are invited to share their expertise in the United States. In tandem, Princeton scholars will present their findings and research in a Brazilian academic community. Network members have also committed to time their activities so that Princeton faculty could participate (as critics, for example) in USP studio reviews.

**Sponsoring departments, interests and complementarity**
The Princeton Environmental Institute is the interdisciplinary center of environmental research education and outreach at Princeton. PEI’s mission is to advance knowledge and develop the next generation of leaders to address global environmental challenges of the 21st century. PEI draws strength from over 90 members of its Associated Faculty including representation of 20 academic disciplines, and is home to several large interdisciplinary research centers focused around topics including climate and energy, biodiversity and conservation, the
biogeochemistry of the oceans and atmosphere, sustainable development and infectious disease. PEI’s program in environmental studies is among the largest certificate programs on campus with more than 180 undergraduates from a broad representation of academic concentrations in the sciences, engineering, social sciences and humanities currently enrolled. PEI actively promotes experiential learning as a vehicle for intellectual growth and problem solving through course related field work, a summer internship program for undergraduate students (~100 students placed annually in faculty mentored assignments) and by providing support for senior thesis field research. PEI is committed to broadening participation of the humanities in study of the environment at Princeton. This proposal intends to involve new/additional faculty as mentors, add to the geographic diversity of undergraduate internship placements, and to engage new groups of faculty and students in the study of environment.

The proposed project is interdisciplinary in nature—bringing together faculty from PEI, ARC, PLAS, CEE, Spanish and Portuguese and History. Graduate students and undergraduates from multiple disciplinary backgrounds will be involved.

**Funding contribution from sponsoring units and strategy for long term support and complementary resources**

**From Princeton**

PEI has committed support for the development of the new course taught by Mario Gandelsonas and Bruno Carvalho in the Environmental Humanities (*Urban Challenges, Environmental Solutions*). It intends to be a multi-year course that can eventually dovetail with related field work tied to PECS (mentioned above in Programmatic Goals). PEI has the infrastructure and experience to support the internship placements in Brazil. This includes the establishment and promotion of new internship opportunities, applications processing, travel risk management, a pre-departure orientation workshop, and communications support. Students participating as interns with PU/USP faculty will be expected to participate in the annual Summer of Learning Symposium – a faculty moderated workshop wherein interns make presentations to an audience of their peers and faculty in the fall. PEI will provide administrative support for internship placements and technical/website support describing the project’s events, aims and outcomes. The School of Architecture can make Betts auditorium available. Faculty and students will have access to the ARC library and to the computer lab. PLAS can provide additional Lecture rooms and programmatic support.

**From FAU USP**

FAU USP will offer its facilities such as auditorium, exhibition space, model workshop, library, audiovisual labs, publishing and printing for publication, and digital lab for web publication.

Besides that, due to the large number of undergraduate and graduate students, and due to the good relationship in between USP and research institution such as FAPESP [Sao Paulo research foundation] and CNPq [National Counsel of Technological and Scientific Development] some of our students will be receiving a
grant for an exchange or research program in Princeton during the three years of this project and beyond. In addition, the Waterway ring proposal has caught the attention of governmental agencies such asEMPLASA that could sponsor or contribute to the project or to its development.

SÃO PAULO AS FLUVIAL METROPOLIS: SIX CONFERENCES/ WORKSHOPS Allocation of Funds and Objectives: Conferences / Workshops
The grant will be allocated to fund six conferences/workshops, student internships, and travel to Brazil as part of the Environmental Challenges, Urban Solutions course beyond its first year. Three of the conferences/workshops will take place at USP, and three will take place at Princeton. Our goal is to organize keynote lectures by faculty members, and to incorporate students into the workshops during each of the events below. Especially during years 2 and 3, we envision these events providing a forum where students can present research initiated in the context of Environmental Challenges, Urban Solutions, as well as in the USP and Princeton School of Architecture studios. These events can also be integrated into the curricula of USP design studios and in PEI’s new “Environmental Challenges, Urban Solutions” course as well as other courses that the faculty involved would be teaching.

Year One:

1. Fluvial Cities: Pasts and Futures (Princeton).
This meeting will set up the context for the discussion of the major areas of research on the transformation of São Paulo into a “fluvial city” and its urbanistic, environmental and cultural ramifications. The USP team will present on the São Paulo Metropolitan Waterway Ring’s characteristics, goals, and challenges. With the comparative approach provided by members of the Princeton team, we hope to also discuss historical precedents and introduce theoretical questions regarding the future and the past of the canal as urban and regional infrastructure. Besides the lead members (Mario Gandelsonas and Alexandre Delijaicov), other key members of the USP team will participate (Angelo Bucci, Cristina Leme). On the Princeton side, graduate students have already been involved in related activities (Vanessa Grossman), and we will also count with the participation of faculty members working on different aspects of “fluvial” urban histories (Christine Boyer, Vera Candiani, Bruno Carvalho, Gyan Prakash).

2. The Engineering of Fluvial Cities (USP).
The current approach to storm-water flooding in urban areas is to pave, pipe, and pump water out resulting in a hardened landscape that sheds massive quantities of runoff into single-purpose drainage systems. Hurricane Katrina brought awareness that a new approach to living with water was needed. The Netherlands learned from previous catastrophes and now have a plan to work safely with water as a complex system, letting the water in rather than fighting it. Building with nature means restoring wetlands, beaches and natural flood plans. Letting the water back in means that some levees protecting farmland would be opened and flooding
allowed where few people lived. The intent is to use both natural processes and better land-use planning to create room for water to expand during high flows. Experts from both universities will discuss engineering elements connected to hydrography and the management of water in urban contexts, including Vladimir Bartalini, Klara Kaiser, Ricardo Toledo e Silva and Mario Thadeu Leme de Barros (USP), and Robert Socolow and Ignacio Rodriguez Iturbe (Princeton).

Integration has been a central concern in Metropolitan and Macro-Metropolitan water resources planning and management in São Paulo. Integrated urban water management aims at controlling the interference of urban systems on the natural water cycle, besides considering quality and quantity as inextricably linked to each other, since water supply, sewage treatment, flood control and urban drainage infrastructures rely upon the same urban water cycles and embrace common environmental goals by means of multi-purpose infrastructures. Interconnecting networks by and large exceed the territorial boundaries of municipalities and metropolitan areas, giving rise to complex challenges for cross-scale and cross-sector management apart from water users, such as housing, urban transport and non-hydraulic energy sources, due to their central role on urban water sustainability.

This will also be an opportunity to count with the participation of Roberto Klein, an expert on 3D data banks, and to launch, discuss and outline a proposal to create a 3D GIS of the São Paulo metropolitan area, which will be able to collect and combine into a single data bank the information assembled and spread out through the different institutions. We expect to leverage support for this initiative from potential public and private partners like the Prefeitura de São Paulo (São Paulo Municipality), Emplasa, Metro, Sabesp, Eletropaulo and others.

Year Two:

3. The future guiding present decisions for São Paulo as a Fluvial Metropolis (Princeton)

Building off of the first year activities, this conference and the accompanying workshop will bring together architects, planners and engineers who will elaborate an historical and prospective environmental approach to plan and design architecture and fluvial infrastructure in urban and suburban areas of New York and Sao Paulo. The notion of a highly differentiated modern metropolitan region were the center/ periphery relation is constantly put in perspective offers the background to the urban analyses. The question of urban rivers and the canal network of metropolitan region of Sao Paulo will be confronted with those in New York, New Jersey and in particular the case of the New York Barge Canal (original Erie Canal) that connects the Hudson River and the Great Lakes. This event's organization will be under the leadership of Christine Boyer and Cristina Leme. This event will include the participation of Vera Candiani and Vera Palamin.

4. Infrastructures of Imagination: New Theories of Tomorrow (Princeton)
From overpopulation to environmental catastrophe, anxieties about the future seem to dominate much of the contemporary discourse on cities. Since the onset of modernity, cities have been sites of both utopian and dystopian fantasies. In an increasingly urbanized world, faced with both new and familiar challenges, this workshop proposes to discuss opportunities and possibilities generated by technological innovations. How have new media helped to awaken and reshape the imaginaries of cities? As urban agglomerations in the so-called Global South surpass European and North American cities as the world’s largest and fastest-growing, what new cultures and visions of the future can emerge? We will explore new paradigms of architecture schools as having the role of producing new and pertinent images that can enlarge the fields of possible futures in specific, profound, and imaginative ways. This event’s organization will include the participation of faculty like Bruno Carvalho and Tom Levin from Princeton, and Angelo Bucci, Luis Antonio Jorge and Guilherme Wisnik (USP).

Year Three:

5. **New Perspectives: Environmental Challenges, Urban Solutions** (USP)
A displacement of the focus is necessary to transform São Paulo into a Fluvial metropolis. A new focus is required on the subjects that our eyes are not trained to see, on issues that were historically neglected, disregarded and refused by the hegemonic culture, that were made invisible by [social] prejudice: dredging sediment, sludge, debris and garbage. By displacing the gaze to rivers and canals, the waterway ring will redefine the shore as a link and connection to the everyday life of the city. The rivers, canals and lakes will become spaces of leisure, with programs, parks and urban spaces where people can meet, interact and have fun. São Paulo will become a fluvial metropolis where liquid boulevards will generate a new residential fabric articulated by water squares and parks. Transforming the main rivers into waterways for slow public cargo transportation, will drastically relieve the heavy traffic of trucks on the urban areas and their shore will be converted into metropolitan public spaces for leisure and tourism. The waterway ring radically changes the relation between water and urban life while contributing to an environmentally balanced management of the urban macro drainage. This conference/workshop will incorporate research on the fluvial city from USP and Princeton faculty and students involved in various dimensions of the project during the previous two years, including Princeton undergraduates who will have studied and visited São Paulo as part of the Environmental Challenges, Urban Solutions course and in each School of Architecture’s respective studios.

6. **Making a Home in the City: Art and Infrastructure** (USP)
By incorporating rivers and canals into the mobility system the Hidroanel will redefine their margins. The canals and lakes will become spaces of leisure, with programs, parks and urban spaces where people can meet, interact and have fun. São Paulo will become a fluvial city where the rivers as fluvial boulevards will generate a new residential fabric articulated by fluvial squares and parks. By transforming the main rivers into waterways for passengers and cargo
transportation, and their margins into metropolitan public spaces for leisure and tourism, the Hidroanel radically changes the relation between water and urban life while contributing to an environmentally balanced management of the urban macro drainage. As the State experiments with new infrastructural models, artists and city dwellers are already rethinking traditional relationships between cities and nature. This final event hopes to include artists working with and around urban infrastructure with the goal of interrogating notions of the city as home, such as Hector Zamora. Art scholars at each institution (Agnaldo Farias, Irene Small) would be invited to join other members of the network.