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Barnard and Columbia Architecture

## DESIGN III: WATER COMMUNITIES IN MEXICO CITY

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Xochimilco canals and floating gardens Mexico City

### A. STUDIO DESCRIPTION

Design III will discuss architecture's role in the construction of communities, considering both the shared management of resources and the shaping of collective attachments and affiliations in Mexico City. Our projects will particularly focus on water management as a critical issue both in the region and increasingly throughout the world, and we will study possible interventions operating upon its collection, distribution, use, recycling, and disposal at a local, urban, and territorial scale. We will work in neighborhoods resulting from the arrival of migration and constituted through processes of rapid urbanization and will consider architecture's participation in shaping new ways of living together in these areas.

Water management in Mexico City has been a matter of great relevance ever since the city was established. A territory that was once regulated by the implementation of canals and ditches is today managed through pipes and tubes. However, this has shown to be the wrong solution, as continuous floods and water scarcity are recurrent problems. Historical multipurpose canals have become underground sewers above which modern speedways run; the former lakebed is either dense urban fabric or desiccated land; the permeable hillside has been irregularly urbanized, promoting fast runoffs that cause flash floods. This situation calls for a new way of water management systems. We will consider Mexico as a key case study to address water management as an essential component in the design of the city, understood as a complex articulation of physical and political forces, cultural and material networks, and social arrangements, in which architecture participates. Through multi-

layered and multi-scalar interventions, we will aim to participate in these current debates that are relevant for architecture and beyond.

After several semesters of work dedicated to local sites in New York City, Design III is an opportunity for students to consider international locations and address contemporary global concerns, incorporating critical questions, research methods, and design strategies that are characteristic of architect's operations at this scale. The studio will partner with a parallel studio at UNAM led by Prof. Loreta Castro Reguera, Taller Hídrico Urbano.

Loreta Castro Regera and Manuel Perló Cohen coordinate, since 2013, a team from the Institute of Social Sciences of the National Autonomous University of Mexico (IIS UNAM) called *Acupunturas Hidrouurbanas*, as a bottom up response to the ever-growing issue of water management in the city. Acupunturas Hidrouurbanas sets the foundations for the Taller Hídrico Urbano, with which we will partner for our work.

The research will additionally build on previous work of the studio critic Ignacio G. Galán together with the After Belonging Agency, concerning the shared management of resources and the construction of communities in a global context characterized by transience and migration. The research of the After Belonging Agency initially unfolded as a curatorial project for the Oslo Architecture Triennale 2016.

### **Learning Objectives**

1. Visually communicate architectural concepts and design intent using discipline-specific techniques including:

- orthographic projections (plans, elevations, sections),
- paraline projections (axonometrics, isometrics),
- physical models using various techniques and materials,
- multiple media and/or combined representational strategies

2. Verbally communicate architectural research methods and spatial concepts

3. Demonstrate an understanding of precedent and site analysis

4. Demonstrate an understanding of design method as a step-by-step, iterative, and incremental process of research, synthesis, and feedback

5. Demonstrate an understanding of design thinking as responsive to and shaper of social and cultural contexts

6. Demonstrate the ability to work independently and collaboratively

7. Utilize both analog and digital techniques in the design process

8. Demonstrate an understanding of program, use, and activity

9. Demonstrate an understanding of material and fabrication

10. Develop a research project with independently articulated design objectives.

### **Prerequisites**

This is an advanced elective course for students in their senior year majoring in Architecture. Students must have completed Architectural Design I. Admission to the course is selective and based on portfolio submitted to the Department.

## **B. COURSE REQUIREMENTS AND ASSESMENT CRITERIA**

### **Studio Teaching Methodology**

Design is a unique type of knowledge production requiring unique working methods. This course is taught by the studio method - an iterative process that requires dialog, design production, and risk taking by the student to explore ideas in the form of a variety of media. The Studio will be divided into small, individual sections, each led by a Studio Critic. The core method of instruction is that of 'desk crits', a one-to-one dialogue at the desk between the student and the Critic. At the desk crit, previous design work is reviewed and discussed and the student and critic formulate the next steps in the process. Desk crits are supplemented by Interim Reviews, or 'Pin-ups', where all students in the Section (sometimes teamed up with another Section) present their design ideas for group critique and discussion. The culmination of each project is the Final Review in which students present their work for public evaluation by a group of Studio Critics and Visiting Critics.

### **Attendance**

Attendance is mandatory at all scheduled classes, field trips, and reviews. Students are encouraged to work in studio, and to review one another's work together. Studio is held Monday and Wednesday beginning promptly at 9:00 AM. Any student arriving after 9:20 AM will be considered late and anyone that arrives after 10:00 AM will be marked absent.

Absences due to acute illness, a personal crisis (e.g. a death in the family), religious observance, or for other reasons of comparable gravity may be excused. In all such cases, students must promptly email their instructor to communicate the reason for their absence and to arrange an opportunity to review any important information they may have missed. Students who know they will miss a scheduled class due to religious holidays should email their instructor during the first week of classes with a list of dates for their anticipated absences.

Unexcused absences, late arrivals, or early departures from class will reduce your course grade. Three non-consecutive absences will result in a grade reduction by one-third (1/3) of one letter grade (e.g., A- to B+). Three consecutive absences or four nonconsecutive absences will be considered grounds for failing the course.

### **Grading**

Each project will be graded with a letter grade. Your work will be evaluated by the following criteria:

1. Depth of investigation and critical thinking skills
2. Iterative design process
3. Ability to articulate ideas verbally
4. Ability to express concepts via well crafted tectonic compositions
5. Precision of drawings using a range of graphic conventions
6. Participation during design crits and timeliness of assignment completion

Project 1: 25%

Project 2: 75%

Students are required to present their work in all Interim and Final Reviews. Failure to do so will reduce the grade of the exercise by a minimum of one letter grade (e.g. B to C). Work not presented at the designated time will not be reviewed at a later date. Project grades will be based on the work you present at your reviews. Required work that was not completed at the Final Review must be completed in time for grading. Additional work completed after the Final Review and before grading will not be considered at the grading session unless otherwise stated by the Studio Critics. No incompletes will be given at the end of the course.

### **Room Rules and Security**

After the first week of classes, students will be granted 24-hour access to the studio and DAL through your school ID. It is crucial that the doors to these spaces remain closed and locked at all times for your personal safety and your belongings' security. Please do not prop open the door and do not leave any valuables unattended at your desk. The studio and the DAL are open to all students in approved courses; please respect other critics and students that are using the space. Barnard and Columbia Security officers do periodically check the studio but security is a responsibility that we all share; please help us maintain a safe and productive environment. If your personal belongings are stolen (or go missing) please notify your instructor and Barnard Public Safety."

General studio rules:

- You must provide your own lock for the locker.
- The studio must remain locked at all times.
- Use the spray hood in the model building room for spray paint or fixative.
- Use headphones for listening to music.
- You are responsible for keeping your desk and storage area clean and organized. If you are using an empty desk adjacent to your assigned seat, it is also your responsibility to keep this area free of debris.
- 100% of the work surface of your desk space should be covered with 3-ply chipboard or vinyl board cover. Do not cut, carve, glue or otherwise destroy the plywood desktop.
- Please help us recycle and reuse extra materials by donating anything you don't need to our recycling locations in the studios.

### **Travel**

This studio has a special foreign travel component. Students will travel to Mexico City the first week of November (4/11-12/11, exact dates TBC) and are advised to consult all their instructors in advance to clear any classes they will miss. Students are responsible to make sure their passports are current, and, if they need visas for Mexico, to take care of this independently.

This studio is the eighth in which students have traveled internationally to cities where they can engage first hand in contemporary global issues. Barnard will help students to fund the trip, providing \$750 for Barnard students and adding to funds from CC and GS to make sure Columbia students also have \$750.

An approximate budget, subject to variation, includes:

Flight	400	USD
Lodging	250	USD
Meals	200	USD
Transportation	100	USD
Visits	50	USD
TOTAL (aprox.)	1000	USD

### **Required materials**

Students will need to purchase materials for physical models throughout the semester. Specific materials will depend on the goals of the models and will be decided by students in consultation with the critic. Students should anticipate to expend around 50-100 USD.

See the materials and vendors list provided by department on our website:

<https://architecture.barnard.edu/node/59931>.

### **Statement from the Office of Disability Services**

Students with disabilities who will be taking this course and may need disability-related accommodations are encouraged to register in advance with the Barnard College Office of Disability Services (ODS) in 8 Milbank or the Columbia College Disability Services in Suite 108A, Wien Hall.

### **Wellness Statement**

It is important for undergraduates to recognize and identify the different pressures, burdens, and stressors you may be facing, whether personal, emotional, physical, financial, mental, or academic. We as a community urge you to make yourself—your own health, sanity, and wellness—your priority throughout this term and your career here. Sleep, exercise, and eating well can all be a part of a healthy regimen to cope with stress. Resources exist to support you in several sectors of your life, and we encourage you to make use of them. Should you have any questions about navigating these resources, please visit these sites: <http://barnard.edu/primarycare>, <http://barnard.edu/counseling>, <http://barnard.edu/wellwoman/about>, <http://health.columbia.edu/>.

### **Academic Honesty**

The intellectual venture in which we are all engaged requires of faculty and students alike the highest level of personal and academic integrity. As members of an academic community, each one of us bears the responsibility to participate in scholarly discourse and research in a manner characterized by intellectual honesty and scholarly integrity.

Scholarship, by its very nature, is an iterative process, with ideas and insights building one upon the other. Collaborative scholarship requires the study of other scholars' work, the free discussion of such work, and the explicit acknowledgement of those ideas in any work that inform our own. This exchange of ideas relies upon a mutual trust that sources, opinions, facts, and insights will be properly noted and carefully credited. In practical terms, this means that, as students, you must be responsible for the full citations of others' ideas in all of your research papers and projects; you must be scrupulously honest when taking your examinations; you must always submit your own work and not that of another student, scholar, or internet agent.

Any breach of this intellectual responsibility is a breach of faith with the rest of our academic community. It undermines our shared intellectual culture, and it cannot be tolerated. Students failing to meet these responsibilities should anticipate being asked to leave Columbia.

It is your responsibility to fully understand what constitutes a violation of the honor code. Below are links to the Barnard and Columbia Colleges honor codes along with pages that summarize what the colleges consider to be academic dishonesty.

Barnard: <http://barnard.edu/dos/honorcode>

<https://barnard.edu/honor-code/faq>

Columbia: <https://www.college.columbia.edu/honorcode>

<http://www.college.columbia.edu/academics/academicdishonesty>

If an instructor believes you to have acted dishonestly, you will be referred to the formal process of Dean's Discipline. Overseen by Student Conduct and Community Standards, the Dean's Discipline process is an educational one that determines your responsibility using the principle of "preponderance of evidence." If found responsible, and depending on the nature of the dishonesty and whether or not you have a disciplinary record, you could face one of several sanctions.

Parents and guardians may be informed, faculty committees awarding honors will be notified, and the case may remain on your permanent record meaning that employers and graduate schools may also be informed. These sanctions are in addition to whatever determination the instructor makes on how your final grade in the class will be affected.



## CONTEXT. A BRIEF HISTORY OF WATER IN MEXICO CITY



Mural painting of pre-Columbian Aztec city of Tenochtitlán, by Diego Rivera in the Palacio Nacional, Mexico City

The Basin of Mexico was formed thousands of years ago as the result of a series of geological events. The most recent one, the formation of the Sierra *Chichinautzin*, is what gives it its endorheic character. Jorge Legorreta, an architect, urban planner, and expert on water management in Mexico City, described the basin's form as that of a bowl or *molcajete*, receiving water runoff from the surrounding mountains and keeping it in the lowest lands, therefore becoming the site for a system of seasonal lakes. *La Gran Tenochtitlán*, the pre-Columbian Mexico City, was built in the shallow Lake *Texcoco*, the largest body of water within the basin.

This ancient city was similar to today's *Xochimilco*. Its urban form responded to its natural context. Through built waterways and dams, the *Mexicas* developed a system to control and pulverize periodic floods around the city. Even though the floods were never completely controlled, the city was resilient to them. Moreover, the *Mexicas* used the same system of infrastructure to develop modes of mobility, agricultural practices, and defense strategies. *Tenochtitlán* was one of the best examples of a *landscape infrastructure*.

In 1529 Hernán Cortés conquered *Tenochtitlán*. This fact, together with the series of events it set in motion, became a turning point for the history of the city. The conquest led to a complete reorganization of *Tenochtitlán's* economic, political, and social systems, as well as to a complete restructuring of its urban form. The most aggressive change in terms of the environment was the desiccation of the 1,100 km<sup>2</sup> lake system. This transformation meant that the city of *chinampas* and canals was to become a prototype of the Renaissance ideal: a grid of earth and stone, highly replicable, and alien to its natural context.

Consequences to the drastic transformation described above did not wait. Mexico City started to suffer from continuous urban floods, desperately calling for solutions. In 1604, a relevant historical decision regarding water management in the Basin of Mexico was taken: the way out to floods became the artificial perforation of the endorheic basin called *Huehueteca* Tunnel. From this moment on, a series of perforations have been opened, drying most of the area that was once water, and leaving vast portions of dry land that have permitted the endless expansion of the urban grid.

The most dramatic change regarding the transformation of Mexico City's waterscape took place during the XX century. In 1900, the *Gran Canal del Desagüe* was inaugurated by Porfirio Díaz. The promise was that this infrastructure should become the absolute solution to urban floods. After the Mexican Revolution, from 1920 to 1930, Mexico City started expanding drastically, duplicating its population from 1 to 2 million inhabitants. This pattern continued throughout the century, achieving a population of more than 20 million living in the Basin of Mexico by the year 2000. Both, drinking water and sewage infrastructures needed to follow the pace. By the 1960's the city started suffering again from urban floods. A new, more complex, and larger tunnel system was built, the Deep Drainage System, which by the early 2000's proved to be insufficient because of its loss of slope due to land subsidence. To provide the basin's dwellers with potable water, more than 1600 deep wells were perforated, and an aqueduct composed of several dams and pipes, with a length of more than 123 km, needing to pump water 1100 m in height, was constructed. What used to be an equilibrated hydrological system has been transformed into a water consuming machine, unable to treat its own sewerage, to infiltrate its own rainwater, but instead drying nearby basins through expensive water importation systems.

Today the city still suffers from urban floods and lack of drinking water. No matter how large we build a tunnel for drainage, water systematically finds alternative paths. The latest drainage infrastructure under construction, the TEO, is 42 km in length and 7m in diameter, and its success is yet to be proved. Rainwater naturally stays in the lowlands, regardless the efforts to channel it elsewhere (with the downside of having to pump it out, mixed with wastewater) while, at the same time, the city is in a desperate need for drinking water. Throughout the years, several individuals and teams have worked to provide alternate solutions to water management in the Basin of Mexico. With the project of Nabor Carrillo as the most successful one, able to rehydrate part of lake Texcoco, several others have tried to fill into his steps. However, historical inertia has proved to be stronger, and large scale projects aiming to reconstruct the hydraulic balance of the basin have always been rejected.