[IN]Flux Territories and Passive Structures: Lessons from Designing for Sea-Level Change in Maryland

Among other processes, the production of the built environment is the result of a series of social, ecological, economic and climatic circumstances. Historically, once any of these factors mutated, it influenced how architecture and cities were utilized, conceived, built or reconstructed. In fact, architectural culture and academia are traditionally rooted on the study, understanding, interpretation and application of such processes.

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Today, for the first time in human history, scientific research is suggesting that global climatic conditions might suffer a long-term change. According to predictions, the consequences of climate change will have a strong impact around the world. It is forecasted that higher temperatures and water shortages will put agricultural production in danger and that an increase in rainfall could generate hazardous health circumstances. Climate change effects will be particularly critical in cities and regions along the coasts, were change in sea levels is expected to cause flooding and disrupt current conditions. Furthermore, as a result of natural, urban and rural habitats being distorted, human displacement will eventually become a significant issue. For the professionals whose work relates to the built, natural and social environments, these in-flux events present both a challenge and an opportunity. Consequently, the current modus operandi and production of such professions, which by now are producing only slow and discreet changes, need to be adjusted—and so do their academic models.

To explore variations and expand the traditional design education models, a collaboration between architecture and landscape architecture courses at the University of Maryland explored opportunities within the conventional studio environment. In particular, the initiative attempted to educate students on the importance and implications of multidisciplinary approaches and public participation in the conception and design of adaptation plans. In this article I

explore the importance, challenges and lessons from the transdisciplinary studio, which investigated collaborative and bottom-up approaches in territories of change. As I describe the structure of the research venture and evaluate its qualitative outcomes, I seek to inform possible modifications to architectural pedagogies and strengthen the role of academia as an agent of change.

THE NEED TO GO BEYOND THE TRADITIONAL STUDIO PROJECT

Architects, landscape architects and other design professional have been aware of the effects of climate change for decades. Early responses to climate change by environmental designers and educators initially focused on mitigation approaches.[1] In architecture for example, priority was given to the reduction of energy consumption and use of alternative energy sources to decrease carbon emissions. Energy efficiency, use of low-impact materials, recycling and more efficient construction processes became the guiding principles of sustainable design in professional and academic settings. However, because of the high level of specialization needed in the conceptualization, design and implementation of such strategies, much of the work produced in offices and schools continued to take place in alienation from clients and communities. But as it becomes imminent that even if greenhouse emissions decrease, climate alterations will continue, planning for adaptation—as a complement to mitigation, will become increasingly critical. [2]

Adaptation schemes are those that incorporate actions needed to reduce the vulnerability of any system or population group to the adverse impacts of climate change.[3] Due to the complexity of such systems and the variables of the expected crises, the design of adaptation plans requires a multidisciplinary and multi-scalar approach to unveil the complexity of the problematic and its possible solutions. Consequently, communication, participation and understanding of current and future scenarios by both the design team and communities at risk become essential processes in the development of adaptive strategies. In this sense, the need for multidisciplinary and participatory practices varies the equation under which most architecture projects, both in professional and academic environments, operate today—one where infrastructure and site are a given and the question of location and programming pre-established by clients or professors. Moreover, the typical architecture studio project usually predetermines that the solution for the specific problem is "a building" and that it can be designed individually. This type of assignment strengthens the misconception of architectural practice as just the formal design of buildings and cities – a process with a beginning and end, rather than the understanding of a series of social, environmental, political and economic conditions that help shape, and then manage, the totality of the natural and built environment.

One way in which academia can initiate a change is by allowing students to better understand the importance of multidisciplinary and participatory processes. To do so, it is necessary to engage them in interactive and reflexive practices that are not usually addressed in academic settings. In fact, as professor José L.S. Gámez quotes Ernest Boyer's famous report on architecture:

> The education of students about the scientific, social, aesthetic, political, and environmental foundations of architecture, should not be about teaching disembodied skills and facts. The standards should stress active inquiry and learning by doing, rather than the accumulation of

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facts from texts, required lectures, or design problems handed ready-made to students. Further, students should be partners in extending the knowledge base of the profession through reflective practice. Learning to define problems, asking the right question, and weighting alternative approaches must be at the heart of architecture study. [4]

Unfortunately, due to a series of reasons that include budget and time constrains in schools, creating scenarios for students to be frequently involved in both multidisciplinary and participatory exercises is difficult.

THE STUDIO: GOALS AND ORGANIZATION

With the limitations of the typical studio course in mind, in 2012 a joint collaboration between Architecture and Landscape Architecture studios was established at the University of Maryland.[5] The goal of this joint venture was to address the need for cross-disciplinary and participatory approaches in local climate change planning.[6] The partnership later led to the organization of a senior studio in the architecture undergraduate curriculum in Spring 2013. The main objective of the course was to enable students to explore how architecture as a formal, meaningful and performative construct operates, relates, adapts to and manages the constantly changing interrelations between the natural, built and human contexts. The course proposed that site could be understood as a field where different forces interact and that one of the critical tasks of the architect is to engage the project's stakeholders and design team in analytical, interpretative and transformational processes.[7]

Following the aspiration of a "collaborative education for a sustainable future", the studio was organized around five important points: 1) a transdisciplinary course and approach, 2) a multidisciplinary faculty and support team, 3) emphasize group assignments, 4) community involvement in analytical and design processes, and 5) unassigned site or program to be defined by students, faculty, guest professionals and community during the process.[8] In order to accomplish this, a lot of attention was put into the organization phase and site proposal.

To achieve the first two points, the organizing faculty team – composed of an architecture and a landscape architecture faculty – opened up several channels of communication among their students and faculty. Through presentations and workshops, students were able to learn the basics of each discipline and the different analytical and design approaches each of the professions specializes in. To support the studio, a multidisciplinary professional team was brought together and invited to various studio sessions and all workshops and presentations throughout the semester. The team included architects, landscape architects, engineers, scientists, town administrators and community leaders, among others. Using the interaction among the invited professional team members as an example, the course emphasized group work as a way of sharing knowledge and to incentivize individual and collective reflection (Figure 1). To achieve this, the 36 students were divided into three sections of twelve and within each section in teams of four. The smaller teams were constantly assembled and reassembled with different members, encouraging collaboration and placing a stronger importance on the goal of the assignment than on the group itself. To engage the community and define what the project "wanted to be", three public workshops were organized throughout the semester. The themes for each workshop were: 1) mutual communication

Figure 1: Group assignments with involvement from community members and other professionals.

of information and restrains, 2) collective design development and ideas, and 3) final design and transfer of technical and other types of knowledge needed to manage the projects in the future. The goal of the first two was to involve residents in analytical and design processes that included site selection and programming exercises, while the goal of the third one is to let the community take ownership of the final project.

Parallel to the dynamics within the class, it was critical for the organizing faculty team to suggest a site that presented a challenging scenario – one that we thought differ from more traditional, stable contexts. The suggested site was the town of North Beach, Maryland, located in the Chesapeake Bay.

THE PROBLEM: SITE AND CONTEXT

The Chesapeake Bay has always been a territory in transformation. According to geologists Steve M. Colman and Robert B. Mixon, "the modern bay is the latest of several generations of Chesapeake Bays that have had significantly different configurations."[9] Today, the bay is the largest estuary in the United States, covering 64,299 square miles and six states.[10] Just like other water bodies around the world, this area is the product of rising and falling sea levels during millions of years. And although the average rate of sea level rise slowed about 5,000 years ago, it still presents a steady upward progression.[11] Current research shows that sea level in the Mid-Atlantic region rose approximately 12 inches in the last 100 years, with places along Maryland's coastland showing rates nearly twice the global average.[12]

Added to climate-related forces reshaping the Bay, a series of direct human actions have further affected it. For example, the Environmental Protection Agency (EPA) attributed a decline in fish population of up to 90% in some species to over-harvesting and pollution. The introduction of chemicals in agriculture fields or through sewage systems in the environment possibly contributed to the decline of bird populations too. Moreover, in the 1930's, one of the first marine dead zones was identified in the Chesapeake Bay.[13] Today, even though work by ecological agencies has reversed the declining environmental quality, "conflict between commercial and environmental interests have encumbered some of the restoration efforts".[14]

In terms of the constructed environment, many urban centers in the region formed and are located around water access. These cities vary in size and density and include places like Baltimore, Annapolis, Ocean City and a number of small communities that depend on water-industries. Although aware and responsive to the possible long-term impact of sea-level rise, these urban centers usually experience the worst of it during and after isolated events like storms and hurricanes.

One of the towns constantly hit by flooding, storms and other problems affecting the Chesapeake Bay, was consciously chosen as the object of study. With an actual population of approximately 2000 people, North Beach is a small city located in Calvert County. The town was founded in the 1900's and served as a vacation retreat for residents of Washington, DC, and Maryland. In time, the town became an animated gambling destination and lived its most thriving days. The end of legalized gaming and the opening of the Bay Bridge in 1955 - which brought easier access to the Atlantic

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Figure 2: Visualization of worst case flooding scenario for North Beach town center.

resorts – weakened the town. Today, after a period of decline, the city is living a revival as one of the closest beach towns to the nation's capital.

The environmental context of the city includes a wildlife marshland refuge on the north edge and a seven-block waterfront city center that revolves around a beach, a pier and a boardwalk. This lively part of the city has constantly suffered from inundation, which in time led to the demolition of various buildings within a two-block area in the center of town (Figure 2). The built context includes a majority of one-story residences, a few three to five story touristic resorts and the Bayside History Museum – housed in an old industrial building. Economically, the town generates most of its revenues through taxes and by charging a beach fee to visitors. Today, most people living in town are year-round residents and all throughout the year water-related and artistic events are organized. In fact, at the time that studio began, the town had decided to find a property and began plans to build a large Performing Arts Center (PAC) of "regional importance" to draw public from other cities.

THE STUDIO: EXPERIENCE AND AFTERTHOUGHTS

Faced with a history of flood damage, lack of identity and a large urban void in the center of town, but also with an optimistic eye on the future, North Beach presented an ideal opportunity for the studio. Following the town's enthusiastic welcoming of the idea, the coordinating faculty organized the semester around site visits, lectures, workshops, participatory exercises and community meetings – all of them paralleled by team teaching and group assignments. The following are afterthoughts based on the two central objectives and experience of the course.

TRANSDISCIPLINARY APPROACHES AND TERRITORIES IN FLUX

Evermore, designers are faced with the tangible components of the complex problems they are asked to solve. The vast availability of data and new means to gather, measure, analyze and share it, pose in themselves a new challenge to professionals and academia. The changing nature of physical sites – in the case of the studio due mostly to sea level rise, increases this complexity. These more complex situations call for transdisciplinary rather than individual actions. Based on this, academic settings should encourage and teach such model. During the studio, it became critical to define the difference between cross-disciplinary, multidisciplinary and transdisciplinary collaborations. Cross-disciplinary is defined as "observing one discipline from the perspective of another", while in multidisciplinary approaches "each discipline contributes its own knowledge".[15] The words of author L. Richard Meeth, better describe the importance of true transdisciplinary methods:

> The highest level of integrated study is transdisciplinary, which is not of the disciplines at all. Transdisciplinary means beyond the disciplines. Whereas interdisciplinary programs start with the discipline, transdisciplinary programs start with the issue or problem and, through the processes of problem solving, bring to bear the knowledge of those disciplines that contributes to a solution or resolution.[16]

One example where transdisciplinary collaboration happened in the studio was the diverse initial approaches to flooding and storm surge protection. As architecture students first thought of massive and rigid infrastructures, their landscape counterparts thought of soft solutions. The following analysis led

to a series of questions and conversations that involved the community's perception of space and the future "atmosphere" of the town. The final proposal included a series of natural barriers - such as marsh areas - and the redeveloping of the flood plain-covered center of town through a natural living system that contained and help control inundations. The creation of this park embraced ideas from all disciplines as well as input from community members.

In the larger context, the conversations that emerged from the design of the central landscaped area of town, led to a deeper reflection on the disciplines' diverse strategies. This became especially evident in the architecture students' reactions, which kept inquiring about the nature of architectural work. For example, a particular discussion revolved around the nature of infrastructure in cities. It derived from the fact that as environmental conditions are influx, it could be argued that most structures and cities around the world share one characteristic: rigidity. Static buildings and infrastructures, usually built with high resistant and enduring materials, exemplify this idea. This stiffness can be traced and linked to one of Vitruvius basic architectural precepts: firmitas. The firmness principle, which reveals the human need of being 'placed', sheltered and protected, has also shaped the way in which most architects conceive what they design and build. The resulting spatial and formal constructions are often perceived as constant and stable as they shield, but also isolate, their inhabitants from nature. The problem, as architect and professor Thomas Fisher points out, is that "the apparent strength and invincibility of the systems and structures we have designed to support our civilization can blind us to our vulnerabilities."[17] In fact, the detachment from the natural world is what some consider the origin of a paradigm that led to many of today's environmental concerns. As a result of this line of thought, students were able to realize that working together from start to end, opens possibilities for solutions that may be tangential to their disciplines, but that present better answers for a more ecological and social sustainable future. To quote a student:

> The most important change for the students, and the work we produced was the team effort by which we approached the problem. Working with other students, and closely with professors allowed for more in depth research, and thoughtful group analysis of solutions. The idiom "two heads are better than one" comes to mind when thinking of the way we approached this project. Surely none of our work would have been as thoughtful or informative without our peers, professors, and an active community. (Student A, A Reflection on the Studio)

COMMUNITY ENGAGEMENT: CONTROL AND MUTUAL KNOWLEDGE

Referring to the call to solve complex socio-economic problems, Professor Felipe Hernandez argues that architects should not "avoid responsibility by suggesting that the political, economic and social changes needed are beyond the reach of architecture."[18] Too often professors and students object to the amount of effort needed to organize and carry this type of studio. It is thus significant to notice that, as problems get more intricate, the role of the architect will include the need to strengthen a series of conditions that go beyond design and that are not easy to sustain: political interests, economical support and the involvement of dynamic public and private groups, among others. In the studio, this became clear during the workshops, when the clash between different interest groups - in some cases based on wrong preconceptions - led

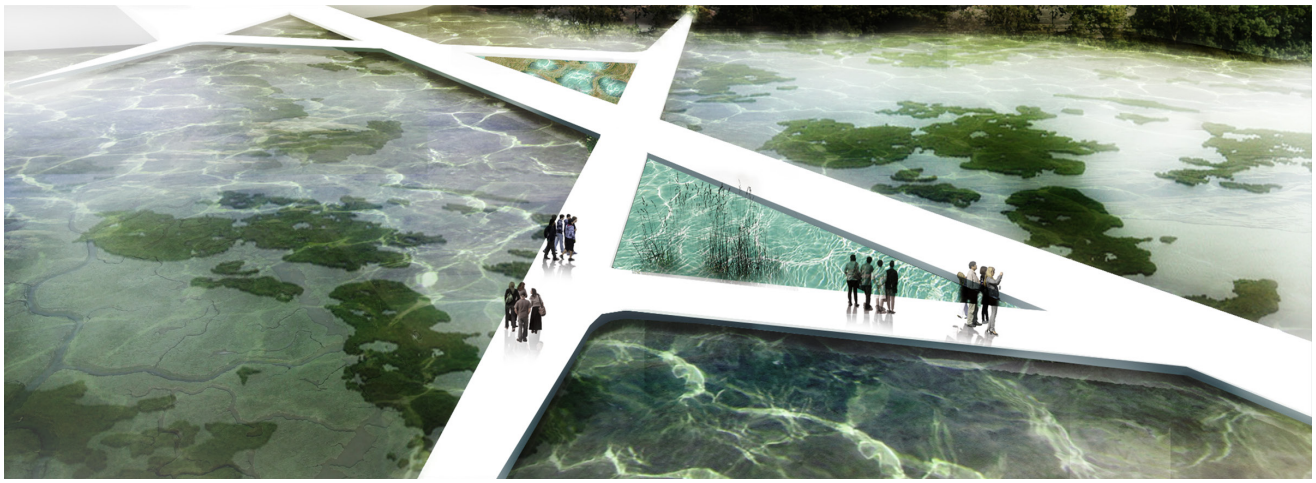

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Figure 3: Living System as center of town–conceptual drawing. Student: Jeremy Hartley.

the conversations to a halt. More and more, students became aware of the importance of listening and communicating the pros and cons of every decision objectively. The analysis of ideas brought up by the professional and non-professional communities involved, brought two important topics to the table: control of the built environment over time and the importance of what sociologist Anthony Giddens calls mutual knowledge.[19]

All too often the role of designers ends at some point of the process. In most cases, inhabitation marks that moment. This becomes clear if one analyzes typical architecture studios, where there is little to no indication as to what is the post-occupancy role of the professional. The interaction between the different disciplines and the community was beneficial from this point of view. Specifically, architecture students seemed to initially conceptualize their designs as finished and semi-passive structures that did not evolve or change, while landscape students were prepared and expected to plan for their creations to evolve and mutate over time. The result was a series of investigations on building adaptability and incremental strategies with responsive materials and construction systems that allow flexibility.

As a consequence of further discussions with the community, the exploration of the studio moved to alternative structures for a variety of building types that differed from the initial Performing Arts Center – for instance a flexible space where conflicts between environmental and commercial agencies could be discussed to advance restoration of the Chesapeake Bay. Additionally, these conversations later led to issues of control and management of the built environment once the projects were delivered, inquiring on the importance of post-occupancy energy consumption measurements and the necessity for constant support and advise from the professional community afterward. The same line of inquiry guided conversations towards issues of design and construction control, where many times designers avoid incremental strategies because of the lack of influence they will have over the final product—in a sense disregarding the value of local ideas and labor in the construction of the built environment.

Nonetheless, if design disciplines are truly in search of a sustainable future, continuous community involvement—and not only support or energy measurements by professionals will become critical. Control is then altered by mutual knowledge—knowledge that is not fixed by professional regulations and

ENDNOTES

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5. At the University of Maryland, the Architecture Program is part of the School of Architecture, Planning and Preservation

expectations, but rather by the exchange and negotiation among the project's stakeholders. By the end of the semester, this became evident for students:

> The workshops [...] were very helpful in refocusing our work on the big picture issues that the town continued to stress. The community members often made insightful remarks and could give us an indication of whether our design ideas would be well-received by the rest of the town [...] I learned that [...] we cannot propose a change without fully thinking through and examining the process by which that change is enacted and how it impacts the community." (Student B, A Reflection on the Studio)

CONCLUSIONS

As of today, architects only contribute to 3% of the world's built environment, raising the question of how to contribute and influence the remaining 97%.[20] This becomes critical when in times like this, climate is causing constant change and the will of a few will not be enough. It is time to re-evaluate the role of the architect and academia, as it seems urgent to re-think the ways in which the profession operates. By increasing the scope of the traditional architecture studio to include other disciplines and communities, not only will students learn to think more holistically, but their work will reach and have an impact beyond the classroom. By taking on real challenges and an open attitude towards problem solving, the complex political, economic, social and ecological implications that lie within the practice of architecture are brought to the forefront rather than prioritizing the skills or objects generated. In addition, by framing climate-change and sea-level rise projects through the realm of transdisciplinary approaches and public participation, the classroom becomes an extended research and learning environment, aimed not just at "designing" but also at doing – hopefully generating a much needed change.

and the Plant Science & Landscape Architecture Department is part of the College of Agriculture and Natural Resources.

6. For more information on the first collaboration between both studios refer to Chanse, Victoria., Quirós, Luis Diego., Adams, Kevin (2012) *Transdisciplinary Approaches to Studio Pedagogy: Civic Engagement on Climate Change in Dorchester County, MD*, Council of Educators in Landscape Architecture Champagne Urbana, IL, Conference 2012.

7. Quiros, L., Mortensen, P., Tilghman, J., *403 Spring 2013 Studio Syllabus*, ARCH 403, School of Architecture, Planning and Preservation of the University of Maryland. Spring 2013. Printed.

8. "Collaborative Education for a Sustainable Future" is the School of Architecture, Planning and Preservation's motto and reflects an aspiration held by our entire community, which includes the Real Estate Development Program, the Colvin Institute of Real Estate Development and the National Center for Smart Growth Research and Education.

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