Climates: Architecture and the Planetary Imaginary

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What Does Climate Change? (For Architecture)

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Climate change changes everything. As Naomi Klein and others have observed, the realities of climate change—from our understanding of the human impact on the planet under current economic and political conditions to our settlement patterns and our energy and agricultural models, from our historical rereading of industrialization and modernization to contemporary visions of our future as one species among many—have altered the conceptual coordinates of inhabitation on this planet and complicated their social frameworks.[1] Now more than ever, there is a clear need to enlist emerging, diverse, and multifaceted forms of practice and action in a renewed engagement with the challenges of the present. To do this requires framing the broader effects of climate change on various disciplines, bringing together climate and social scientists, engineers, technologists, artists, writers, scholars of the humanities, lawyers, historians, and, importantly, architects.[2] For architecture in particular, climate change is recasting the boundaries and interconnections that define the field—affirming that architecture is, in fact, a synthetic discipline.

The overwhelming and impending transformations of our built and natural environments—the vulnerability of flood-prone coastal cities, water shortages, changes to worldwide food production, and the resulting conflicts and large-scale forced migrations—is matched by a collective realization of the herculean response needed for humanity to ensure its survival. The staggering quantitative and qualitative projections for our planetary future inevitably and instantly recast everything about our way of life: the very foundations of our global economy; the urgency of political action in support of technological innovation, regulation, and implementation; and the need for radical social and entrepreneurial transformations. This recasting demands a mobilization across all fields at unprecedented scale and speed, beyond even the most ambitious post–World War II reconstruction. The building of new housing and infrastructure, the launching of radical transnational and developmental initiatives, and the constitution of new diplomatic and nongovernmental institutions are called for.

So what does climate change change for architecture? For well over a decade already, architecture's engagement with climate change has taken on various forms. Most evidently, the notion of *architecture as technology* has led to innovation in energy systems, material performance, and energy regulations and certifications, consolidating the building (in terms of both construction and operation) as the optimal frame through which to regulate architecture's impact on carbon emissions. Combined with the increasingly important field of data science, new developments in sensing technologies, and the possibility of reacting to use patterns through feedback loops have become the leading

frontier of building performance, cementing the understanding of architecture as a technological system reliant upon engineering problem-solving. At its most experimental, this notion of architecture as technology has built on the history of biomorphic design to move beyond formal and structural analogies to natural systems and enlist instead recent computational advancements to "grow" organic and bioengineered materials with carbon footprints close to zero.

Scaling up this systems approach is the idea of *architecture as infrastructure,* which has expanded on Team 10's concept of *building as urbanism* to consider how large urban and ecological systems are intertwined (and can be made more so). This infrastructural focus unites the smaller material scale of building parts with a larger environment. The turn of the twenty-first century saw an expanded definition of "architecture," and of its attendant territory of intervention. The traditional boundaries of the building dissolved, making clear that buildings no longer simply constituted autonomous objects but that their scale stretched to come to that of territorial and ecological systems. This strategy has posited a form of continuity between the urban and the natural, leading to new typologies such as the "landform building" and new forms of strategic infrastructural and ecological interventions.[3]

This conceptual dematerialization of building boundaries has also revealed a new understanding of the material qualities of buildings, shedding new light on the possibilities of making and revealing *architecture as embodied energy.* As Kiel Moe suggests in his *Convergence: An Architectural Agenda for Energy,* architecture needs a more ambitious agenda for energy.[4] As buildings weave together complex systems, parts, and materials, each element extends beyond its presently self-contained and bounded state to touch on the geographies and processes of its extraction, production, transport, and assembly, connecting buildings to the vast territories and scales, spatial as well as temporal, of their making. With every step, energy is consumed, produced, or exchanged, accumulating within the "finished product" as traces of a networked and always-in-transformation life cycle. Seen as assemblages of energy in this way, buildings are imagined as registers of intertwining life cycles, not only consuming energy but also possibly producing it, as the excesses that differentiate building from architecture are transformed into positive externalities, contributing to the life beyond their walls. As architecture registers and manifests the material life it is made of, exposing the complexity of its systems, buildings become quite powerful ecologically.

The need to render such systems legible also points to a renewed interest in *architecture as visualization,* which has intensified drawing and ushered in new mapping practices critically engaged with the nature of data. Lines are no longer drawn as walls but as vectors, making the interconnected and scalar relationships of networks of exchange manifest across extensive landscapes and territories.[5] Drawing climate change's intricate web of causes and effects across geographical as well as historical scales, these new forms of visualizations create layered understandings of planetary politics (resource extractions, forced migrations of humans and animals, labor movements, conflict, and high-speed urbanization) in tandem with the spatial and temporal transformation of our built and unbuilt environments.[6] Interestingly, this reconceptualization of architecture as visualization engages the discipline's capabilities as a parametric practice—not to produce the endless and self-referential form-making that early parametric design invited but rather to open up new possibilities for *architecture as narrative,* a practice that is at once analytical, informational, and projective as it is critical, aesthetic, spatial, and

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Stan Allen and Mark McQuade, *Landform Building: Architecture's New Terrain* (Princeton, NJ: Princeton University School of Architecture and Baden, Switzerland: Lars Muller Publishers, 2011).

4
Kiel Moe, *Convergence: An Architectural Agenda for Energy* (London: Routledge, 2013), in particular the introduction "Matter Is but Captured Energy," 11–32, and Chapter 1 "Energy Hierarchies and Architecture," 33–106.

5
See Neil Brenner's work on "Operational Landscapes" in the exhibition *Operational Landscapes: Towards an Alternative Cartography of World Urbanization,* curated by Brenner and the Urban Theory Lab, ALKF Gallery, University of Melbourne, 2015.

6
See Laura Kurgan's work on conflict urbanism with the Center for Spatial Research.

experiential. From this, new overlapping representations of the world are produced, enabling new forms of collaboration, of politics, practice, and action.

Beyond the legibility of its systems and its making, it is *architecture as form* that climate has yet to change radically. As it continued to resist the question of its contingency, the discourse on form became increasingly isolated, with dire consequences for its ability to contribute to today's shifting concerns. Form's reduction to the abstract and the visual alone found its limit as it became real, with the recent hardships in materializing its smooth virtual surfaces unleashing an explosive response—from the protest surrounding the labor conditions it produces, to the assail of the material and resource excesses of its assemblies, to critique of the complexities and absurd scale of its construction. Only by reconnecting the formal to the informal, the tangible to the intangible, and the visible to the invisible networks of building "form" can the new forms of our contemporary condition be discovered in a renewed collapse of "the real" and its representation.

Finally, and perhaps most centrally for the essays contained in this book, climate change has opened up new lines of inquiry for *architecture as discourse* and as a form of political engagement. If architecture has long been seen as strictly anthropocentric—in its history as well as its projections into the future—design thinking is now considering other species, plants, and animals as equally entitled to shelter and livable environments, undoing the age-old separation of nature from culture and pointing instead to the imbrication of all things in the production of contemporary life. The architectural responses to this awareness consist of shrinking and compressing the human footprint as well as working to improve the lives of other species, moving beyond the common notion that "life on the planet has overall gotten better" and instead acknowledging that it has, in fact, only gotten better for humans—not for the planet and its wildly diverse and equally important "other" forms of life.[7] To refocus architecture on a wildly diverse set of actors can only lead to exciting new possibilities for the field—as discourse and as practice. Moreover, as the concept of the Anthropocene continues to redefine disciplinary boundaries across the sciences and the humanities, it invites us to consider new spatial and temporal scales as frames of inquiry, new material agencies, and new intersections between human and natural histories. The study of the Anthropocene urges an understanding of architecture as a geological agent able to mobilize Earth's resources and alter its atmosphere, and thus argues for renewed critical thought that brings together planetary politics with the design of the built environment.[8]

In many ways, climate change has already transformed architecture, charging and intensifying its expanded field to focus and qualify certain directions, while opening up further territory for critical engagement and for new modes of practice. Architecture was never a single object; today it is more than ever a form of knowledge that can enable the convergence of physical space and historical time. This involves an expanded notion of architecture's "subjects" as well as a reflection on how it is simultaneously constituted as an expanded object, a network, and a field. And yet, despite this promise of convergence, climate change has yet to undo the familiar constructed oppositions between discourse and practice, art and life, aesthetics and performance, communication and technology. At one extreme are discourses and practices focused on technocratic solutions and the firm belief in architecture as a solution advanced by new technologies. On the other are discourses and practices that continue to prop up increasingly fragile walls around the idea of the "art

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This is a common line often most heard at World Economic Forum–type gatherings. For example, this view was upheld by Eric Anderson, chairman of Planetary Holdings, this year (2016) as part of the panel "Life in 2030: Humankind the Machine," which also included Jennifer Doudna, professor of chemistry and of molecular and cell biology, University of California, Berkeley, United States; Nita A. Farahany, professor, law and philosophy, Duke University, United States; Toomas Hendrik Ilves, president of Estonia, Global Agenda Council on Cyber Security; Andrew Moore, dean, School of Computer Science, Carnegie Mellon University; and moderated by Zanny Minton Beddoes, editor-in-chief, the *Economist*, United Kingdom.

See also Doyle McManus, "Bill Gates: The World Is Better than Ever," the *Los Angeles Times*, February 8, 2014.

8

See Etienne Turpin, *Architecture in the Anthropocene: Encounters Among Design, Deep Time, Science and Philosophy* (Ann Arbor: Open Humanities Press, 2013).

of architecture" as the creation of autonomous objects, moved by formal processes and nostalgia for an imagined shared "discipline." This continued polarization leaves architecture's possibility for a renewed and more meaningful engagement with the material realities of the present unsatisfying and devoid of the boundary-defying thinking occurring in other fields.

Yet there is hope for architecture still. In his seminal essay, "The Climate of History: Four Theses"—and, subsequently, at a conference on architecture and climate change hosted by Columbia University GSAPP in December 2014 (a discussion continued in an interview included in this book)—historian Dipesh Chakrabarty offers several insights into how diverse fields, especially those in the humanities, might meaningfully enter into the climate change conversation. What Chakrabarty defines as one of the principal challenges presented by anthropogenic global warming to history—a discipline bound up in a particular narrative of development as freedom, enabled by fossil fuels—is the "collision" of three histories that have traditionally been treated as separate processes: the history of earth and its systems; the history of life on the planet, including that of human evolution; and the history of the industrial way of life we often equate with the era of capitalism. Faced with the vastly different spatial as well as temporal scales of these disciplines and their transversal applications across the humanities and sciences, Chakrabarty finds his framework as a historian insufficient. A more enabling frame would allow one to think across differing scales of time and space—from the history of our immediate lived experiences to the deep history of geological transformations. It would enable holding together our conflicts and differences, with the consciousness of being collectively one: an endangered species among others. Finally, it would imply not the *certainty* of risk management but life faced with *uncertainty* and our inability to model it.

As he redefines the terms of a historian's engagement, Chakrabarty invites other disciplines and fields to reconsider their own boundaries, modes of knowledge, forms of practice, and terms of action. "I knew nothing of the history of earth and the planet system," Chakrabarty remarked at a conference in Berlin, before entering into a detailed explanation of the key moments of that history he found transformative for his own thinking about climate change and the radical paradigmatic shift it presented for the understanding, production, and practice of human history.[9] The siloing of disciplinary expertise has long become a part of universities and governments, from the economists waiting for the scientists to give them the "stable data and projections" they need to compute probability (and thus continue their usual embrace of "risk management" as a model for life on the planet) to the computer scientists at work in the development of automated cars and awaiting "others"—lawyers and ethically concerned members of "society"—to tell them how computerized cars should be programmed to choose between saving various forms of life.[10] This deferral to other disciplines can be heard from the architects who maintain that climate change has nothing to do with "our discipline" as they urge us to wait for industry regulations to dictate what to do—a common historical refrain, already upheld with the adoption of ADA guidelines some twenty-five years ago, with important and at times greatly problematic consequences. Collaboration across expertises, which architects have rightly embraced in recent years as a creative and productive mode practice, is also an invitation to dive deeper into other disciplines, zooming far beyond their contemporary boundaries to retrace old connections and create new ones. Climate change has radically upended what we thought were stable paradigms though which to see the world. In so doing, it presents an incredible chance to reimagine what architecture is, as discourse and as practice.

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Dipesh Chakrabarty, Keynote, "Anthropocene Project: An Opening," Haus der Kulturen der Welt, Berlin, January 13, 2013.

10

See the presentation "Life in 2013: Humankind and Machine" at the World Economic Forum 2016, in which Andrew Moore, dean of the School of Computer Science at Carnegie Mellon University shared the difficulties computer scientists are facing as they program for automated cars to choose between saving lives: for example, choosing between a male driver and a mother and child crossing the street or between a driver and a dog. Moore's position was that scientists were waiting for others to decide those ethical questions.

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See note 9.

12

Henk Ovink, the
former senior
adviser to the
secretary of
Housing and
Urban Develop-
ment, for instance,
advocates against
strict professional
boundaries,
promoting more
active regional
planning and urban
planning for water
engineering and
infrastructure.

13

This term was first
coined by Kate
Orff as part of her
design studio The
Urban Estuary:
Scales of Environ-
ment; it was then
used in the title for
a conference held
at GSAPP.

14

Vitruvius Pollio,
*Vitruvius on
Architecture*, trans.
Thomas Gordon
Smith (New York:
Monacelli, 2003).

15

See Hilary
Sample's lecture
at Columbia Uni-
versity Graduate
School of Architec-
ture, Planning and
Preservation, New
York, March 21,
2016.

The second invitation extended by Chakrabarty's thought, one with deep consequences for architecture, is his call to "cope with the problem of scale."[11] As one considers not only architecture but all of the disciplines of the built environment, one is confronted with academic disciplinary boundaries and professional expertise that impede the possibility of connecting, thinking, and acting across scales: from the material and structural scale for engineers, to the building scale for architects, the neighborhood and master plan scale for urban designers, and that of cities and regions for urban planners.[12] These boundaries follow both spatial and temporal scales, visible in the constructed boundary between "architecture" as a discipline and "historic preservation" as another—as if past, present, and future could ever be discontinuous. This embrace of scale was the driving principle for one of the most seminal architecture books of the twentieth century, Rem Koolhaas's *S,M,L,XL*, in which scalar discontinuity was at once structural as a main framing device for building and undermined as continuous ideas, forms, and effects cut across all of the scales. Today, following the notion of "scales of environment" it is the tracing of people, animals, objects, materials, and energies that could become structuring, and restructuring of architecture and the disciplines of the built environment.[13] How do we design "scales of environment" at once connecting the scale of a brick with that of a building, a city or an entire territory always in simultaneity? How do we rethink the past and design for the immediate future as well as for the longer future of geological time?

Finally, and maybe the most compelling and challenging of Chakrabarty's invitations is to consider what it means to live with uncertainty. For architecture and the disciplines of the built environment, this question has been posed as "how do we design or plan for uncertainty?" But the issue should be larger than the challenging of design approaches and planning frameworks, even if both need to be recast. The history of architecture is one of certainty: from the classical representations of power and authority to the modernist embodiment of progress, the postmodern claims about disciplinary origins and boundaries or the more recent abandonment to formal pleasures and scalar excesses. Throughout this evolution, even the most critical of practices failed to undermine architecture's Vitruvian "firmitas," despite having the ground gradually pulled from under its foundations.[14] And yet, as rising waters redraw edge conditions, as migrants erase territorial boundaries, as time is stretched to that of geological transformation, and as seemingly endless flows of information recast our concept of context, there is an urgency to move beyond the stability and certainty offered by oppositions, to consider instead weaving together *uncertain* grounds and positions from which to project new forms of knowledge, of engagement, and indeed, of architecture. As architecture becomes an expanded, perforated, and porous object, whose edges in space and time are always in flux, we can plan for redundancies and design for resiliency, or at times, engage in mad alchemy as we rewrite architecture as the art and science of the unknown.[15]

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