

Matterscapes

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Ecological awareness starts with visualizing the time and space embodied in every element of the built environment. From substance called matter extracted from the earth system to material made, transported, and converging in a building, the afterlife of material can trigger different timescales depending on its ability to be part of a loop. For this reason, studying the material's life cycle begins with understanding the time dimension behind the "Matter-Material-Matter?" sequence.

Matter, extracted from the earth's crust, generates an economy and a social organization. From industrial landscapes to eco-logical upheavals, the transformation and transport of matter shape our living environment. Matterscapes means a com-prehensive view of the matter. This concept aims to decipher the interconnection between different network systems inte-grated into the use of materials. Matterscapes respond to the scrambling of networks and data triggered by globalization and the abstraction of climate change.

The content of the "Matterscapes" class is directly linked to the urgency of visualizing the journey of matter far beyond its temporality restricted by the life of a building. Visualizing the economic, social, and ecological landscapes intertwined in the life of matter could initiate the power of actions in our psychology.

In 1949, Aldo Leopold, father of wildlife ecology, claimed the need to narrate history from an ecological interpretation to build an ethic between people and land. In *A Sand County Almanac*, he explains how this new ethic would highlight that man is a member of a biotic team because ". . . the individual is the member of a community of the interdependent parts."

Nevertheless, four decades passed before Leopold's argument could be demonstrated. In 1991, William Cronon, one of the most important environmental historians, in his book *Nature's Metropolis*, asserted and demonstrated the intertwined and inseparable unity of the city-country system

that built Chicago. Moreover, he reveals that the city's story was based not only on that system for making and spending money but also on the unexploited natural resources inhabited for thousands of years by the Indians to create a wealth foundation. Cronon explains how entrepreneurs in Chicago and the Northeast aggressively capitalized on these natural advantages by building canals, railroads, and lake shipping networks that allowed this business-driven city to tap its surrounding region. The book opened up a new consciousness on the interrelations between the built environment and infrastructure network that sustains the city beyond its locality. Therefore, the "story of metropolitan expansion" initiated the construction of a new ethic that marked the starting point for recognizing the environmental history discipline.

Is awareness of the intertwined relationships of our transformed material world a sine qua non for forming a cosmopolitan architect of the 21st century? The *Matterscapes* course is an attempt to delve into and explore this question. Indeed, *Matterscapes*—an expanded view of matter—aims to provoke a greater sensitivity to the journey of matter that converges in our building-like material world. From the object designed to the construction strategy shaped by architects, it is necessary to claim not only the value of raw materials but also all the landscapes triggered by the manufacturing process before and after the convergence toward a building. *Matterscapes* challenges future designers to visualize the vastness of time, space, and energy embedded in the characteristics of building materials. Beyond objects assembled in a specific place, materials can be seen as a state in the course of matter. By revealing the temporal ecology in the life cycle of a stone or an oak floor, we can shape a new sensitivity regarding our living terrains. As Timothy Morton wrote in his book *The Ecological Thought*, "Ecology isn't only about vast space but also about vast time."

This paper highlights the pedagogical tools developed in the Materials' class, *Matterscapes*, taught over four years at the Gerald D. Hines College of Architecture and Design, University of Houston. The approach to the journey of matter starts from a philosophical position. It then establishes the basic steps for scientific research on the life cycle of the material while it juggles with artistic representations. In other words, navigating through and crossing different modes of existence

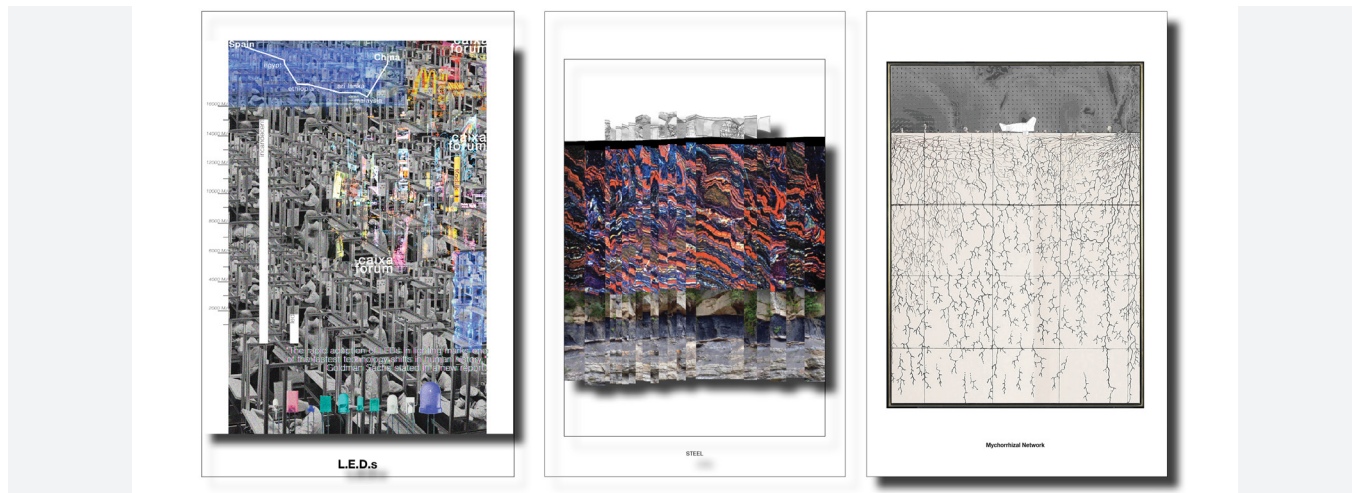


Figure 1. Material's life Cycle's Collages from Matterscapes Class. Image credit. Patrick Margain, Iker Rodriguez, Ana Sevilla.

might be an essential component of approaching the complexity of the extended view of the material world. Therefore, it might create a new sensitivity leading a designer to action.

POSITION

New Materialism Vs Phenomenology

According to Manuel DeLanda, "Any materialist philosophy must take as its point of departure the existence of a material world that is independent of our minds," which stands against a phenomenological approach to the material world. New materialism, claimed by DeLanda and built upon Deleuze and Guattari's philosophy, offers the possibility to redefine the responsibilities of humankind on planet Earth. That is to say, following up on his theory, the phenomenological standpoint of the material world triggers a disconnection or decontextualization of the natural relation between culture and the social and geographical territories. Consequently, human beings cannot establish responsibilities between extraction processes on the earth's crust and the degradation of the biosphere.

Matterscapes' theoretical position has its foundation in the new materialism philosophy. It aims to provoke a dissident voice for students who inherited a phenomenological architectural education where the material world only exists through the human experience.

This exercise of distinguishing the two positions is based on individual research. Students are asked to extract the basic concepts of these two philosophies to compare them. They prepare a five-slides presentation to demonstrate their understanding in class, utilizing a selection of possible architectural examples. Thus, the misunderstandings can easily be reviewed, polished, or corrected in class.

Matterscapes states the urgent need to assume responsibility in the transformation process of the material world. However, to give a sense of it, we need to tackle the visualization of the network that sustains the material construction of the architectural building.

MATERIAL GEOGRAPHIES I

From the Material Library to the Territory

Before converging in a building, a material carries with it not only a territory of extraction or exploitation, but all the social and economic landscapes built around its commodification. How can we visualize the blurriness of the actors who hide behind a material selection for an architectural project?

The first step focuses on identifying the infrastructure that enables any material to be obtained in Houston today. With the help of the Material Research Collaborative—a resource within the Gerald D. Hines College of Architecture and Design that has an online library and gathers multiple material samples—students select one material and search for information regarding its manufacturing process. After defining the physical properties of the selected material, students are asked to present the different steps of its life cycle: origin, extraction, transformation, transportation, assembly, and maintenance over time once it is part of a building. Afterward, the work is complemented by a collage highlighting one of the main elements of the life cycle of the material that students consider difficult to comprehend or visualize through "scientific" research or conventional material narratives.

The origin of the material indicates the time required for its formation or production. It leads to identifying mainly two different cycles: geological and photosynthetic. Both are interrelated to the Gaia regulation system and solar energy. Indeed, from marble to thermoplastic, geological times have generated the substances that are extracted today. From the mountain that feeds a mine to the oil-soaked subsoil, the raw material transformed by man requires millions of years before being extracted. On the contrary, a tree that depends on light energy, water, and carbon dioxide has much more to share with the human lifetime.

In contrast, manufacturing processes, transportation, and assemblies account for a very short cycle that tends to be accelerated in some countries to generate greater economic benefits. The cycle might also depend on the closeness of the

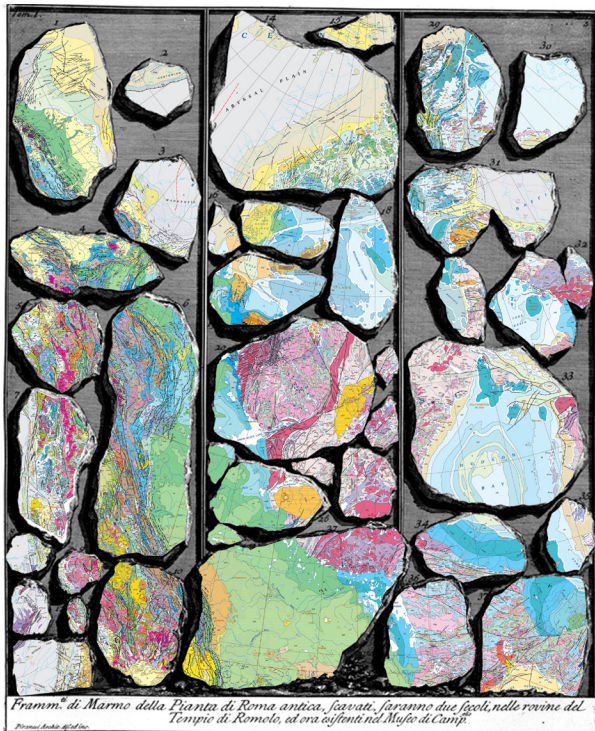


Figure 2. Author's collage based on Piranesi's Engraved *Frammenti di marmo della Pianta di Roma antica*, 1795

extraction or production site of the material.

The assembly process can reveal different social, economic, and energy systems. Indeed, machines, human labor, or both would be related to a very different energy system and economic organization: fossil fuel versus metabolic energy. It means that a brick made and assembled in Mexico will rely much more on human labor than one in Texas, triggering a very different socioeconomic landscape.

Finally, maintenance introduces the idea of obsolescence that can partially depend on material degradation over time. Nevertheless, the idea of obsolescence—later deepened in the course from a social, political, and economic standpoint through Daniel Abramson's book *Obsolescence: An Architectural History*—helps identify the hidden actors of the accelerated decay of architectural buildings. Beyond the physical properties of materials, Abramson demonstrates that the belief in obsolescence profoundly affects architectural design. He highlights the history of two opposite insights regarding decay that stand among architects. He depicts the struggle of each position: While some designers promise to liberate humans from conventions and habits, addressed by ephemerality and waste, others resisting such impulses defend a more sustainable practice by adapting, reusing, and preserving the built environment.

Today, facing material scarcity and breathing the ashes of our conquest for freedom, it seems obvious to choose the last position, but while the Third Industrial Revolution,—based on the synergy between renewable energies and internet tech-

nology—comes down slowly to Earth, the following question tackles the representation of the Globe.

REPRESENTATION OF THE GLOBE

From the World to Gaia

Five centuries after the first cartographies, established from the voyages of the Renaissance explorers, the representation of planet Earth does not require new technical tools. Rather, it is based on redefining the representation of Gaia that would build new relationships with it. The construction of a new sensitivity for our living milieux is the main task that the historian Ait-Touati has tackled, in partnership with two landscape architects Arènes and Grégoire, in their book *Terra Forma: A Book of Speculative Maps*. The work is a manifesto that claims a new cartography that aims to reveal the interrelations within living things rather than the space available for conquest and colonization. Instead of avoiding planetary limits and continuing to define ourselves from a vanishing point on the horizon, the authors claim to enlarge the thickness of our living environments.

The meaning of the blue marble's representation is presented to students to bring out the ideology carried by the earth's maps. From the different projections that trigger the changing proportions of a continent for geopolitical interests to the geological description of material attractions, a map is a tool for power. Students are encouraged to seek a world map that consciously helps them position themselves with a consistent ideology. Thus, they are prepared to scale-down their framework analysis and focus on a curated precedent in which converges an entanglement of materials and geographies.

MATERIAL GEOGRAPHIES II

Entanglement of Geographies, Materials, and Landscapes

Classical Geography is undoubtedly one of the first disciplines to carry the project of Modernity. Geographers, at the time of the conquest, were in charge of identifying and representing the affordances of the territory. Plains, mountains, rivers, coastlines, etc., were not just contributing to the social organization on the land, giving opportunities for subsistence; indeed, their representation highlighted the deep relationship between human activity and material attraction. Before the real economy, which is countable and governable, human survival was described as the relationships between vital resources and human collectives.

However, today, this relationship does not rely on the local affordances of the land. Freed from spatial constraints, man does not quake to bring materials from the other side of the planet. Although economic globalization, fed by the extended and accelerated trade flows, has disconnected designers from visualizing the foreign landscapes embedded in their material selection, globalization is a concept that helps us define new human relationships with the living environment that constitutes the planet. Indeed, globalization is the process that establishes and imagines the systemization of all social realities



Figure 3. Copperplate Engraving by Anonymous Author, 1590

(human, non-human, materials, and ideal realities) in a configuration of spaces and times on a global scale within which any local phenomenon is global and vice versa. Thus, the concept of globalization helps us understand the interdependence of our lives on Earth.

The documentary *Manufactured Landscapes*, which depicts Edward Burtynsky's work about China's economic boom in the 2000s, has been a thread weaving the different parts of the course. It helped by illustrating the multiple landscapes that carry our built environment inherited from economic globalization: material geographies, cultural, socio-economic landscapes . . . They all illustrate the journey of material and the exoskeleton built to support it. The Edward Burtynsky photos play between the terrible and the sublime while opening a conversation about the impact of human activity on Earth.

In this chapter of the *Matterscapes* class, each student or student's team has a precedent. All the precedents aim to be extended all over the planet. They are located on different continents, and each of them should help reveal the tension between local and global. USA, Mexico, Paraguay, Chile, Nigeria, Zimbabwe, India, China, Vietnam, Australia, and Europe all present a diversity of geographies which allow revealing social, cultural, economic, and environmental landscapes. By using their precedent, researching about the life cycle of three materials and depicting the most relevant information

with a collage, students aim to convey the journey of the matter-material from an unconventional perspective.

AFTERLIFE OF BUILDINGS Beyond the Anthropocene

Beyond depicting the Anthropocene and being paralyzed by the inertia of capitalism, what about *Staying With the Trouble* as suggested by the philosopher Donna Haraway? We cannot accept ". . . a position that the game is over, it's too late, there's no sense trying to make everything any better, or at least no sense having any active trust in each other in working and playing for a resurgent world." Would it be an opportunity for designers to work on reconsidering the value of the materials by redesigning our architectural strategies regarding possible material disassembly and afterlives of buildings and materials? This question highlights one of the main arguments of this paper. How can we, as designers, work toward minimizing waste and designing with undervalued materials to allow material manufacturing processes to be redefined within a circular economy? To illustrate this point, Atelier LUMA and ROTOR Cooperative Design practices might be great examples to demonstrate the realism of the purpose.

For this reason, after grasping the essence of the journey of matter-material until they are assembled into a building, we should fight for some optimism in projecting to

our built environment the idea of quarries of the future. Students can re-empower themselves in the fascinating design discipline by speculating on the afterlife of a building. As designers, we can be actively involved in reevaluating the residues of the material production and optimizing design assemblies to ensure reusing and recycling processes. We can work on “making generative oddkin” within our discipline, but to do so, we also need to change the stories of our built environment. How can we disturb the conventional stories of material life cycles based on intense data that are difficult to digest and balance? Our material world needs attention and care built upon new stories. Narratives that might not be tangible on the numbers compiled on an Excel file but will rather help build or rebuild, in our modern western societies, a sensibility for our intertwined lives on Earth.

POSITION, SPACE, AND TIME

Land Art and Matterscapes

The 1970s marked one of the most significant artistic shifts in America. Rachel Carson’s book titled *Silent Spring* on the adverse effects of industrial chemicals, nuclear weapons threats in the Cuban Missile Crisis in 1962, and the massive offshore oil spill in Santa Barbara, California, in 1969 opened a period of social-environmental protests and gave birth to a diverse and activist vision of political ecology. Architecture and art, deeply interlaced with those intense events, brought new aesthetics, from Fuller’s tensegrity structure to Land Artist’s Earthworks. All the cultural actors related to this engaged vision toward a “planetary ecology,” drove a new relationship between art and environmental activism.

In Utah’s Great Salt Lake, Robert Smithson—another iconic artist of the Land Art—offers, in his work *Spiral Jetty*, a critical response to historical ideals about progress by playing with forms at multiple scales, with the spiral shape alluding to the molecular structure of salt. With a large quantity of mud and rocks, *Spiral Jetty* builds a curving road on which the video performance filmed the artist rushing with an uncertain run path to nowhere. The recording encapsulated Smithson’s fascination with entropy and system failure, using spatial and temporal scales to depict a material world transformed over different velocities. The mixing of maps, dinosaur skeletons, machines, and the slow salt water movement play with unexpected rhythms and sounds until our stunning.

The Smithsonian’s complex and often inaccessible work also foretells the unachieved Earthwork called *Bingham Copper Mining Pit, Utah Reclamation Project*, in 1973. Before his premature death in a plane crash in 1973 while filming *Amarillo Ramp* in Texas, the land artist stated a pragmatic view of art and ecology: “The world needs coal and highways, but we do not need the results of strip-mining or highway trusts. Economics, when abstracted from the world, is blind to natural resources. Art can become a resource that mediates between the ecologist and the industrialist. . . . Art can help to provide the needed dialectic between them.”

Smithson’s commitment to entangling art and ecol-

ogy is the final stage for depicting the journey of matter-material in class. The introduction of land artist aesthetics helps students weave relationships between the different actors of their final project: precedent’s materials, space, and time. Indeed, students culminate the *Matterscapes*’ class by projecting a different narrative of their building in which they compile all their research, collage discoveries, readings, and class conversations.

TOWARD THE REBUILDING OF SENSITIVITY TIME-LAPSE DOCUMENT

Robert Rauschenberg, American painter and graphic artist, produced the first *Earth Day* poster in 1970, by juxtaposing heterogeneous real-world images. Thus, his graphical eclecticism highlighted the aesthetic of postmodern language and opened up a critic on traditional and homogenous ways of depicting environmental ideals. Rauschenberg conveyed the need for more hybrid representation related to ecological consciousness and stated, “Once the individual has changed, the world can change.” Simply put, the construction of a new cosmology will trigger a new way of inhabiting *the Critical Zone*, that is, the earth’s outer skin.

Matterscapes, with its modest timeline framework, aims to bounce on that statement by mixing scientific, artistic, and environmental approaches to the journey of matter-material before and after converging into a building. The pedagogy of this course dismisses the faith in techno-fixes. It rather encourages a different ethos built upon an artistic-sensitive representation of building materials. It embraces the vast space and vast time of the journey of matter within a specific architectural building. In the end, *Matterscapes* takes the bet that “Art speaks not only to the senses we can describe in language but also to those we are unable to express. Art allows us to feel ideas and thoughts. The knowledge we obtain through experience informs our actions globally and locally. . . . Art is the key, and science, the tool for ensuring humanity a wondrous future here on earth.”

ENDNOTES

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17. Smithsonian untitled statements, (1971), in *Collected Writings*, 376.
18. On photographic montage, see David King and Ernst Volland, eds., *John Heartfield: Laughter Is a Devastating Weapon* (London: Tate Modern, 2015); Peter Boswell and Maria Makela, eds., *The Photomontages of Hannah Höch* (Minneapolis: Walker Art Center, 1996); and Rauschenberg quoted in Mattison's essay, "Robert Rauschenberg's Environmental Activism."
19. The National Research Council (NRC, 2001, p. 2) defined the Critical Zone as "the heterogeneous, near surface environment in which complex interactions involving rock, soil, water, air and living organisms regulate the natural habitat and determine availability of life sustaining resources."
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