Columbia University
Graduate School of Architecture, Planning and Preservation
A4104-3 Syllabus: Advanced Studio IV, Spring 2022, "Scales of Environment"
Critic: Lindsey Wikstrom (lmw2167@columbia.edu)

Fringe Timber: ***An Ethics of Care in a Vertical Commons***

Given their production of oxygen, and thousands of years of providing fuel and building materials, forests are fundamental to life and civilization, which are synchronistically transformed and interpreted by human thought. The last 500 years of Euro-centric power produced imaginaries of nature, value, virtue and therefore personhood. From Dum diversas (1452) declaring moral authority to vanquish native flora, fauna, and persons, "into perpetual servitude"; to the book Sylva (1664) that framed forests without Cartesian improvement as abandoned places; to the ongoing practice of imagining American forests as wilderness in the form of National Parks (1916), as opposed to occupied and cultivated indigenous landscapes. Since building materials come from colonized landscapes, the modern built environment is a derivative of cultural, spiritual, colonial interpretations of nature. The co-production of societies and forests has been consciously understood and practiced by both colonizing and non-colonizing groups, each with an accompanying interpretation of nature's value as it relates to a specific definition of sustainability. To imagine equitable non-extractive living environments for humans and non humans, the supply chain for renewable building materials—its underlying protocols for cultivation, making, moving, using, and reusing—must be re-designed.

The energy required to produce concrete and steel is far greater than the carbon emissions of all the world's cars and planes combined.[1] This industrial heat complex has entrenched environmental racism, resource degradation, and wealth consolidation as the means for modern life. When thinking in terms of global material flows, most often, increasing distance between sites of consumption and sites of extraction are incentivized, with the goal of accumulation on one side and dispossession on the other. Without a deeper understanding of value at both sites, the built environment will continue to depend on supply streams that marginalize and exploit.

Architects are not neutral when it comes to global material flows, our material expertise is implicated. Material choice is the moment when we actively eliminate carbon from our palette; it's when existing or new supply chains are affirmed or denied. Material choice is a vote for the factories, the working conditions, the trade agreements, the mining protocols, the fuel used. Decisions at this scale profoundly impact the long term health of citizens, both local and global. In these moments, architects are carbon brokers, negotiating between human needs and the earth itself, between humans and non-humans, present and future, local and nonlocal. Not surprisingly, from this point of view, beauty and access to beauty emerges with immense importance. Most often beauty is the contract through which carbon is given value, as we ask ourselves, "is it worth the heat?"

The Timber Innovation Act, passed in late 2018, as part of an agricultural improvement bill, outlined new initiatives for research and development of mass timber, launching investment in construction projects and subsequent supply chains.[2] The goals are to reduce carbon emissions and provide jobs in rural places. Smallholders, silviculture, intercropping, rewilding, afforestation, and genetically modified trees will generate new sources of renewable income similar to other agricultural practices. And, the International Building Code of 2021 acknowledges the high performance of mass timber, allowing buildings up to 18 stories and confirming its fire resistance that, in some cases, rivals steel. Together, these policies are inviting a new era, and new scale, of renewable construction. Composite wood of any shape and size will emit less carbon than equivalent materials that require industrial heat. Numerous products have emerged including NLT, DLT, GLT, LVL, MPP, LSL, OSL, PSL, MHM, and WLT to name a few, all designed to mitigate resource availability, expand machining capacity, enage local labor pools, enhance speeds of construction, and improve building quality.

The most common and versatile of the products is certified CLT Blanks, or uncut panels the size of a truck bed. Right now, they rely on the growth rate, strength, and predictability of only a few species: douglas fir, spruce, and pine. Codification of this architectural product through ANSI interlocks the biological makeup of our forests to the needs of the built environment like never before, incentivizing the proliferation of only a few species. In the Pacific Northwest, softwood cultivation on public land is common because of its checkered[3] past and logging culture. In the Northeast, most land is privately owned with a history of preservation, with more biodviersity and more forest fragmentation. In this context, an increase in mass timber construction will conserve the forest, preventing urban sprawl, but only if the local species are incorporated into mass timber products and coalitions of cultivators are formed. In the last remnants of a neoliberal economy, trees must maintain a higher value on the market than agriculture or greenfield development.[4]

Today, New York has the highest volume of live trees in the country, but that wasn't always the case. The Northeast was settled prior to the Declaration of Independence and is primarily unceded (lack of treaty) territory. New York was occupied by the Mohican, Munsee Lenape, Haudenosaunee, Oneida, Mohawk and many other nations before the Europeans arrived. Between 1776 and 1887, 1.5 billion acres of land was stolen from Indigenous nations across the U.S. either by executive order or treaty signed under duress.[5] During this time, forests were also disappearing fast to fuel the development of industrial towns that in turn fed the rise of large urban centers like New York City. But at the turn of the century, New York was the first state to reverse deforestation. A new ritual was initiated: planting seedlings to replace cut trees. Franklin Hough, often called the "father of American forestry", helped seed hundreds of millions of Norway spruce, white pine, red pine and Scotch pine, planted to protect the environment against ultimate depletion, but also to provide timber. As economic depression and poor soil caused the abandonment of farms, the state aggregated and afforested this land, eventually leading to stronger ecosystems. While local resource extraction was tempered, consumption was not, leading to global outsourcing and the slow violence of material supply chains we have today.

1 Friedmann, J., Zhiyuan F., Ke, T. "Low-Carbon Heat Solutions for Heavy Industry: Sources, Options, and Costs Today." Columbia University Center on Global Energy Policy. (October 2019): 59.

2 Agriculture Improvement Act of 2018, H.R. 2-9, 115th Cong. ss 8641-8644.

3 Checkerboarding refers to a situation where land ownership is intermingled between two or more owners, resulting in a checkerboard pattern. Checkerboarding was deployed in the Northwest US during the 19th century to break up traditionally communal indigenously occupied settlements into many individual plots and allow non-natives to privatize land between those settlements.

4 Monbiot, George. "The Pricing of Everything" SPERI Annual Lecture at Sheffield Political Economy Research Institute at the University of Sheffield. July 2014. https://www.monbiot.com/2014/07/24/the-pricing-of-everything/

5 Data based on maps produced by the Bureau of American Ethnology in 1899 under the guidance of Charles C. Royce

6 Earth Charter and Ecological Civilization as a Mutual Flourishing by Center for Earth Ethics

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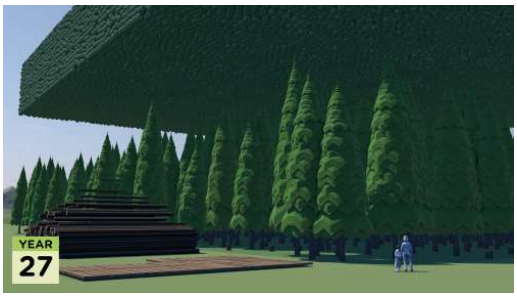
If we are to redistribute material flows back to localized conditions, human and non-human needs must be designed in tandem. We need to envision a new kind of "civilization".[5] Renewable construction that improves health, relies on regional resources, and builds wealth for BIPOC owners demands new places for new interpretations of nature, with new rates of change and protocols, and ultimately new architectures. When it comes to the transformation of resources for the public good, a critical position on values, rituals, and limits is required. As our climate continues to transform, the new-normal will most likely be ever-changing, demanding the the establishment of intelligent and flexible reciprocal relationships in opposition to entrenched linear systems that rely on the pollution of extraction, designed absolescence, exported waste.

Students will design a vertical commons, a community owned forest, research and manufacturing facility, that produces mass timber for urban centers in the northeast, using mass timber as the primary building material. In groups of two, students will begin by constructing a graphic narrative of Equivalents to establish a scale for their project. Then, using this idealized scale, each team will choose a brownfield site, and through an analysis of ecological and material flows, propose new methods of generating and distributing renewable materials through new rituals and greater purpose. Students will design an architecture that supports an intentional cadence of life, describing through drawing how the place actively participates in reducing carbon emissions and engages in environmental justice.



Making Sense of Carbon, Trees and Timber by Carbon Visuals (2015)

Building Immersion at Soul Fire Farm, Petersburg New York (2019)

EQUIVALENTS (2 weeks)

As a studio collective, build a living document that tracks the equivalent impact of each process and material across the supply chain of mass timber. Individual students will choose one phase of mass timber to study: planting, harvesting, sawyering, laminating, cutting, transporting, constructing, occupying, deconstructing, decomposing, etc. The gathered metrics that describe the carbon footprint, health impact, ecological impact, etc. will be collectively workshopped and compiled.

In teams of two, create a graphic argument for an appropriate scale for mass timber. For example, if Douglas Fir trees grow approximately 24" every year, are harvested in heights of 16', and grow as close as 20 feet apart, then 1 acre of trees yields 100,000 board feet of wood after 100 years, absorbing 450 tons of carbon equivalent to: taking 100 cars off the road for 1 year, powering 1 family residence for 80 years, or 5 CLT Blanks.

READING

Buck, Holly J. "Introduction Desperation Point" in *After Geoengineering: Climate Tragedy, Repair, and Restoration*. London: Verso, 2019.

Elbein, Saul. "Will the skyscrapers of the future be made out of wood? Wood products that are nearly as strong as steel are going into more high-rises, locking up carbon. But can we grow enough trees to keep pace?" *National Geographic*. January 13, 2020.

REPRESENTATION (due 02/03)

1. Collective equivalents drawing
2. Large format print describing the metric-based relationship the forest, mass timber and human habitation

RITUALS + SITE (2 weeks)

Using your established scale (1 acre, 10 acres, 100 acres) located in affiliation with the Black Rock Forest before the scheduled daytrip. Utilize the Black Rock Forest Consortium's data archive to develop an understanding of the landscape over the last 100 years.

Using a deep understanding of value over time established in the previous exercise and leveraging multiple representational techniques, expand the definition of a living laboratory program for the site. Consider the visible and invisible choreography of indigenous material resource stewardship, reciprocity and reparation models, land trusts, privately owned protected forests, long and short term environmental change as well as long and short term human needs.

Through topographic circulation and multi-species analysis, draw the biological, ecological, economic, and ritualistic circulatory flows of a proposed way of life on the site.

READING

Jabr, Ferris. "The Social Life of Forests" New York Times. December 12, 2020.

Antonelli, Paola. "Design and the Politics of Wood" *Formafantasma Cambio*. New York: Koenig, 2020: 35-45.

Derek Wall, "Commons Ecology" in *The Commons in History*. Cambridge: MIT Press, 2017.

REPRESENTATION (due 02/16)

1. Large format print describing everyday life at least three scales
2. Large format print describing the ecological flows over time

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Mid Rise Building in Quebec by Nordic Structures

MODULARITY & MANUFACTURING (9 weeks)

After the first patent was filed for composite lumber (what looked like Cross Laminated Timber and Laminated Veneer Lumber) in Tacoma, Washington (1920), the concept evolved in the less massive easily hand-lifted panels of plywood as opposed to crane-lifted CLT or equivalent. Plywood feeds the rapid and long-lasting economic and cultural emergence of private housing in suburban and rural communities throughout the twentieth century. But, after Gerhard Schickhofer published his thesis in 1994, Austria released the first ever national CLT building code, launching new supply and demand for large composite wood focused on urban density rather than the single family house.

Through physical models, develop a critical viewpoint towards modularity. Deploy your interpretation of modularity as an architecture made entirely from CLT Blanks. CLT Blanks range in size and thickness, from 3" - 12" thick, with a panel size of 11' x 55' that can be subdivided. Theoretically, dimensional lumber can be cross laminated indefinitely, but panels are limited by the size and capacity of semi-truck beds as manufacturing facilities are not co-located with construction sites. Using 11' x 55' panels, invent a new way to manipulate and accumulate mass timber to support the rituals and ecological flows on site with a focus on providing occupiable space in support of your values, site constraints, and rituals. Explore the tensions of lightness and mass, bending, folding, creasing, carving, interlocking, twisting, thermal radiation, weathering, grain and unique local species characteristics. Push the material beyond recognition.

Architecture's mass, geometry and porosity should establish a distinct sequence of experience, an unfolding of an ascribed social contract, the spatial hierarchy and ecological reciprocity within the site. From the operational protocols to designing distinctly nested zones of generation and non-generation, the architecture should enhance the health and wealth of those involved, represent a critical position towards speed and economic value, thermal envelopes, and a multi-generational experience.

READING

Demos, T.J. *Decolonizing Nature: Contemporary Art and the Politics of Ecology*. Berlin: Sternberg Press, 2016.

Fabrizi, M., Lucarelli, F. *Inner Space: Constructing the Imagination*. Lisbon Architecture Triennale: 2019.

REPRESENTATION (due 04/25)

Modularity Critique w/ Physical Models
Physical Model of Final Design
Comprehensive and Compelling Presentation

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SCHEDULE

01/24	Studio Introduction
01/26	Model Tutorial Lecture
01/27	Group Workshop: EQUIVALENTS
01/31	Project Discussions: EQUIVALENTS
02/02	Adv IV Lecture
02/03	Pin Up: EQUIVALENTS
02/07	Project Discussions: RITUALS + SITE
02/09	Adv IV Lecture
02/10	Day Trip TBD
02/14	Project Discussions: RITUALS + SITE
02/16	Adv IV Collective Review: RITUALS + SITE
02/17	Project Discussions: MODULARITY
02/21	Project Discussions: MODULARITY
02/23	Project Discussions: MANUFACTURING
02/24	Project Discussions: MANUFACTURING
02/28	MIDTERM REVIEW: MODULARITY & MANUFACTURING
03/03	Attend other Midterm Reviews
03/07	Adv IV Kinne Week
03/14	Spring Break
03/21	Workshop: Mass Timber Structures
03/23	Adv IV Lecture
03/24	Project Discussions: MODULARITY & MANUFACTURING
03/28	Project Discussions: MODULARITY & MANUFACTURING
03/30	Adv IV Lecture
03/31	Project Discussions: MODULARITY & MANUFACTURING
04/04	Project Discussions: MODULARITY & MANUFACTURING
04/06	Adv IV Lecture
04/07	Project Discussions: MODULARITY & MANUFACTURING
04/11	Project Discussions: MODULARITY & MANUFACTURING
04/13	Adv IV Collective Review: MODULARITY & MANUFACTURING
04/14	Project Discussions: EQUIVALENTS, RITUALS, SITE, MODULARITY & MANUFACTURING
04/18	Project Discussions: EQUIVALENTS, RITUALS, SITE, MODULARITY & MANUFACTURING
04/21	Project Discussions: EQUIVALENTS, RITUALS, SITE, MODULARITY & MANUFACTURING
04/25	FINAL REVIEW: EQUIVALENTS, RITUALS, SITE, MODULARITY & MANUFACTURING
04/26	Attend other Final Reviews