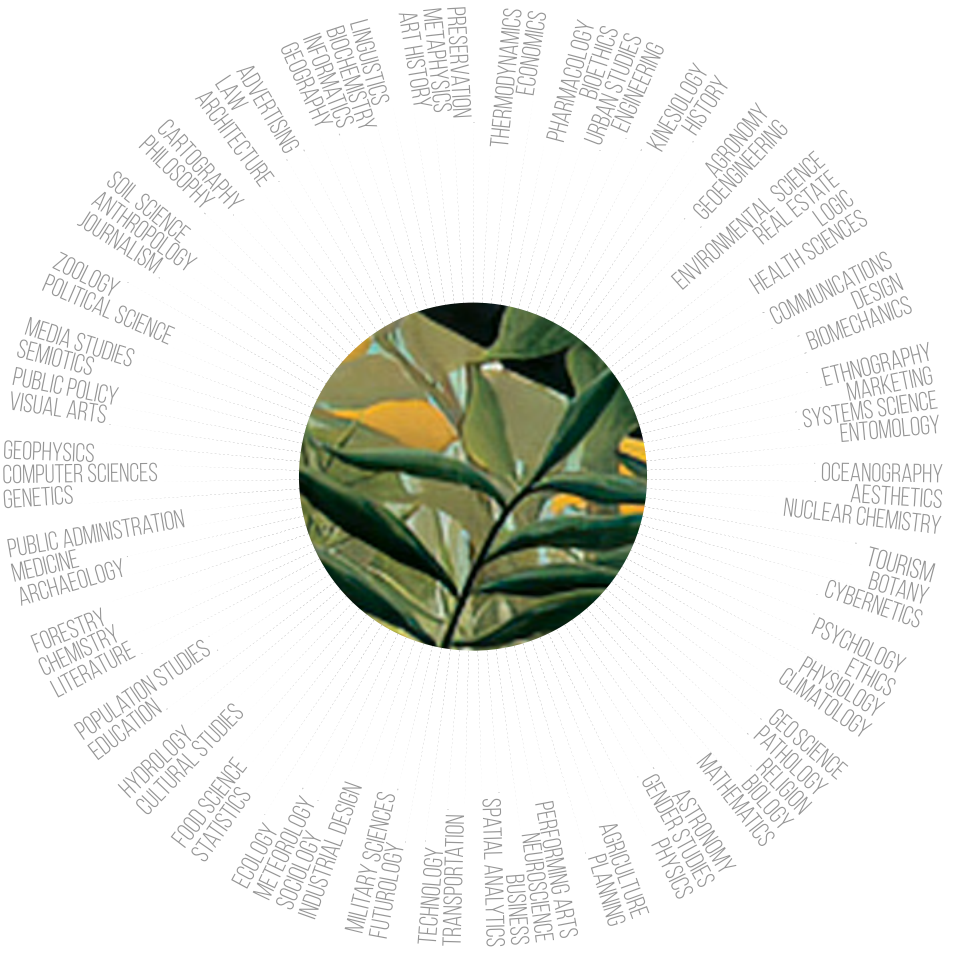
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# GREEN SCREENS IN EIGHT CHANNELS

SHANNON MATTERN

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+ MEDIA STUDIES, CULTURAL STUDIES, ART



Formafantasma, *Cambio* (2020).



Georges Méliès, *Dislocation Mystérieuse* (1901).

### Channel 1

We start about 200 feet in the air, then descend through the pine boughs toward the forest floor, where there lies a green screen, an illuminated rectangle waiting to be animated with moving images. The green flips from figure to ground as we watch, as if through a microscope, the subtle movements of blue and green photosynthetic bacteria that incited the Earth's Great Oxygenation roughly two billion years ago. Over the 23 minutes and 21 seconds of Studio Formafantasma's *Cambio* (2020) we cut slices across millions of years of biological and arboreal history – from the evolution of lignin to contemporary forest conservation efforts.[1] Green screens, lying flat on the forest floor or floating upright, sometimes partly obscured by brush or fallen trees, present a succession of images: logging operations, botanic garden collections and Wardian cases, indigenous protesters marching to stake their claim to forest lands, warehouses stuffed with cardboard packaging, CNC machines carving blocks of wood, and landscapes ruined by climate change. Sometimes the green screen retains its verdant hue and serves as a backdrop for burning logs – or as a work surface for hands presenting archival images of logging operations and natural philosophy manuscripts, or hands demonstrating the assembly of a wooden IKEA contraption. Those hands sometimes push *another* screen around the frame, magnifying whatever text or object lies beneath – a green screen amplifier atop a green screen *mise en scène*. At the end of the video, as we climb back up above the treetops, watching the vivid green screen recede as it's framed in by the hunter and forest greens of countless boughs, the narrator issues a warning: "our survival is the survival of trees." We hear the amplified roar of wind rushing through thousands of forested acres, and the screen goes black.

### Channel 2

If a forecaster were standing before a weather map, warning us about those gusting winds, we might detect a green halo around their body. Such glitches are the digital artifacts of a cut. Our meteorologist is not actually confronting a map on set; they're engaging instead with a green screen that, on our screens, is "keyed out" and replaced with the map. Chroma key, media scholar Carolyn Kane explains, "is a special effects technique that involves removing color from an image so that another element"–like a map, or a disaster scene, or another galaxy, or, in Formafantasma's case, archival logging footage– can replace it.[2] The background screen's green is "used only to negate itself"; its hue is not meant to be seen by human eyes, but to function as an operative image – a "wavelength and frequency that [can be] isolated and removed so the image can function as an element of another composite." A green screen is about deferral, anticipation, "pending treatment," suspended resolution.[3]

Why green? As Jeff Foster explains in *The Green Screen Handbook*, "the green channel in composite video has the highest luminance value of the three signal colors red, green, and blue (RGB)...so it gives you more data to work with," and it requires less intense lighting on set.[4] Or, as Lucas Benjamin puts it, "nearly half the photoreceptor pixels of analog video sensors were used to scan for green wavelengths, and so registered green far more precisely. Today, this is still true of digital video chips."[5] But the "green screen" is not always green. Filmmakers have historically used blue screens, and videographers (as well as some contemporary Zoom-casters), green. The key is choosing a color that allows for a clear distinction between figure and ground, so the actors and objects on set stand apart from the backdrop. On the color wheel, blue is opposite yellow-orange, and green is opposite red, which complements blondes and redheads. Furthermore, Kane notes, "because all humans contain about 70% red pigment in their skin, regardless of race, green or blue screen is always better than red."[6] And while green happens to be *my* favorite color and comprises a large proportion of my wardrobe, this is apparently *not* the case in costume design, if the green-screen technical guides are to be believed. A verdant-avoidant wardrobe means we run little risk of having a heroine in a green get-up "keyed out" of her own costume.

### Channel 3

But before the blue and green, there was black. Photographers and filmmakers, like Georges Méliès, began experimenting with image compositing in the 19th century. They masked off and repeatedly re-exposed sections of film, or they placed black-clad actors in front of black backdrops or in darkened chambers draped in black velvet, which created illusions of "invisibility, disappearance, or superimposition."[7] Film historian Noam Elcott finds that these "Black Arts," and the broader history of artificial darkness, are "mired in racist rhetoric."[8] Yet the racial dimensions of imaging technology reside not merely in rhetoric and representation; photographic and filmic technical processes were built and calibrated on racist principles, too. As Wendy Chun proposes, race is not simply "an object or representation or portrayal"; it can also be a "technique that one

1 Formafantasma, "Cambio, 23:21," Vimeo (March 2020): https://vimeo.com/394232651.

2 Carolyn L. Kane, *Chromatic Algorithms: Synthetic Color, Computer Art, and Aesthetics After Code* (University of Chicago Press, 2014): 178.

3 Lucas Benjamin, "Colorless Green Ideas," *Bulletins of the Serving Library* 11 (2016): 7.

4 Jeff Foster, *The Green Screen Handbook: Real-World Production Techniques*, 2nd ed. (Focal Press, 2015): 24.

5 Benjamin, "Colorless Green Ideas," 6.

6 Kane, *Chromatic Algorithms*, 179.

7 Benjamin, "Colorless Green Ideas," 4.

8 Noam Elcott, "A Brief History of Artificial Darkness and Race" in Nick Dunn & Tim Edensor (eds), *Rethinking Darkness* (Routledge, 2020): 67.

9 Wendy Hui Kyong Chun, "Introduction: Race and/as Technology; or, How to Do Things to Race," Camera Obscura 70 (2009): 7. See also Ruha Benjamin, *Race After Technology* (Polity, 2019).

10 Genevieve Yue, "The China Girl on the Margins of Film," *October* 153 (Summer 2015): 97, 103, 104. Zoom, the ubiquitous teleconferencing platform, uses portrait segmentation technology to separate users' faces from their real-life environs. But as we've seen in many cases of biased machine-vision technology trained on limited data sets, Zoom has often proved incapable of dealing with darkly hued faces. "I have heard



Chicago Film Society, *Leader Ladies* (2011).





Stephanie Syjuco, *The Visible Invisible* (2018).

uses, even as one is used by it – a carefully crafted, historically inflected system of tools, mediation, or enframing."[9]

White female faces—"China Girls," "Shirley" cards, and even a particular *Playboy* centerfold from 1972—were central to quality-control processes in photography, film, and digital media. As Genevieve Yue describes, they were "used to calibrate the desired exposure and color balance of film reels as well as the functionality of developing and printing machines." Predictably, "lighting and exposing a film based on a white face often means that the values for everything else—sets, props, costumes, and other actors—are thrown off." Darker complexions are underexposed. Jean-Luc Godard, while on assignment in Mozambique in the 1970s, reportedly refused to shoot on Kodak film because he regarded the stock as inherently "racist." And even though digital technologies make use of a wider range of references and technologies for image adjustment and monitor calibration, the China Girls' influence persists – partly, Yue suggests, because of sentimental attachment. Such engrained conventions "manifest the degree to which white skin is perceived as natural, ideal, and uniquely correlative to instruments valued for their precision and accuracy."[10] And for their position relative to green on the color wheel.

### Channel 4

In her 2018 *Typhoon Coming On* installation at the Serpentine Galleries, Sondra Perry juxtaposed various visual elements: first, a close-up motion graphic of her skin, modulated, magnified, and animated to undulate as if it were a bed of lava; second, footage of police brutality that highlights not the physical violence itself, but its mediation, surveillance, and transcription, rendered on a blue screen; and third, an immersive environment that blends a highly processed iteration of J.W.M. Turner's *Slave Ships [Slavers Throwing Overboard the Dead and Dying, Typhoon Coming On]* (1840) painting with a computer-generated rendering of an ocean. A purple ocean. In Blender, the visual effects software Perry used to produce the work, purple signifies an error – a missing texture. Speaking with curator Hans Ulrich Obrist about the exhibition, Perry explains that she positioned a blue screen opposite the flesh wall "because the blue screen and the chroma key green are supposed to be hues of color that are furthest away from skin tone." Animating much of her work is a question regarding "whose skin tone that was supposed to be."[11] The tones that have historically been "keyed out," those missing chromatic textures, are, of course, blacks and browns.

Perry thus renders her own Black skin larger than life, with a life of its own. "In order to avoid White normativity, I prefer to disassemble my own body. To take my skin, reanimate it into fluid waves."[12] Cultural studies scholar Daniela Agostinho proposes that the adjacency of Perry's skin wall to *TK [Suspicious Glorious Absence]*, the video featuring body cam and news footage, further "juxtaposes the visual history of the brutalization of Black people with the racialized materiality of technologies of seeing," including, as we've seen, China Girls and green screens and surveillance cameras.[13] Some of Perry's other work draws additional chromatic connections between the computer's "blue screen of death," which signals fatal errors, and police officers' "blue wall of silence," an unofficial oath precluding officers from ratting one another out. These resonances suggest that fatal system errors—technical, social, protocological—"are not so much aberrations…as a constitutive necessity of the system," visual studies scholar Soyoung Yoon argues.[14]

The bodies performing this labor—the labor of brutalizing and being brutalized, of policing and being policed, of looking and making things to be looked at—are also central to Perry's work. A "missing texture" in many discussions of labor and exploitation, she proposes, is the Middle Passage, which encompasses the textures of the ocean, and the textures of skin enveloping those bodies "moved *over* oceans in order to become labor sources" [italics mine].[15] Perry re-appropriates colored screens—purples and blues and greens—to create those missing textures, not through evasion or masking, but by imagining recognition as a means to "make a claim instead of being exclusively claimed."[16] "I'm interested in thinking about how blackness shifts, morphs, and embodies technology to combat oppression and surveillance throughout the diaspora," Perry says. "Blackness is agile."[17] In her hands, chroma key is similarly agile. Chroma key, she tells Obrist, is "blackness, it is space, it is sci-fi, it is Mars, it's my grandmother's kitchen table; it's all of these things wrapped into one…The chroma-key, in post-production, it can be anything… The [agility] of blackness exists in the chroma key [and] in this Turner painting, in this ocean," where many enslaved people threw themselves overboard in protest. Perry turns blue screens into oceans so that they might serve as spaces of imagination and liberation. "Given the historical inadequacy of indexical media to document

reports that Black people are fading into their Zoom backgrounds because supposedly the algorithms are not able to detect faces of dark complexions well," Anissa Ramirez told *One Zero*. Some users with out-of-date software and older machines were likewise unable to activate the virtual background feature. The solution? Upgrade your computer! Buy a better camera! And get a green screen. The at-home green screen market exploded amidst COVID-19. Drew Costley, "Zoom's Virtual Background Feature Isn't Built for Black Faces," *OneZero* (October 26, 2020).

11 "Sondra Perry: Typhoon Coming On," Serpentine Galleries, YouTube (May 16, 2018): https://www.youtube.com/watch?v=Qunkb4piXGw.

12 Dean Daderko, "Ill Suns: Arthur Jafa and Sondra Perry," *Mousse Magazine* 57 (2017).

13 Daniela Agostinho, "Chroma Key Dreams: Algorithmic Visibility, Fleshy Images and Scenes of Recognition," *Philosophy of Photography* 9, no. 2 (2018): 145.

14 Soyoung Yoon, "Beware the Light," *Millennium Film Journal* 65 (2017): 33.

15 "Sondra Perry: Typhoon Coming On."

16 Daniela Agostinho & Eric A. Stanley, "Anti-Trans Optics: Recognition, Opacity, and the Image of Force," *The South Asian Quarterly* 116, no. 3 (July 2017): 617.

17 Quoted on "Sondra Perry: Typhoon Coming On," Serpentine Gallery (2018): https://www.serpentinegalleries.org/whats-on/sondra-perry-typhoon-coming-on/.



Felix Burrichter, *Pavillon de l'Esprit Nouveau* (2015).



Felicity Hammond, *Remains in Development* (2020).

black life," Agostinho proposes, "digital might be harnessed to craft different worlds."[18]

### Channel 5

Filipino-American artist Stephanie Syjuco drapes her green screen on the photographic subject, turning the body into a site of projection. For *The Visible Invisible* (2018), she rendered a collection of historical American garments—a pilgrim dress, a prairie dress, and Revolutionary- and Civil War-era gowns—in vibrant green. Syjuco's choice to work with commercial patterns, which represent more of a simulacrum than an accurate representation of sartorial history, demonstrates how these artifacts help to tailor the "American imagination." By rendering the garments in chroma key, "a color you're not supposed to see," Syjuco calls our attention to unquestioned nationalist narratives: puritan religiosity, Manifest Destiny, and so forth. "It's like manifesting ghosts hauling forward all this American history," she says.[19] Here, those ghosts are embodied as white, blank-faced mannequins, gesturing toward the naturalization of whiteness as a structural foundation for so many techniques of representation.

Her *Dodge and Burn* (Visible Storage) (2019), whose name references a photo-editing technique for lightening or darkening areas of an image, is a riotously polychromatic still-life assemblage of images and objects representing America's colonial expansion in the Philippines in the early 1900s. Victorian garments, tiki torches, artificial plants, and suspended backdrops are rendered in both chroma key green and a gray-and-white checkered pattern that evokes Photoshop's "transparency" background. Set against these "invisible" substrates, both symbolizing their own eventual erasure and replacement, are photo calibration images, color charts, Shirley cards, ethnographic photographs, portraits of Filipino revolutionaries, and stock images of tropical bounty. Here, we see how colored screens can construct an imaginary world—not of liberation, but of colonization, exoticization, and oppression.

### Channel 6

Others have deployed chroma key to construct—or critique—new slickly immersive, consumerist fantasy worlds that are the products of colonial pasts (and presents). Felix Burrichter's *Pavillon de l'Esprit Nouveau: A 21st Century Show Home*, staged at the Swiss Institute in 2015, honored the spirit of its namesake: Le Corbusier's 1925 show at the Paris Exposition des Arts Décoratifs. "I tried to figure out what the white boxes of the 21st century would be," Burrichter said, referencing the standard modern exhibition space, "and decided that would be a green screen."[20] The show's chroma-keyed interior projected its guests and furnishings—the work of 30 international artists and designers working with contemporary technologies like 3D printing and carbon fiber construction—into various futuristic settings. While the green surround suggested total immersion, the projections were actually visible only via flat-screen monitors on the walls. Still, *ArtNews* suggested that the show delivered a subtle warning: that the "precarious confluence of surveillance and entertainment has radically transformed the sanctity of domestic space," as has been particularly apparent during the pandemic.[21]

Felicity Hammond, meanwhile, critiques the urban growth machine and neoliberal design culture by laying bare the chroma-keyed nature of real-estate marketing billboards and developers' renderings. Her *Remains in Development* exhibition at C/O Berlin (2020–21) is installed in rooms coated in chroma key green, with particular site lines framed through chroma key blue cut-outs.[22] The site itself is just as blatantly "constructed" as the images on display. Hammond's collages mix aspirational utopias and harsh material realities: gleaming towers and rubbish piles. Some images even appear to delaminate, liquidate, and drip down the gallery's green walls. For her "Stone Effect" sculptures, Hammond gathered gravel and rubble from construction sites and melded it with acrylic, coating the building materials in artificial wrappers – just as construction sites are often shrouded with vinyl banners featuring gleaming CGI renderings of buildings-to-come. Hammond frames both the gallery and the development site as green screens. We might wonder what's erased in the substitution. What material precursors and prior inhabitants are "keyed out"? And what generic, placeless developments—plans ready for deployment in any context—are "keyed in"?

### Channel 7

Those urban insertions are themselves often green. Inspired by Singaporean Prime Minister Lee Hsien Loong's speech at the August 17, 2014, National Day Rally, where he stood before an unmediated chroma key green screen, Ho Rui An's *Screen Green* (2015) lecture performance examines the semantics and politics of both screening and greening.[23] These annual rally speeches, unlike the more traditional State of the Union addresses in the United States, are typically hyper-mediated affairs,

18 Agostinho, "Chroma Key Dreams," 144.

19 "Stephanie Syjuco: Making Time," *Art21*, YouTube (October 2, 2019): https://www.youtube.com/watch?v=BKFvqKGtjvc&feature=emb_title. See also Sarah Archer, "Stephanie Syjuco: Pattern Recognition," *Renwick Catalog* (November 2018): https://www.sarah-archer.com/writing/2018/12/10/stephianie-syjuco; Jessica Baran, "Openings: Stephanie Syjuco," *Artforum* (November 2019).

20 *Pavillon de l'Esprit Nouveau: A 21st Century Show Home,* Swiss Institute, New York (November 2, 2015). For more green screen artists, see Shannon Mattern, *Twitter* (February 3, 2021): https://twitter.com/shannonmattern/status/1357140367087460352.

21 Stuart Comer, "Best of New York, 2015," *ArtNews* (December 22, 2015).

22 "Felicity Hammond: Remains in Development," C/O Berlin (September 12, 2020–March 14, 2021): https://www.co-berlin.org/en/exhibitions/felicity-hammond.

23 "National Day Rally 2014," Prime Minister's Office, Singapore (August 17, 2014): https://www.youtube.com/watch?v=xEeFZ1ceEVY.

24 See, for instance, Hillary Angelo, *How Green Became Good: Urbanized Nature and the Making of Cities and Citizens* (University of Chicago Press, 2021); Jennifer Light, *The Nature of Cities: Ecological Visions and the American Urban Professions*, 1920–1960 (Johns Hopkins University Press, 2009).




Ho Rui An, *Screen Green* (2015).




A botanical green screen at Changi Airport, Singapore.

with an array of screens featuring renderings that open up a "world of possibility," a "call for investment and speculation" – images akin to the developers' renderings that Hammond works with. Singapore itself is framed as a site of projection; its future is conjured up on the green screen, and those projective images are themselves usually full of greenery. Ho comments on how bountiful botany "seems to sprout out in any futurist imagining of Singapore," and how foliage–real or computer-generated, in the form of potted plants or towering trees–appears in most official media events.

Singapore calls itself the Garden City. Like many other states that have adopted "greening" as part of broader governance and development strategies, Singapore's leaders are continually creating more gardens and encouraging residents to engage in gardening, particularly through state-sponsored community gardening initiatives and centralized community garden districts.[24] Esther Choi writes about how a similarly naturalized urban development model–the "Landform Building" that's sculpted to look like a forest or mountain–benefits from green screen rhetoric: "Landform Building's attempt to assume the appearance of a landscape produces a phenomenon akin to [chroma key's] kind of composite reality, wherein a synthesis of assembled parts is often confused as a 'natural,' seamless hole."[25] In Singapore, many unclaimed green spaces in the city-state, Ho says, are transformed into gardens and branded as "free spaces," which ultimately enables the government to exercise control over their use. Yet just as with the green screen booths one finds in the local shopping malls, where one can pretend to hold up the Marina Bay Sands Hotel or fly through the Gardens by the Bay mega-developments, these community gardens, too, are "fantasy fulfillment machines," promising but failing to "combat the soul-sucking nature of capitalist modernity." Singaporean greenery–both of the botanical and chroma key varieties–*screen* the imagination, "providing a screen for it to be projected" onto, while also "submitting it to a regime of screening, checking its articulations."[26]

## Channel 8

One might grow a green screen by coaxing vines up a building façade, using a cable or wire-mesh support system for their growth, or by constructing a system of planter cells. Greenscreen is one aptly named Los Angeles-based company that produces welded trellis systems for green walls.[27] Growing a "vertical garden" on a wall, fence, column, pergola, or arbor–"engineering nature," as the company describes it–has the potential to add shade and sound insulation, mitigate light and air pollution and urban heat island effects, cut air-conditioning costs, aid in stormwater management, extend the lifespan of building materials, provide benevolent security, deter graffiti, and contribute to residents' physical and mental health.

While they do offer environmental benefits, such botanical green screens–much like Singapore's gardens–also have the potential to serve as smokescreens, as projective surfaces for green-washed, AstroTurfed visions of sustainable urban growth and management. Consider the parking garage clad in trellises and vines or the "vertical forest" concrete high-rise whose balconies are bursting with potted trees. We might also look again to Singapore, where the Changi Airport, seventh busiest in the world, features a four-story indoor forest. "Greenery is unfortunately too often used as an alibi for new developments, by wrapping buildings in green as [the] sole legitimization of an otherwise unsustainable project," landscape architect Céline Baumann argues.[28]

Botanical green screens also often shade their own environmental costs; such projects can be high maintenance and require a lot of water and chemicals to live and function. "Greenery is not per se ecological," Baumann says, "and the commodification of nature can lead in fact to reduced biodiversity and higher pollution." Baumann's proposed solution is that landscape architects be involved in city planning and urban development "in a much more significant way, not just as window dressing" – or, in keeping with our chroma-key theme, as color correctors or special effects technicians. Planners and designers might also engage the complexity of chromatic politics by looking behind and beneath the screen in order to recognize that greenness has both biological and historical roots, and that it requires a vast infrastructural and ideological apparatus to ensure its survival. Within the deep pixels of the chroma-key screen, green is also Black and Brown; it is roiling oceans and outer space; it is erasure and inclusion, exploitation and assimilation, promise and imagination.

25 Esther Choi, "Sustainability's Image Problem," Library Stack (2019): 7. See also Emily Eliza Scott, "Leaky Design for a Broken Planet" in Paola Antonelli & Ala Tannir (eds), *Broken Nature: XXII Triennale di Milano* (La Triennale di Milano, 2019): 50–56.

26 "Screen Green by Ho Rui An," Parasite, Vimeo (2016): https://vimeo.com/140178554; "Screen Green," Ho Rui An: https://horuian.com/screen-green/.

27 See greenscreen: https://greenscreen.com/.

28 Quoted in India Block, "Greenery is Often 'Sole Legitimization' for Unsustainable Buildings Says Céline Baumann," *Dezeen* (October 31, 2019). See also Daniel Barber & Erin Putalik, "Forest, Tower, City: Rethinking the Green Machine Aesthetic," *Harvard Design Magazine* 45 (2018); Yael Stav, "Transfunctional Living Walls – Designing Living Walls for Environmental and Social Benefits," Doctoral Dissertation, Queensland University of Technology, 2016; Sabrina Syed, "Outrage: The False Promises of Floating Gardens," *The Architectural Review* (February 2, 2021). Thanks to Emeline Brulé, Zoya Gul Hasan, Elis Mendoza, Emmet Ó Briain, Rae Root, Alissa Walker, and Tim Waterman for some of these and other references.

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