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Colonizing Flow: The Aesthetics of Hydropower and Post-Kinetic Assemblages in the Orinoco Basin

Catastrophe is coming. This, argues Jason Moore, is the upshot of five centuries of human attempts to colonize nature. "Capitalism—or if one prefers, modernity or industrial civilization—emerged *out* of Nature. It drew wealth *from* Nature. It disrupted, degraded, or defiled *Nature*. And now, or sometime very soon, Nature will exact its revenge."[1] If this ecological impasse must be traced through a *longue durée* of human and nonhuman encounters in capitalism's historical geographies as Moore suggests, then an extractive frontier like the Orinoco basin is a fitting place to start. Hydrological survey and hydroelectric infrastructure have long been metrics of human conquest of nature, and this is especially true in the Orinoco—a realm where the interests of empire, capital, and nation have played out for centuries.

Established in the colonial imaginary as the route to El Dorado, in modernity the river was reframed as a "moving mirror" of Venezuelan progress.[2] In the late twentieth century, the river's colonized flow reflected a picture of unrelenting industrialization. In the 1970s, the State built the Central Hidroeléctrica Simón Bolívar—one of the largest dams and hydroelectric plants in the world, which generates energy from the Caroní River, the Orinoco's main tributary. Not only this, it also filled the plant's engine rooms with outsize works of kinetic art whose production of vibrating motion mirrored the energy generated by the river waters as they spun the turbines,

1 Jason Moore, *Capitalism in the Web of Life* (London: Verso, 2015), p. 5. Emphasis in the original.

2 Venezuelan intellectual Mariano Picón Salas uses the phrase "moving mirror" in his prologue to Rafael Gómez Picón, *Orinoco, río de libertad* (Madrid: Afrodisio Aguado, 1953), p. 13.

coursed through Venezuela's national grid, and then into homes and businesses, powering a nation on the move. As art critic Alfredo Boulton put it at the time, the dam materialized a schism between premodern and modern timescapes:

> That entire world of vegetation, of primary force, of mysterious forests, snakes and cataclysmic sounds, that entire magical world suddenly comes to a halt at the docile edge, the lake, which outlines at the feet of the Raul Leoni Dam a new Parima set in the very same geographical spot where the ancient cartographers of Rotterdam, De Bry, Blaue and Hondius placed the site of El Dorado and its capital Manoa in the ancient maps of the 17th century.[3]

Hydroelectric megaprojects are built on assumptions about human-nature relations. They presuppose a steady flow of water consistent with yearly rainfall patterns and climatic phenomena, and they wager that mathematical calculations (flow patterns and hydraulic modeling) and hydroengineering facilities (sluices and reservoirs) can reliably harness river flow to generate an unstinting supply of electricity. Today, however, the waters of the Orinoco basin fluctuate unpredictably between drought and deluge, and the catastrophic failure of Venezuela's hydroelectric facilities is a topic of regular speculation. As recently as August 2017, an unexpected bout of torrential rains threated Guri with collapse. As engineers opened the floodgates, the homes of nearby communities were flooded and hundreds were displaced. Nature, whether exacting revenge or not, had clearly escaped human control.[4]

3 Alfredo Boulton, *Art in Guri* (Caracas: C.V.G. Electrificación del Caroní (EDELCA), 1988), p. 24.

4 Indeed, this is evident in the plans outlined by Venezuelan hydroelectric experts to run Guri at below its ideal capacity levels: see G. Montilla, A. Marcano, and C. Castro, "Air Intake at Guri Dam Intake Operating at Low Heads," in *Hydraulics of Dams and River Structures*, ed. Farhad Yazdandoost and Jalal Attari (London: A.A. Balemka Publishers, 2004), p. 69–78.

Even amid the increasing frequency of ecological crises, faith in hydroelectric megaprojects continues unabated both in Venezuela and worldwide. This situation compels a revision of the human-nature relations that have been historically interwoven both in the Orinoco's web of life and in the poetics of hydroelectric infrastructure. The ontology of infrastructure (hydroelectric or otherwise) bridges technopolitics, poetics, and political ecology. Hence, as "concrete semiotic and aesthetic vehicles," dams are both mouthpieces for the developmentalist discourses associated with human quests to put nature to work, and structures that entangle human and nonhuman things in the systematic movement of matter.[5] With this in mind, in the pages to follow I retrace these relations through historic and modern conceptions of the river basin as a source to be colonized by humans, before dwelling on the high watermark of hydromodernity left by the dams built in Venezuela in the 1960s and 1970s. I probe the aesthetic and discursive valences of the hydraulic and kinetic flows set in place in hydroelectric plants, by linking their infrastructure, public spaces, and monumental artworks to national narratives of industrialization. Ultimately, by attending to recent interruptions of these flows in light of new materialist thinking, I seek to reframe Venezuelan hydroelectricity as an assemblage shaped as much by human feats of engineering and art as by the "vibrant matter" of nonhuman actants.[6]

5 Brian Larkin, "The Politics and Poetics of Infrastructure," *Annual Review of Anthropology* 42, no. 3 (2013): p. 327–343, here p. 329.
6 Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham: Duke University Press, 2010).

Taming the Waters

Measuring some 948,000 square kilometers, the Orinoco basin covers approximately four-fifths of Venezuela and a quarter of Colombia. From its sources in the Guiana Highlands to its mouth at the Atlantic Ocean, the basin's eponymous river flows over some 1,700 miles, departing from its headwaters to course through rapids and rain forests, before meandering through expansive grasslands. In the upper region, the Orinoco's muddy waters are joined by the sapphire blue ones of its main tributary the Caroní, which springs from Angel Falls and is fed by the Kukenan, Arobopo, and Yuruani rivers among the Gran Sabana's ancient massifs. As it reaches the lower region, the Orinoco swells in rainy season to between five and fourteen miles in width before bifurcating, about thirty miles downstream from Ciudad Guayana, to form its delta of innumerable canals (*caños*) and islands. Finally, as it seeks out the ocean, the river splits into two main distributaries: the Río Grande that discharges into Boca Grande to the east, and Caño Mánamo which flows north to Boca de Serpiente, just below Trinidad.

It takes scant effort to compose this high-altitude picture today. But for centuries explorers were frustrated in their quests to chart the Orinoco, which was conceived of as a fluvial highway to Lake Parima and the instant wealth of El Dorado (Fig. 1). Even though El Dorado gradually disappeared from the increasingly detailed maps of the river basin, this heady prospect still imbued conceptions of the Orinoco when Alexander von Humboldt tracked the Casiquiare canal through its upper reaches at the start of the 1800s.[7] As the myth waned, however, the Enlightenment culture of rational human endeavor shaped representa-

7 Humboldt criticized the belief that "the banks of the Carony lead to the lake Dorado and the palace of 'the gilded man'" and counseled a more responsible ecology. See Alexander von Humboldt, *Personal Narrative of Travels of the Equinoctial Regions of America, during the Years 1799–1804*, trans. and ed. Thomasina Ross (London: Henry G. Bohn, 1852), p. 25.

Figure 1. Map showing Lake Parima and El Dorado, 1635.

tions of the river basin, as can be seen in the painting *Humboldt on the Orinoco* (Fig. 2). Its flow arrested by the paintbrush, here the river serves as backdrop to a scene of scientific knowledge developing empirically in the field. Nonhuman ontologies—the water, trees, and mountains—simply provided a picturesque frame for the great scientist; while the tangled vegetation is inscrutable in the darkness, Humboldt's face is illuminated, a spotlight cast on it by the setting sun.

Throughout the nineteenth century, the Orinoco remained a symbolic and physical frontier for the human conquest of nature. Emulating the industrial modernity and technological developments of northern Europe and the United States, in the 1870s President Antonio Guzmán Blanco suggested that the river basin would connect Venezuela with global trade routes. He conjured a vision of "rivers that resemble seas, and seas that resemble oceans, with hundreds of steamships on the Orinoco River to the River Plate with diverse and rich products

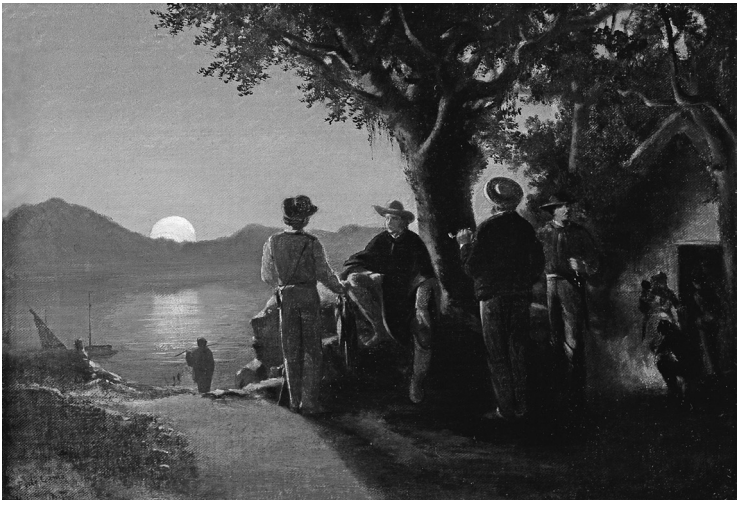

Figure 2. F. de Canta, *Humboldt on the Orinoco*, undated. Oil on canvas, 10 x 14 3/8 inches. Colección Patricia Phelps de Cisneros.

Figure 3. Auguste Morisot, *Raudal de la désolation* (Desolation Rapid), December 16, 1886. Graphite on paper, 4 x 6 1/8 inches. Colección Patricia Phelps de Cisneros.

from this blessed land."[8] Although Guzmán Blanco leveraged the Orinoco to augur Venezuelan development, foreign interests held sway over the river. In the late nineteenth century, it was European and U.S.—rather than Venezuelan—expeditions that acted out versions of Manifest Destiny in the torrid realm as they attempted to reach the river's sources and harness its economic potential. This contest between man and nature is captured vividly in a drawings and diary entries that the artist Auguste Morisot recorded as he accompanied French explorer Jean Chaffanjon on a voyage up the Orinoco (Fig. 3). Dated December 18, 1886, the sketch depicts the voyagers wading in the river, battling its waters as they push a *curiara* (canoe) over the coursing rapids. "We fought for hours, panting, breathless, sweating and wet," Morisot wrote in his diary, describing his chagrin as Chaffanjon left him behind, only to return days later claiming to have reached the river's sources.[9] The triumph turned out to be an embellishment of the truth, yet Chaffanjon claimed victory all the same, even inspiring Jules Verne to write his novel *Le superbe Orénoque* (1898; translated into English as *The Mighty Orinoco*), in which three geographers set out to chart the river basin, based on the French explorer's tall tales.

Hydrological Sovereignty

It was not until November 27, 1951, that Venezuela could claim hydrological sovereignty when a French-Venezuelan expedition (led—nominally at least—by army major Franz Rísquez and financed entirely by the military dictatorship in power at the time) arrived at the river's source, debunking Chaffanjon's

8 Cited in Pedro Calzadilla, "El olor de la pólvora: Fiestas patrias, memoria y Nación en la Venezuela guzmancista 1870–1877," *Caravelle* 73 (1999): p. 111–130. My translation.

9 Chaffanjon's claim was later proven to be spurious. Auguste Morisot, *Diario de Auguste Morisot 1886–1887* (Madrid: Planeta, 2002), p. 126–127.

spurious claim of having found it. Illustrated by photographs of the two nations' flags planted at the fluvial spring, the official report cast the feat as a patriotic triumph, "a new victory for man over nature."[10] This widely publicized display of human might dovetailed with the technocratic project to industrialize the southeastern state of Bolívar initiated by the State in the late 1940s.[11] Reviving Guzmán Blanco's nineteenth-century vision of global trade in the mold of growth pole theory, the plan involved dredging the Orinoco to allow heavy cargo ships passage to the Atlantic Ocean, increasing national participation in the iron and steel industries, and tapping the Caroní River's hydroelectric potential. The nearby development of diamond and gold mining, and the iron, steel, and aluminum industries (largely managed by U.S. companies) meant the Orinoco basin held the potential to diversify growth and industry away from the oil hubs in Maracaibo and Maturín, as well as from the rapid urbanization of the capital Caracas. In the 1960s, the project gained further traction through the construction of Ciudad Guayana, Venezuela's only planned city (based on a master plan drafted by urban planners from MIT-Harvard along with Venezuelan counterparts) located at the confluence of the Orinoco and Caroní rivers. Venezuela's "'Wild West' frontier city" was envisaged as an industrial hub built around the steel industry, and as a headquarters for the Corporación Venezolana de Guayana (CVG), a public corporation founded in 1960 and endowed with the powers to function as a develop-

10 "La Expedición franco-venezolana al Alto Orinoco en 1951," *Boletín de la Academia Nacional de la Historia* 42 (1954): n.p.

11 Venezuela was under military control from 1948 to 1958, when the first steel production company, Empresa Siderúrgica de Venezuela (SIVENSA), was founded and work began on Central Hidroeléctrica Macagua I. The main reference text on Ciudad Guayana is Lisa Peattie, *Planning: Rethinking Ciudad Guayana* (Ann Arbor: University of Michigan Press, 1987). For an updated commentary, see Clara Irazábal, "A Planned City Comes of Age: Rethinking Ciudad Guayana Today," *Journal of Latin American Geography* 3, no. 1 (2004): p. 22–51.

ment agency that could plan and build the urban center, as well as provide services, such as hydroelectricity, roads, schools, and healthcare.[12]

The prospects of development attached to the Orinoco from the mid-to-late twentieth century are summed up in the optimism of Venezuelan intellectual Mariano Picón Salas, when he wagered in 1953 that the river basin's premodern myth of plenty had been reinscribed in the language of science and industry. The Orinoco had become

> a different Dorado—no longer with the domes of gold and porphyry that Walter Raleigh's fertile imagination located in his made-up Manoa—but with iron mountains and hydroelectric resources. [...] Gone is the era of gold, rubber, *balatá*, *sarrapia*, heron feathers, diamonds. We live in the age of iron, bauxite, [and] electricity. [...] The vast, regal waters are now asking to be tamed. The Orinoco that until now did not lead anywhere [...] is now showing us the routes of a transformative economy.[13]

Hydrological sovereignty, then, signified State capacity to harness the great river's directionless flow and marshal it into a new aquatic scene: one that merged ancestral beginnings with the futuricity of the technological sublime, where awe-inspiring infrastructure attests to human control of nature.[14]

12 The city was to link the existing, scattered settlements of San Félix and Puerto Ordaz. The population of Ciudad Guayana grew rapidly from 148,000 in 1970 to 577,000 in 1990, and 800,000 in 2000. Thomas Angotti, "Ciudad Guayana: From Growth Pole to Metropolis, Central Planning to Participation," *Journal of Planning Education and Research* 20 (2001): p. 329–338, here p. 332.
13 Picón Salas, "Prólogo," p. 14–15. My translation.
14 David E. Nye, *American Technological Sublime* (Cambridge, Mass.: MIT Press, 1994).

Magical Hydraulic State

In the 1950s, Karl Wittfogel advanced the thesis that ancient civilizations that developed large-scale waterworks and irrigation systems in arid areas should be understood as "hydraulic states" where political power was highly centralized. Although subsequently criticized, Wittfogel's paradigm undoubtedly established important connections between hydrological infrastructure and the structures of power.[15] The political, social, and material relations shaped by water-management systems can elucidate processes of political representation and modern state formation, a phenomenon that the geographer Erik Swyngedouw terms "liquid power."[16] State imaginaries of liquid power and hydromodernity play out particularly vividly in the construction of dams and hydroelectric plants, as has been the case across the globe in the modern era. In Venezuela, however, it is oil rather than water that is usually credited with thrusting the nation into modernity. Fernando Coronil's seminal theory of the "magical state" tells us that from the early 1940s the increased flow of oil revenues turned politicians into conjurers. Mediating the relation between oil (the natural body) and citizens (the social body), leaders of the "magical state" promised to deliver this formerly agriculture-based nation to instant modernity.[17] The oil booms of the 1950s and 1970s, as well as the nationalization of the petroleum industry in 1978, all buttressed this imaginary of oil-driven progress, while also providing increased revenues that could be channeled into grand-scale infrastructure.

15 Karl Wittfogel, "Developmental Aspects of Hydraulic Civilizations," in *Irrigation Civilizations: A Comparative Study*, ed. Julian H. Steward et al. (Washington: Pan American Union Social Sciences Monographs, 1955). For critique, see William P. Mitchell, "The Hydraulic Hypothesis: A Reappraisal," *Current Anthropology* 14, no. 5 (1973): p. 532–534.

16 Erik Swyngedouw, *Liquid Power: Contested Hydro-Modernities in Twentieth-Century Spain* (Cambridge, Mass.: The MIT Press, 2015).

17 Fernando Coronil, *The Magical State: Nature, Money, and Modernity in Venezuela* (Chicago: University of Chicago Press, 1997).

This is the prevailing thesis of Venezuela's petromodernity. While compelling, the thesis overlooks the significance that hydromodernity garnered in the mid-twentieth century as a marker of progress. Chemistry dictates that oil and water are immiscible, but from the 1960s till the 1980s these liquids became deeply intermingled. During this period, the State used oil revenues to fund the construction of hydroelectric infrastructure, some of which remained the world's largest for a number of years and which still provides the majority of the nation's energy supply. This unleashing of liquid power meant that the "magical" petrostate had expanded into a hydraulic one, effectively mixing together the political ecologies (and economies) of oil and water. As a result, the energy landscape was no longer solely dominated by the platforms, refineries, and "black gold" associated with the petroleum industry. Huge concrete dams, metal turbines, and spillways had also become symbolic and material expressions of the human capacity to harness natural resources to power the nation.

Satellite imagery provided a synoptic eye onto this untapped geography, whose hydrological and mineral resources the Venezuelan State had set out to harness as part of the "conquest of the South" (Fig. 4). Venezuela's hydromodernity was literally cemented ten kilometers from the meeting point of the Orinoco and the Caroní River in Ciudad Guayana. There in 1961 the publicly owned company CVG Electrificación del Caroní, C.A. (EDELCA) completed the first stage of Central Hidroeléctrica Macagua I, a power station and 69-meter-high and more than 3.5 kilometer-long embankment dam, whose construction had begun in 1956 (Fig. 5).[18] Built next to the city, the infrastructure of Macagua I made visible the colonization of the river's flow

18 Macagua I partially stemmed the river flow of the Lower Caroní region, taking advantage of the natural spillway created by lateral waterfalls. The first stage of Macagua only partially dammed the Caroní, since the river's waterfall—Salto La Llovizna—itself provided a natural dam. Construction on Macagua II began in 1988. Macagua I and II were subsequently renamed

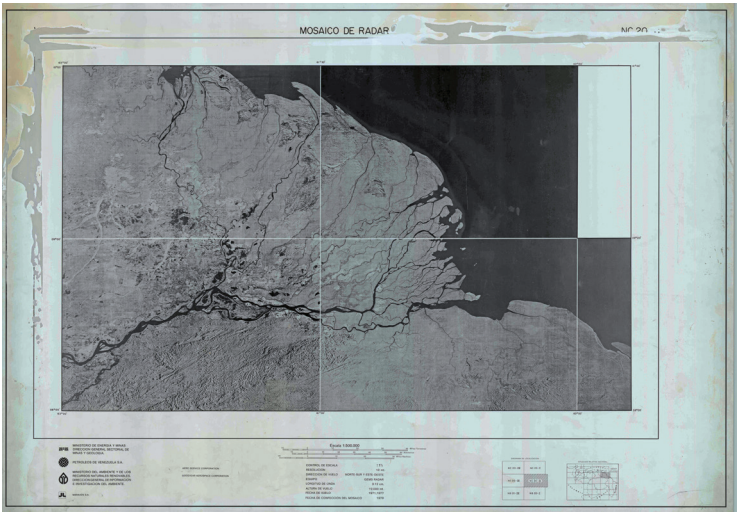

Figure 4. Satellite photographs of the Orinoco basin taken between 1971 and 1977. Ministerio de Energía y Minas/Petróleos de Venezuela/ Ministerio del Ambiente y Recursos Renovables/Maraven.

through the vast, concrete installations of the dam wall. While this aquatic scene was steeped in the technological sublime, the vista of water cascading from the spillway on the other side of the dam echoed a "restorationist" mode of the sublime, one that euphemistically erased human impact on the environment by creating what appeared to be a pure realm of nature.[19] For their part, the large, landscaped Parque La Llovizna, and the terrace of the nearby Guyana Intercontinental Hotel (now Hotel Venetur), built to the rear of Macagua I, each provided vantage points from where the gaze would be trained onto a restorationist scene made possible by technological might.[20]

23 de Enero (23 January), to mark the fall of the dictatorship of Marcos Pérez Jiménez, who ruled from 1952–1958.

19 T. J. Demos uses the term "restorationist" in *Decolonizing Nature* (Berlin: Sternberg, 2013), p. 39.

20 Public spaces were later added to the Macagua facility, which provided even more direct engagements with the poetics of hydroelectric infra-

Figure 5. Natural spillway of the Macagua dam in Ciudad Guayana, with the hotel and Parque La Llovizna behind it. Photo: Heribert Dezeo, 2011. WikiCommons.

In short, the dam wall vertebrated a two-fold waterscape that served to reaffirm the human objectification of nature. While one side underscored human capacity to tap natural resources in the name of progress, the other occluded the more detrimental ecological impacts of industrialization and hydroelectricity, preserving an ideal of Venezuela as an Edenic treasury of pristine nature. Channeled into Macagua's aesthetically awe-inspiring aquatic scenes, water electrified nation and imagination at the same time.

structure. Visitors can walk around the circular fountains of the open Plaza del Agua (Water Square), then enter the plant itself by walking through a cylindrical corridor (shaped like a turbine turned on one side) towards a viewing platform that looks down onto a large turbine hall in the Ecomuseo del Caroní, inaugurated in 1998.

Kinetic Flows

Eight years after Macagua I was set in liquid stone, another much more ambitious dam project was undertaken one hundred kilometers upstream from Ciudad Guayana. The first stage of the Central Hidroeléctrica Raúl Leoni (formerly Raúl Leoni, but now commonly known as Guri) was completed in 1969, featuring a 690-meter-long and 106-meter-high dam, and a 1,750-megawatt capacity powerhouse (Fig. 6). Demand soon outstripped supply however, as the global oil crisis of 1973 quadrupled Venezuela's petroleum revenues, causing a spike in consumer activity and State-led development. As a result, the two further stages in the project—originally planned for gradual construction as energy demands increased—were merged and built together from 1976 to 1986. The dam grew almost sixty meters and almost doubled in length, creating a huge reservoir with nearly ten times the capacity of the original project. Even today Guri alone provides two-thirds of the nation's energy supply and remains the third largest hydroelectric plant worldwide.[21]

This project also brought a deepening of the aesthetics of hydropower as the State commissioned huge kinetic artworks for the site. The first to be installed were Carlos Cruz Diez's two *Ambientaciones cromáticas* (*Chromatic Environments*, 1977) located inside the two powerhouses just as the first stage of the facility was completed.[22] In Engine Room No. 1, the installation consisted of 11,400 square meters of polychromatic murals lining the walls, and ten multicolored metal and fiberglass "chromostructures" that fit over the vertical shaft generators (Fig. 7). The overall effect was an immersive, vibrating space, in which

21 Guri is outsized only by the Itapiú Dam, on the Paraná River between Brazil and Paraguay, and the Three Gorges Dam in China.

22 Alejandro Otero's *Torre Solar* (*Solar Tower*, 1986), a fifty-meter-high metal structure with spinning blades, was installed later in the Plaza La Democracia (Democracy Square) outside Guri.

Figure 6. Central Hidroeléctrica Simón Bolívar (formerly Raúl Leoni). From left to right, reservoir, spillway, dam, Plaza del Sol y la Luna, and construction of extension of dam wall. Represa del Guri, Bolívar State, c. 1978. Photo: Fernando Irazábal © Archivo Fotografía Urbana.

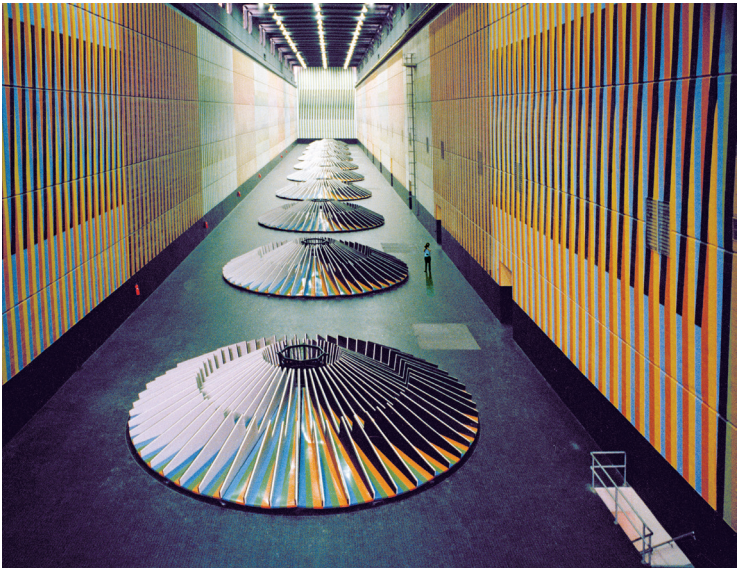

Figure 7. Carlos Cruz Diez, *Ambientación cromática* (*Chromatic Environment*), 1977–1986. Simón Bolívar Hydroelectric Station, Engine Room No. 1, Guri, Venezuela. 26 x 260 x 23 m (85 x 853 x 75 ft.). Engineers: H. Roo, A. Gamboa, E. Carrera, G. Chavarri. © Adagp, Paris 2017.

the artworks matched the scale of the plant and mirrored its internal kinetics. In Engine Room No. 2, the *Mural de color aditivo (Additive Color Wall)* lined the walls in sections of multicolored stripes, some with black sheets of metal added to them in relief. At one end of the hall, the wall was covered by the *Cromosaturación* (*Chromosaturation*), a large panel whose 1,200-bulb lamp would change color from red to green, then to blue, when visitors on the mezzanine level opposite pressed a button (Fig. 8).

By contrast to the aquatic scenes staged around the Macagua dam, which retained water as the main representational motif, the *Ambientaciones cromáticas* turned away from the landscape and toward the professedly "universal" values of kinetic and abstract geometric art. In this sense, they furthered the schism that had begun to split Venezuelan art in the late 1940s, when young artists rejected the Círculo de Bellas Artes school of

Figure 8. Carlos Cruz Diez, *Ambientación cromática* (Chromatic Environment), 1977–1986. Simón Bolívar Hydroelectric Station, Engine Room No. 1, Guri, Venezuela. 28 x 300 x 26 m (92 x 984 x 85 ft.). Engineers: H. Roo, A. Gamboa, E. Carrera, G. Chavarri. © Adagp, Paris 2017.

landscape painting and embraced abstraction in its place. The intersection of kinetic aesthetics and hydromodernity at Guri also epitomized the Venezuelan State's policy of funding outsize artworks for other types of public and industrial infrastructure, from subways and museums, to airports and silos.[23] In the dominant narrative, these public installations represented—to quote critic Roberto Guevara—*arte para una nueva escala*:

23 Amply studied by art historians, this rupture is generally traced to Alejandro Otero's exhibition of abstract paintings *Las cafeteras* at Caracas' Museo de Bellas Artes in 1949. It is reflected particularly vividly in the manifesto penned in 1950 by a group of young Venezuelan artists who vehemently rejected the landscape tradition and accused the nation's art institutions of being out of step with the changing times. See Los Disidentes, "Manifiesto," in *Alfredo Boulton y sus contemporáneos* (New York: Museum of Modern Art, 2009), p. 178.

art for a new scale. Writing just after Cruz Diez's works were installed at Guri, Guevara used the metaphor of liquidity to describe the immersive aesthetic experience such artworks generated, attributing to them an epic, edifying quality. Saturating "arid" spaces, public artworks induced "a *thirst* for encounters and adventures for the grand endeavor of broadening man's horizons and with them the human condition itself."[24] As they unfurled inside the engine rooms, the *Ambientaciones cromáticas* became deeply entangled with the national narrative that held human domination of nature as proof of hydromodernity. Glossing the *Ambientaciones cromáticas*, in the lavish book *Art in Guri* (published by the State energy company in charge of the hydroelectric plant) the art critic Alfredo Boulton took up the metaphor of liquidity in an even more anthropocentric register of human supremacy, which presented aesthetic and technological mastery on equal terms:

> Color vibrates in the large halls of Guri as an active dynamo that encloses the new image man holds of the potential and energy of color. Instead of glorifying the ancestral river with a historical account narrated by images of nature or scientific characters in a theatrical pose, Carlos Cruz-Diez has chosen to use severe aesthetic forms presented through *the inner force that pours out from the colored material*, his interpretation of that which is also a new attitude of man towards his own new creative forces.[25]

These were not the first works that Cruz Diez had made for hydraulic infrastructure. Before Guri, he produced the *Muro de color aditivo* (*Additive Color Wall*, 1975), a mural painted along the metal structure built to control the River Guaire's course through Caracas. While this work emulated the river's forward

24 Roberto Guevara, *Arte para una nueva escala* (Caracas: Maraven S.A., 1978), p. 150. Emphasis added.
25 Boulton, *Art in Guri*, p. 68. Emphasis added.

motion through its chromatic interplay, water was no longer a representational resource in Cruz Diez's works at Guri or at the José Antonio Páez Hydroelectric Plant, in Barinas state. In these works ensconced in the turbine halls, liquid flow was replaced by the chromatic flow simulated by the play of light and color that underpins *fisicromía* (physical color), the theory that informs Cruz Diez's practice to this day. It advocates the technique of "splitting form" (*fraccionar la forma*) to show how "color is constantly being created, and occurs in time," thus turning away from semiotics toward "autonomous color, without anecdotes, stripped of its symbolism, like an evolutive event that involves us."[26] For the artist, this nonfigurative, chromatic autonomy was his work's fundamental tenet. Indeed, he even ventured that it might even produce a mode of vision and sensorial experience that would liberate perception from technologies of production and consumption entrenched by industrial modernity by pushing beyond the conventional cultural encodings of the mass media and contemporary society.

Cruz Diez's chromatic chambers at Guri certainly staged a compelling kinetics of physical color. Yet, they can hardly be isolated from the politics and economics of industrial modernity, not least due to their State patronage and site specificity. The industrial scale and optical technics of Cruz Diez's kinetic artworks only amplified the longstanding prospecting of the Orinoco as "a great factory" of industrialization and progress, destined to spin the turbines of a nation on the move. In the 1970s, Uruguayan art critic Marta Traba hurled vitriol on the kinetic art movement, of which the *Ambientaciones cromáticas* were key exponents. For Traba, this "official art" of the political and cultural elites was an illusory *telón de futuro*: a backdrop on which to project futuricity and development that willfully obliterated Venezuela's past and ignored the precariousness of

26 Carlos Cruz Diez, "La construcción de un lenguaje," in *Alfredo Boulton y sus contemporáneos*, p. 228–231.

its uneven modernization.[27] Unleashing vitriol against the rise of kinetic art in the immediate aftermath of the 1973 oil crisis, and amid the industrialization of the Orinoco basin, she wrote:

> The Venezuelan ruling class has sought to project a completely progressive image of their country. [...] In this space odyssey, it is obvious that the present keeps being erased, with increasing force, and the contempt for the past is constantly growing. It is also evident that a society that embarks on such comic-book futurism disconnects itself from its problems [...] [28]

Despite such criticisms, the dominant narrative unashamedly cast Guri and its kinetic artworks as exemplars of the "monuments of glory that man has put up to pay tribute to the powerful, to the power of spirit and the power of force."[29] For Boulton, the artworks portended a radical (national) transformation in the timescape of modernity, summed up in the phrase: "Today's world is not yesterday's and will never be tomorrow's."[30]

The novel technics and aesthetics of hydroelectric infrastructure clearly re-energized cultural and national narratives of Venezuelan development. In the final analysis, then, Cruz Diez's artworks at Guri displayed not so much the autonomy of aesthetics, but a topocentric confluence of art and hydropower, which generated positive feedback for a telos of progress written into histories of nation and art alike. The abandonment of figuration supersized by the *Ambientaciones cromáticas* reaffirmed the thesis that the avant-garde embrace of abstract aesthetics had catalyzed a generalized leap into the future. By creating an analogy between chromatic and liquid flows, Cruz Diez's works

27 Marta Traba, "Finale: Allegro con fuoco: Cinéticos y experimentadores," in *Mirar en Caracas* (Caracas: Monte Ávila Editores, 1974), p. 123–133.
28 Traba, "Finale: Allegro con fuoco," in *Alfredo Boulton and His Contemporaries* (New York: Museum of Modern Art, 2009), p. 278–284, here p. 278.
29 Boulton, *Art in Guri*, p. 60.
30 Boulton, *Art in Guri*, p. 70.

were perfectly in sync with the modern episteme of technological mastery, through which river waters could be transformed into the unstinting electrical current that would course across Venezuela's national grid.

Post-Kinetic Assemblages

As an infrastructure devised to power the technological apparatuses, industrial and commercial processes, and the cultural circuits of modern life, hydroelectricity is founded on an oppositional logic that puts remote nonhuman resources at the service of human agents in urbanized centers. This understanding of infrastructure tends to privilege a means-end logic that establishes little conscious relation, for instance, between the final output of the switching on of a light bulb and the nonhuman ecologies that make such an action possible. In reality, though, hydroelectric energy connects the bodies, actions and lives of millions of Venezuelans to the ecology of the Orinoco basin and the hydrological reserves of the Caroní River that are challenging forth at Guri. Gretchen Bakke, author of *The Grid*, explains this succinctly:

> When a light switch is flipped in Caracas, the current that leaps to the bulb was likely, less than a second before, a drop of water behind the Guri Dam, four hundred and fifty miles away. As it passed through the dam, a turbine spun, tearing electrons from atoms and causing them to bump along, down cables and wires to the city, through the wall, past the switch, and into the bulb—a silent line of dominoes falling at nearly the speed of light.[31]

31 Gretchen Bakke, "The Electricity Crisis in Venezuela: A Cautionary Tale," *The New Yorker*, May 17, 2016, http://www.newyorker.com/tech/elements/the-electricity-crisis-in-venezuela-a-cautionary-tale. Bakke is author of *The Grid: The Fraying Wires Between Americans and Our Energy Future* (New York: Bloomsbury, 2016).

In this apparently frictionless system of flows, as long as the waters at Guri keep running and streams of electrons continue unabated, light-bulb filaments keep burning, water pumps keep pulsing, fridges keep humming, blow dryers keep blowing, food processors keep spinning, computer screens keep flickering, and life goes on as usual.

In early 2016, however, the flows of both water and electrons ebbed. A tenacious dry season took hold, causing the most severe drought in the history of Venezuelan hydropower. Instead of a body of water lapping at the rim of the reservoir's concrete wall and spinning the turbines below it, photographs of Guri taken in April that year revealed scenes of desiccation as the water levels sunk to a historic low of 243 meters. An archipelago of islands surfaced, scruffy clumps of vegetation sprouting from their centers and belts of reddish mud circling them above water level. Around the reservoir's edges, the usual picture of verdant plant life and the Caroní's deep blue hue gave way to spindly black trees that poked up through murky and stagnant waters, forced out of their subaquatic environment and back into contact with the atmosphere.[32] As the water levels dropped, the government instituted increasingly drastic energy-saving measures, mandating power outages that cut the working week to two days, closed schools on Fridays, and curtailed energy transmission to industries and homes.

The photographs of the parched land and sprouting islets parsed visually a fissure in the prevailing aesthetics of hydropower that had pictured Guri as the powerhouse for a nation on the move. Wrapped around turbines and unfolding along the engine room walls, the *Ambientes cromáticas* had emulated the kinetic motion of the water that electrified the nation; walking past these polychromatic murals generated its own energy

32 The photographs circulated widely, especially in: Andrew Cawthorne, "Drought-Hit Venezuela Awaits Rain at Crucial Guri Dam," *Reuters*, April 13, 2016, http://www.reuters.com/article/us-venezuela-energy-idUSKCN0XA1WL.

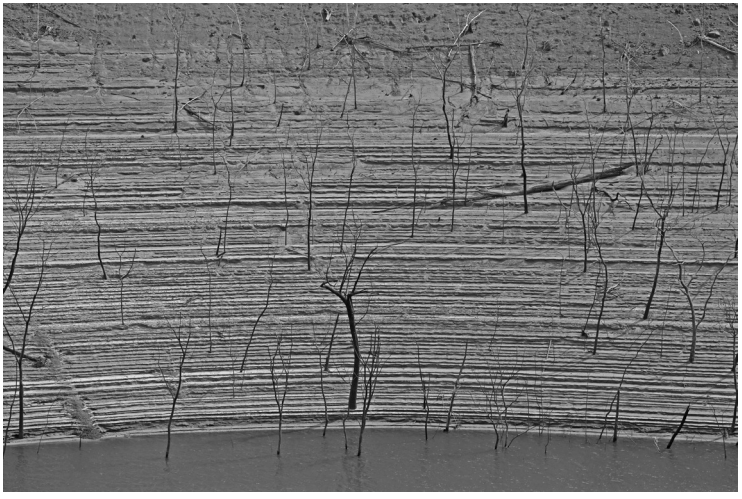

Figure 9. Guri in April 2016. ©REUTERS/Carlos Garcia Rawlins/Latinstock México.

through the vibrational field and forward trajectory that echoed the national narratives of free-flowing progress embedded in the dam. Amid the energy rationing and mandated blackout caused by the drought at Guri, though, free flow gave way to syncopated stutter as the linear kinetics of Cruz Diez's works were replaced by the horizontal strata of mud which re-emerged as water levels at the reservoir dropped (Fig. 9). In place of autonomous, free-flowing color, the dense, sticky materiality of the Orinoco came back into view, like a specter from the pre-hydromodern past.

Guri's desiccation plunged Venezuela into penumbra, but in so doing it illuminated the hubristic assumptions that drive human colonization of nature. Thinking through blackout today inevitably brings to mind Jane Bennett's description in *Vibrant Matter* of the huge grid collapse in the United States in 2003, in which she posits the material ontologies of electricity infrastructure as actant forces that produce aleatory effects beyond human control. Bennett's call is to disturb the

hierarchical configuration of human and nonhuman actants by countering technoscientific attitudes and cultural narratives that deaden matter, life, and nature to open up collective stories and politics to "a fuller range of the nonhuman powers circulating around and within human bodies."[33] With Bennett, infrastures are no longer exemplars of technology mastery, but *assemblages* of human and nonhuman forces, "ad hoc groupings of diverse elements, of vibrant materials of all sorts" of which she cites the power grid as an exemplar, since it is at once an artifact of human confection based on social, legal, and scientific knowledge and a cluster of active nonhumans constituents.[34]

The power outages on Venezuela's grid might be understood in a sense similar to the one parsed by Bennett. As the Caroní's flow withdrew, it paradoxically returned water to the fore as an agential constituent in the human-nonhuman assemblage of hydroelectricity, one whose objectification to serve human ends was deeply disturbed by the drought of 2016. Less directly, the emergent agentic force of water also brought the cognate (and equally hidden) liquid of oil back to the fore, flagging the unsustainability of the material constituent that has historically powered precisely that rapid urbanization which caused the demand for electricity to rocket, and on whose fickle mono-product economy the Venezuelan State is almost entirely dependent. Cruz Diez's art interventions at Guri are also part of this erratic hydroelectric assemblage. The drought and blackouts of 2016 disturbed the subject-object binaries that inhered in the artworks as they presented water as something separate from humans, a resource to be challenged forth and instrumentalized. More specifically, Guri's deceleration to minimal hydroelectric production generated what might be called a post-kinetic assemblage: a dissonance in the intersection of hydraulics and kinetic aesthetics that de-composed the scene

33 Bennett, *Vibrant Matter*, p. ix.
34 Bennett, *Vibrant Matter*, p. 24.

of unstinting forward motion in industry, art, and national development that the hydroelectric plant and Cruz Diez's works were supposed to configure.

Flow of Flows, Matter that Matters

The kinetic art that blossomed in Venezuela in the mid-to-late twentieth century was founded on the modernist principle of aesthetic autonomy, which held that it was form—not matter—that mattered. Yet, just as the hydroelectric plants in the Orinoco basin are bound up with the human-nature relations underpinning the promises of rapid development tendered by the magical hydraulic State, today the legacy of the kinetic artworks at Guri is entangled with the fluvial desiccation that brought the turbines grinding to a halt just forty years after they were inaugurated and the embedded mud that returned spectrally into view. The *Ambientaciones cromáticas* had served as an anthropocentric *telón de futuro* in which liquid, chromatic, and electric flows composed a national scene in which natural resources were in perfect concert with human activities. When the drought decomposed this scene, muddying the supposed autonomy of art and turning the technopolitical discourse of the human colonization of nature into a stutter. Returning as an uncontrollable constituent in the assemblage of hydroelectricity, the Orinoco asserted the agency of its liquid ecology within the broader crises of contemporary climate change and environmental decline.

The parallel rise of global dam-construction projects and climatic disaster suggests that the principles of both artistic autonomy—its separation from technopolitical, economic, and ecological contexts—and of human colonization of nature are becoming ever more untenable. This calls for new approaches to human-nature relations that escape the oppositional logic that subordinates the latter to the former. Responding to this

call, Jason Moore underscores the agentic forces of nature, signaling that while "the manifold projects of capital, empire, and science are busy making Nature with a capital 'N'—external, controllable, reducible—the web of life is busy shuffling around the biological and geological conditions of capitalism's processes."[35] He suggests conceiving of nature—with a lowercase *n*—as a flow of flows that is not objectifiable, but that *is* us, is *inside* us, and moves *around* us.

Imagining human-nonhuman continuity as a "flow of flows" in which matter that matters can interrupt circulation speaks particularly well to the concept of the post-kinetic hydroelectric assemblage proposed here. Recognizing the artworks at Guri, and Guri itself, as constituents of an erratic post-kinetic assemblage alerts us to the need for more sustainable forms of art, scaled not in bombastic capitals letters, but as a lowercase environmental aesthetics more attuned to the unpredictability of the present. Given that drought and deluge are likely to continue interrupting the free flows of rain to river, reservoir to grid, cable to socket, technology to body, the post-kinetic assemblage might well become an enduring cipher of hydroelectricity. More broadly, this impasse compels more wide-reaching critical revisions of the human-nature relations embedded in cultural imaginaries of art and infrastructure, and the political and economic ideologies for which they often used as legitimizing vehicles. The Orinoco's longstanding status as an extractive frontier of Nature with a capital *N* makes this task particularly pressing, especially in light of the ongoing construction of hydroelectric power stations on the Caroní River, the recent intensification of oil drilling in the Orinoco basin, and the designation for mineral extraction of an area in the region measuring more than one hundred thousand square kilometers as a "mining motor"

35 Moore, *Capitalism in the Web of Life*, p. 2–3.

for the Venezuelan economy.[36] Such moves suggest that the aspiration to colonize nature endures in dreams of El Dorado that have been updated for the twenty-first century. To these dreams, the aesthetics of hydropower and post-kinetic assemblages offer a stark warning, one that signals the need for more sustainable and responsible engagements with the ecology of the Orinoco basin and its lively material constituents.[37]

36 Hydroelectric development continues with the completion of Caruachi in 2006, and the construction of Tocoma, both on the Caroní River. Drilling began in the Faja Petrolífera del Orinoco (Orinoco Oil Belt) in 1936, but in 2007 Hugo Chávez (in power in successive terms from 1998 to 2013) nationalized the area and redoubled efforts to exploit its oil reserves. After a fractious relationship with foreign extractivist corporations, in 2016 President Nicolás Maduro launched the Arco Minero del Orinoco as a *motor minero* (mining motor) for Venezuela's economic recovery. Both projects have been criticized by environmental groups.

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