

The *Reserva Ecologica*: Three Streams of Material Excess in Buenos Aires

In 1976 the military dictatorship of Argentina proposed a radical plan to remake the capital city of Buenos Aires as part of the National Reorganization Project.¹ A new system of elevated urban highways [autopistas urbanas] was to be sliced through the existing fabric of the congested metropolis of 10 million, improving connectivity between the center and periphery, and demolishing the buildings that stood in the way. The debris

created from the operations were to be collected, trundled through the city and deposited along with dredge material from the nearby industrial port in the shallow Rio de la Plata estuary on the edge of downtown. This was part of a massive land reclamation project, occurring at a historical moment when Argentina was shifting from an authoritarian regime to a democratic republic, and was to eventually provide the land for a new federal governmental center. The waste created from the highways project was combined with the dredge spoils from the nearby port and the biological material and sediments brought by the historic 1983 flood on the Rio de la Plata to create a new form of terrain on the edge of the modern city.

Examples of radical overwriting of the form of the city proliferate in the global urban history of the last two centuries, from the Haussmanization of Paris to Robert Moses 'taking a meat axe to the Bronx'.² However, there are few studies that consider these processes in terms of material displacement. The spatial result of these large-scale renewal projects is typically understood to be twofold: the removal of the existing and the installation of the new. However, there is a third effect: Once the construction and demolition waste is displaced, it can exert an influence on the spatial relations and material reconfiguration of the city. By developing the conceptual and technical tools to grapple with and negotiate the effects of material displacements at a large scale, architectural and landscape practice might expand to take on a more efficacious role in the construction of new types of urban space.

Using the Reserva Ecologica of Buenos Aires as a case study, this paper will examine waste as both the result of, and embodying the potential for a meaningful spatial refiguring of specific places within a particular

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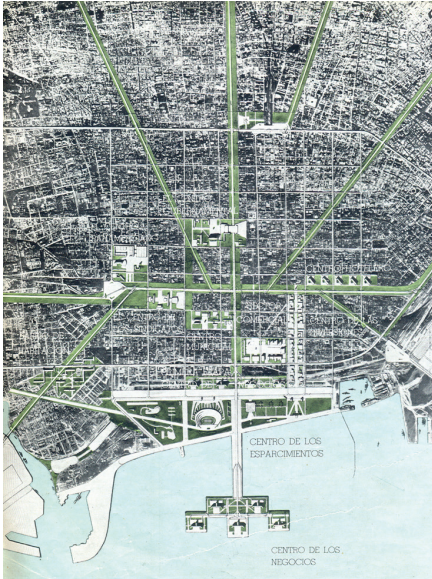
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Figure 1: [1977, Buenos Aires, Argentina] Dump trucks deposit construction and demolition debris from urban highway construction projects in to the Rio de la Plata estuary. (Image courtesy of La Nacion newspaper)

Figure 2: Le Corbusier's 1937 Plan for Buenos Aires imagined a new commercial district on the shallow muddy flats of the Rio de la Plata. (Image from the Plan Director para Buenos Aires, Le Corbusier.⁵)

political-economic context. Streams of excess material- waste are reconsidered as both a spatio-political result and the raw material giving rise to spatio-political transformations that figure the powerful ecological and geological processes of the Rio de la Plata in the historical fabric of the city.

FROM A SPACE OF POWER TO A SPACE OF POSSIBILITY

Buenos Aires was founded for the second time in 1580 on a bluff of the southern shore of the Rio de la Plata. The Rio de la Plata is the alluvial estuary of one of the world's great rivers, the Rio Parana^{3,4}. The particular geology and hydrodynamics of the estuary are such that its edges are rocky and eroded on the Uruguayan side and shallow and muddy on the Argentine side; Uruguay is always being deposited in Argentina. This fact has necessitated certain particular technological adaptations in Buenos Aires: the use of shallow-bottom boats, the construction of extremely long piers and finger dikes, and massive quantities of dredging. As the city expanded, it radiated out from this central bluff into the great plains of the Argentine pampas. As a result, the center of Buenos Aires remained anchored adjacent to the la Plata estuary even as the city grew into a modern metropolis of thirteen million residents. As a result, the intermediate zone between land and water created by this juxtaposition has always been important and fraught with difficulty.

In the nineteenth century, when Argentina was in the midst an eighty-year emigration period in which they received more European immigrants than any nation in the world except for the United States,⁶ the customs house and immigrant hotel occupied the zone between the city and the Rio de la Plata. During the interwar period, as Argentina's economy thrived from the sale of raw materials and manufactured goods to Europe, Le Corbusier's 1937 plan imagined a gleaming commercial district built out in the water. The designs of the military dictatorship were decidedly less optimistic; the location seems to have been chosen because of a combination of logistical pragmatism, symbolic importance, and the high level of access control it afforded.

The location was ideal for an autocratic regime. A land reclamation project would allow the military government to be near the nerve centers downtown, but topographically separated from the population. The design called for using the construction and demolition debris generated during the construction of elevated urban highways⁷ to create an armored levee, establishing a perimeter. This perimeter would then be infilled with dredging spoils generated by the maintenance operations from the adjacent industrial cargo port to the north and the petrochemical port immediately south, both of which required large-scale, ongoing dredging to maintain a shipping channel in the shallow, silt-laden Rio de la Plata.⁸

The project began in 1977 and by 1983 the perimeter had been completed and the interior was partially filled in. In 1983 a flood on the Rio Parana caused water levels in the Rio de la Plata estuary to rise nearly nine meters above the mean level.⁹ This flood was enough to push massive quantities of water hyacinth and seeds of other wetland plants from the rich Parana biome over the perimeter levees and into the interior lagoons that were

partially filled with fine-grained clasts from dredging operations. It was an invasion of an unanticipated excess of biological material, producing very real effects. At the time of the flood the interior zone of the project was only partially filled in with dredging spoils, resulting in a varied topography rich in micro-habitats. Many of the seeds and rhizomes brought by the flood took root in these quasi-intentional zones of opportunity.

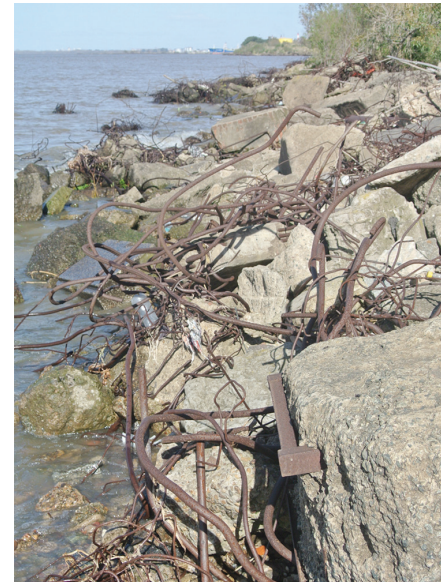
In 1984, after eight years of state-sponsored violence against its own citizens, the Falklands War disaster, and a stagnated economy, the military dictatorship was deposed and a democratic government elected. The National Reorganization Project was ended and the plan for the governmental administrative zone was abandoned in its partially constructed, vegetated state. However, the fecundity and power of the river, and the unending omnivorous processes of the industrial national capital have given this liminal zone a particular allure, seeming to create a space of possibility that surpasses the intentions of architects and military dictators alike.

With the cessation of infilling the reclamation project was rapidly overtaken with biological agents. Native water hyacinth and pampas grasses, juncus and ceibos all colonized the rich mudflats and lagoons on the interior and mixed with the seeds of horticultural specimens found in gardens scattered throughout the city and airlifted to the site in bird excrement. Concurrently, political action was organized in the newly democratic nation to reimagine the project. On June 8, 1986 municipal ordinance number 41,247¹⁰ declared the reclaimed terrain a nature preserve for the city of Buenos Aires, a place to be open to the public where wildlife would be protected, and in 1989 the newly named Reserva Ecologica was included in the city's urban plan for the first time.

WASTE AS ARMATURE AND CATALYST

Recent estimates put the percentage of solid waste in the United States produced by construction and demolition debris at 30 percent, and 91 percent of all construction waste is the result of either renovation or demolition.¹¹ While a number of initiatives exist to study ways in which buildings can eventually be designed to reduce construction waste, it should be noted that the bulk of the building stock that will be demolished over the next several decades is already in existence and has not been built with either demolition or deconstruction in mind. Much of this aging building stock is constructed of reinforced concrete or unit masonry, or a combination.

Typically, for this type of debris to be utilized, it is finely crushed and used either as fill, which is subsequently capped and put out of sight, or as aggregate for low-performance concrete.¹² When reused in this way, the material presence of this category of demolition debris and the physical, material, and social history to which it might attest is completely overwritten or obscured. The use of concrete and unit-masonry debris at the Reserva hints at a range of new possibilities for the way the potential of this type of demolition waste might be used. Large pieces of reinforced concrete line the water's edge, but the steel reinforcing bar has not been removed and so the chunks of concrete have become entangled with each other—able to shift,



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Figure 3: Reinforced concrete debris anchors the perimeter of the Reserva. (Image courtesy of the authors.)



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Figure 4: Intact segment of brick and mortar, common along the shoreline pathway of the Reserva. (Image courtesy of the authors)

but unlikely to come fully loose, even during extreme weather events. This debris performs in a similar way to the precast concrete tetrapods seen on Japanese and Chilean coastlines.

Another example of an unconventional yet fortuitously effective use of this type of debris can be found on the walking paths along the perimeter of the Reserva. While many full and partial bricks are visible, mortar still intact, the dust on the paths is minimized by the presence of a large quantity of terracotta chips. Similar in performance to the decomposed granite that one might find on a walking path of a high-budget park in New York, yet offering a color and texture specific to the terracotta, the chips combine with the silty dust (ostensibly dredgate from the Rio de la Plata) to create a durable and aesthetically pleasing walking surface.

Grappling with an agency of waste calls for more than simply reconsidering how it might be utilized. At the Reserva Ecologica, various forms of waste clamor to be considered as something much more than raw constructive material. By theorizing¹³ waste as a catalyst and armature for new spatial possibilities in the city, designers might start to develop the conceptual tools to explore these futures.

The concept of an armature within architectural discourse most often conjures images of a Marxist-like megastructure such as Constant's New Babylon. However, to draw out an ecological metaphor, this is a bit like loving the charismatic megafauna while the mycorrhizal associations that provide a basis for the function and performance of an ecosystem go unappreciated. In the case of the Reserva, the armature is much more subtle: The structure is as much chemical and biological as it is mechanical and semiotic.

Through field observation¹⁴ one can see that the material composition of the perimeter levees is wildly heterogeneous but contains a high amount of mortared brick and large concrete pieces, some with steel reinforcing bar. The mortar and concrete both affect the pH level of the soil: as little bits of the material are decomposed and mixed with the sediments trapped by the rip rap, the pH levels are raised to the point that they begin to alter the plant communities that can take root. As the slabs of broken concrete that resist the wave and tidal action are slowly turned into rounded forms, they are creating an entirely new calcium-rich soil, one that favors plants that grow in alkaline conditions. These conditions create what are known as fens here in the United States, one of four main types of wetlands according to the Environmental Protection Agency¹⁵, each with their own plant communities and ecological associations.

The dredging spoils that were used to partially fill the interior from 1977 until 1983 initiate additional and particular effects. Because the sediments on the Argentine side of the Rio de la Plata tend to be fine-grained clasts, the spoils from dredging the port make a rich soil. However, they were drawn directly from an industrial landscape with high levels of toxicity from 200 years of unregulated industrial operations.¹⁶ As such they provide a fecund medium, but only for plants that have the capacity to withstand moderate levels of heavy metals and other industrial contaminants.¹⁷

These industrial-scale wastes interact with a third stream, the biological excesses of the Rio de la Plata biome which take the form of the masses of flora and fauna that are distributed and flushed out to sea during flooding events. Although not waste in a conventional sense, this is an example of excessive material displacement this is similar to industrial dredging operations.¹⁸ In the case of the Reserva these material streams are crossed, brought into conflict with each other in such a way that catalyzes the production of a new type of urban space in Buenos Aires.

DUMPTRUCK DETERMINISM

In his 2009 essay “Landscape as Infrastructure,” Pierre Bélanger discusses the intertwined operations of demolition and land-building relative to the case study of the Leslie Street Spit in Toronto:

Often dismissed as clandestine, accidental or temporary, field operations—such as excavation, demolition, de-engineering, dredging, backhauling, backfilling and storage—are all representative operations and sites forming a decentralized landscape prevalent throughout North America that may previously have seemed disconnected and disorganized. The cases of active lakeshore reconstruction over the past 200 years, including the more than 350 lakeshore disposal facilities in the Great Lakes currently in operation (USACE 2008) testify to the longevity and endurance of this paradoxical practice.¹⁹


Numerous parallels exist between Toronto’s extemporaneous wildlife sanctuary and the Reserva. Perhaps most notably, both were constructed through an incremental process of debris dumping that was initiated during the latter decades of the twentieth century. Thus, as land was slowly built out into the lake or estuary, it provided the stable ground on which subsequent dump trucks could make their way to the edge and deposit their loads. The dump truck is the active agent in the land-building process, and the forms that become possible are as much a result of the turning radius and capacity of the trucks as they are of any deterministic design vision of how the finished landform should look. This capacity of instruments and technology to influence and inflect the historical development of space was theoretically explored by Lefebvre, who noted technology as one of the primary forces at work in the production of space.²⁰

A noteworthy difference between the Reserva Ecologica and the Leslie Street Spit is that while the Spit was built over the course of several decades, ostensibly from numerous types of debris and from projects throughout the city, the Reserva is the reconstitution of the demolition waste from a singular initiative that lasted slightly more than eight years. As was the case with most urban renewal projects from this era, the disenfranchised and powerless were the targets of least resistance for this urban hollowing.²¹ Whereas in the United States during the 1950s this tended to take the form of socio-economic and racial prejudice with interstates cutting through historically black neighborhoods, in Buenos Aires this seems to have been more closely tied to political affiliation and how sympathetic to the military authorities different sections of the city were perceived to be.



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Figure 5: 1969, Asphalt Rundown, by Robert Smithson. (Image from robertsmithson.com)



In addition, the relatively linear process of land-building by dump truck and what was quite likely a systematic demolition that went neighborhood by neighborhood or perhaps even building by building has constructed a land-form, the composition of which roughly maps the sequence of demolition. Restated more simply, neighborhoods are reconstituted as land in the order in which they disappear. During a two-mile jog around the perimeter path of the Reserva, the material underfoot manifests a paradox, two simultaneous yet inverse tales: the demolition of the city and the building of nature.

THE AESTHETIC EXPERIENCE OF WASTE ECOLOGIES

The Belgian collective ROTOR, which studies the flow of material in industry and construction, uses the writing of mid-century sociologist Mary Douglas to clarify their position on the societal role of waste:

By using dirt or waste people state a paradox: although we want life to be clean and neat, although we search for purity, for logical categories and non contradictions, experience or life cannot be (entirely) forced into such categories. 'Existence', says Douglas, 'is a chaotic jumble', it is 'an inherently untidy experience'.²²

Understood in this light, the Reserva manifests yet another paradox: the aesthetic experience of waste within an environment in which an encounter of waste is unexpected. A popular and well-used urban retreat, the Reserva is overrun on the weekends with groups, individuals, and families representing a cross-section of Buenos Aires society. It is located adjacent to the wealthy residential neighborhood of Puerto Madero, is within easy walking distance of many downtown attractions as well as the historic working-class barrios of San Telmo and La Boca, and is home to the poor informal Villa Rodrigo Bueno settlement. In the last twenty years it has been knit with trails and peppered with interpretive signage meant to inform passersby of the history and ecological importance of the site. Most impressive, it brings visitors into contact with a vastness, both industrial and geological, not accessible in the modern city. It is clearly, despite its sordid beginnings, an important public space of possibility and resistance that offers an alternative to normative municipal landscape types such as the park or the promenade.

When considering the Reserva, corollaries in the Northern Hemisphere such as Fresh Kills in New York City or Gasworks Park in Seattle readily come to mind, although those tack much more closely to established norms of social and aesthetic experience based on the municipal park typology. However, despite the similarities of scale and a history of waste accumulation, the Reserva offers a profoundly different aesthetic experience. This difference, generated by a subtle perceptual shift, is revealed upon closer examination of the ground and the shoreline. Unlike the parks²³ which propagate over the top of defunct urban and ex-urban dumping grounds, almost no attempt to mask the composition of the ground has been made at the Reserva.

This space is neither a carefully preserved estuarine outpost nor is it a celebration and skilled acknowledgment of the place's transformation from waste repository to urban pleasure ground.²⁴ Rather, it is a chimera, closer to some sort of synthesis of land art and conservation zone. The aesthetic

experience here is closer to that explored by Robert Smithson than any contemporary park space. The debris-rounded shards of brick and mortar pushing their way up through the dusty walking paths, and large chunks of reinforced concrete at the water's edge knit together by jagged rebar with a patina of rust, simply exist as they are. In addition to providing the initial armature for ecological and geological processes to take hold, the debris is an active participant along with migratory birds, indigenous and invasive flora, informational signage, and container ships floating in and out of view, in the construction of the aesthetic experience of the Reserva.

SOME IMPLICATIONS

Today the Buenos Aires Reserva Ecologica exists as the liminal space between intent and potential, the materialization of the historical desire to occupy the intermediate zone between city and river. It is a subnature,²⁵ a place where autochthonous vegetation springs from dredge spoils alongside strange invasives and horticultural specimens in a terrain carved from a mighty river, and contained within a ring of crushed concrete and shattered brick and stucco. As such it is testament to both the efficacy and inadequacy of political actions and design strategies, and proof of the incredible potential and power of the geological and biological forces of the Rio de la Plata.

In confronting a place that throws off all definitions of natural, designed, or built, architectural and landscape practice might conceive of the history of this space in terms of waste. Here the crossing of three streams of waste creates a spatial armature of a different nature—neither infrastructure nor superstructure, but rather a substructure—catalyzing new material and social processes for a radical refiguring of the city. These political and material intentions and their spatial effects suggest that designers might find a way to engage these waste disposal processes and the agency of waste itself as a form of architectural practice. An architectural concept that positions waste as an excessive material displacement might offer the conceptual tools needed to relate powerful geological and ecological dynamics with industrial expansion efforts and ongoing maintenance and rebuilding operations within a political economic context.

If we can develop the techniques, conceptual tools, and theoretical approaches to grapple with excessive material displacements and their potential to reshape our cities, we might take on the challenge to contemporary practice that these waste places provoke and work to open up a field of possibility for architectural disciplines. The Reserva offers an extreme but instructive case: architectural action will require a sensitivity to and engagement with a variety of political, ecological and economical actors as well as an interest in spontaneity and opportunism. In the past, architectural practice has exhibited the capacity for this work, and many people are currently developing exciting projects that hold much promise.²⁶ By applying these capacities to waste streams as material displacements, architecture might again take on the task of creating new forms of living, and new types of living, and new types of space.

The Buenos Aires Reserva Ecologica seems to offer a sort of natural history of urban space, one in which shifts in political ideology are figured alongside

ENDNOTES

1. Luis J. Domínguez Roca, "Planes Urbanos y Transporte en la Ciudad de Buenos Aires," *Revista Electronica de Geografia y Ciencias Sociales*, University of Barcelona, (Vol. IX, núm. 194 (112). September 18, 2012, <http://www.ub.edu/geocrit/sn/sn-194-112.htm>).
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3. US Geological Survey and US Department of the Interior. *Circular 1254: The World's Largest Floods, Past and Present: Their Causes and Magnitudes* (USGS, Reston, Virginia, 2004).
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13. Elizabeth Meyer, "Situating Modern Landscape Architecture: Theory as a Mediating, Bridging, and Reconciling Practice," (paper presented at the annual Council for Educators in Landscape Architecture Conference, *Design + Values*, 1992). In this work landscape theorist Elizabeth Meyer showed that theory is as a "mediating, bridging and reconciling practice".

14. Based on field work by the authors. (July, 2012)
15. US Environmental Protection Agency, *Fens*. <http://water.epa.gov/type/wetlands/fen.cfm> (accessed September 17, 2012).
16. The environmental history of this industrial watershed is detailed in the Integrated Plan for Environmental Health (PISA, after the Spanish initials); this document is the foundational document for ACUMAR, the water basin authority http://www.acumar.gov.ar/Informes/Control/CalAmb/Abril2011/Abril2011_link.pdf (accessed September 17, 2012).
17. At this point the types and quantities of contaminants are not entirely known, as no comprehensive environmental study for the Reserva Ecologica has been carried out. However, studies by the ACUMAR agency focused on the nearby Riachuelo provide insight into the types of contaminants likely present here, as many of the dredging spoils in the Reserva originated in the Riachuelo due to industrial processes.
18. William Cronon's work *Nature's Metropolis*, as well as Henri Lefebvre's *The Urban Revolution* both offer insight into the way that modern urbanism is regional in scale, connected through processes of industrial production and extraction.
19. Pierre Bélanger, "Landscape as Infrastructure," *Landscape Journal*, Vol 28 no. 1 (2009): 83.
20. Henri Lefebvre, *The Production of Space* (Blackwell Publishers, 1991): 46.
21. O. Oszlak, "Merecer la ciudad. Los pobres y el derecho al espacio urbano," CEDES-Humanitas, (1991): p 78
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24. Frederick Law Olmsted. *Preliminary Report to the Commissioners for laying out a park in Brooklyn, New York: Being a consideration of circumstances of site and other conditions of public pleasure grounds*. (New York: Van Andens Print, 1866). Note here how Olmsted uses the term park and public pleasure ground interchangeably.
25. Gissen, David. *Subnature: Architecture's Other Environments* (New York: Princeton Architectural Press, 2009). This work is illuminating, calling for architecture to reengage with the dust, mud, insects, weeds, flotsam, and jetsam that are the stuff of our material world.
26. Again here, the work of Belgian collective ROTOR, as well as Smout Allen and Alan Berger offer a diverse yet instructive set of precedents for this type of work and thinking.
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major floods, construction waste disposal, port maintenance operations, feeding habits of migratory birds, and the desires of denizens of a major metropolitan city for recreation and meaning in daily life. The work of Henri Lefebvre in his work *The Production of Space* is helpful in excavating this history:

If space is produced, if there is a productive process, then we are dealing with history.... The history of space [sic] is not to be confused either with the causal chain of 'historical' events, or with a sequence, whether teleological or not, of customs and law, ideals and ideology, and socio-economic structures or institutions. But we may be sure that the forces of production (nature; labor and the organization of labor; technology and knowledge) and naturally, the relations of production play a part ... in the production of space.²⁷

In the case of the Reserva, the confluence of three streams of waste—large scale demolition debris, industrial dredge spoils, and biological material carried by a massive flood—created a new spatial armature, one that catalyzed new material and social processes for a radical refiguring of the city. These political and material intentions and their spatial effects suggest that designers might find a way to engage these waste disposal processes and the agency of waste itself as a form of architectural practice. ♦