In the Nature of the Non-City: Expanded Infrastructural Networks and the Political Ecology of Planetary Urbanisation

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Abstract: This paper proposes extending Urban Political Ecology's (UPE) ideas about the urbanisation of nature in order to include the geographical imprints of expanding, global metabolic flows of matter, energy and capital. It does so through the analysis of Huasco, a small agricultural village in northern Chile that has been overburdened with massive energy undertakings aimed at powering the operations of mines that supply raw materials to international markets. Like the sewage and technological networks that feed the life of cities, the paper argues that Huasco—as a metabolic vehicle of planetary urbanisation—has also been hidden from view, and thus the fetishisation of urban infrastructural networks initially theorised by UPE, has been ratcheted-up to the global level by the mediating powers of neoliberalising capitalism. Just as the socio-material arrangements that facilitate the smooth functioning of the modern city and household are riddled with glitches and exclusions, the paper suggests that globally up-scaled infrastructures reveal even larger contradictions that put into jeopardy the very premises upon which the ongoing commodification of nature is grounded.

Resumen: Este artículo propone extender los marcos conceptuales de Ecología Política Urbana (EPU) acerca de la urbanización de la naturaleza, con el fin de incluir flujos metabólicos globales de materia, energía y capital. Esto se hace a través del análisis de Huasco, un pueblo agrícola en el norte de Chile que tras la bonanza extractivista de la última década, fue transformado en un distrito energético inserto en densas redes globales de producción e intercambio. Tal como sucede con las infraestructuras tecnológicas que soportan la vida de las ciudades, el artículo sostiene que Huasco–un vehículo metabólico de la urbanización planetaria–también ha sido invisibilizado, y en ese sentido la fetichización de la redes infraestructurales urbanas teorizada inicialmente por EPU, ha sido elevada a una escala global por el capitalismo neoliberalizante. Así como los circuitos sociomateriales que permiten el funcionamiento regular de la ciudad y el hogar modernos están plagados de desperfectos y exclusiones, el artículo aduce que las infraestructuras globales contienen contradicciones aún mayores que ponen en peligro las premisas sobre las que se fundamenta la mercantilización de la naturaleza.

Keywords: planetary urbanization, urban political ecology, world ecology, urban metabolism, neo-extractivism

Introduction

Vast terraced bowls step down—and down and, impossibly, farther down—tracking dead faults and mineralization fronts on a scale only made clear when we notice 16-ton trucks like specks of dust on canyon walls. Discolored oceans of chemical runoff wash across vehicle tracks with acid tides ... artificial hills, each uncannily and exactly like

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> its neighbor, roll from one side of the frame to the other, shifting in tandem with commodities prices, their malleable geography thus forever resistant to mapping ... These mines grow in great metastasizing voids, like storm fronts of negative space exploding with slow thunder into the planet. (Manaugh, quoted in Maisel 2013:205)

With photos of open-cast mines like the one described above, David Maisel's 2013 book *Black Maps* graphically documents some of the most radical alterations that the late modern, financially driven and technologically rejuvenated mode of production has inflicted upon the surface of the earth. These colossal landscapes, however, are not celebrated as wonders of human engineering but are instead swept under the carpet and hidden from view. Yet, their sheer magnitudes alert us to the fact that the metabolic exchanges of matter, energy and capital required to feed the contemporary urban world have been distorted and up-scaled to the point that they have now reached a hypertrophic, global extent. In this context, and despite its valuable contributions to contemporary understandings of metabolic flows within cities, the School of Urban Political Ecology (UPE) (Heynen et al. 2006; Kaika 2005; Kaika and Swyngedouw 2000; Swyngedouw 2004, 2006; Swyngedouw and Heynen 2003) has been recently criticised for not expanding its radical political-ecological imaginary beyond urban agglomerations (Angelo and Wachsmuth 2015; Ibañez and Katsikis 2014; Wachsmuth 2012). Allegedly, UPE has persistently centred its analysis on urban areas, in both its site selection and analytical framework, and as a result, the global socionatural dimensions that stretch from the city to the non-city have remained unexplored (Angelo and Wachsmuth 2015).

Such critique is particularly relevant in a context where, as Henri Lefebvre (2003) observed in *The Urban Revolution*, urban areas have been exploding relentlessly beyond their boundaries, producing a highly uneven urban fabric that ceaselessly extends its borders across non-urban geographies. The current commodity boom, regarded as the most wide-ranging and persistent since the postwar period (ECLAC 2013; IMF 2011; World Bank 2009), is among the key determinants of this urban explosion, as it has fostered an extraordinary expansion of the resource extraction frontier, especially in Latin America (see Arboleda 2015a; ECLAC 2013; Toro 2012). If we take Lefebvre's process-oriented view of urbanisation as the multiscalar production and reproduction of the built environment—regardless of population size or density (see Brenner and Schmid 2013; Lefebvre 2003; Wachsmuth 2014)—then these landscapes of extraction need to be considered an integral part of the global urban condition.

By engaging with an emergent strand of critical urban theory that reworks the Lefebvrian notion of generalised urbanisation (see Angelo and Wachsmuth 2015; Brenner 2013, 2014; Brenner and Schmid 2014, 2015; Merrifield 2013; Schmid 2014a, 2014b; Wachsmuth 2014), as well as with UPE's ideas of the urbanisation of nature, this paper interrogates the emerging patterns of urban metabolism that ensue from the expansion of the resource extraction frontier through an analysis of energy infrastructures in Huasco, a small village in northern Chile. During the last three decades, Huasco has witnessed the arrival of massive energy undertakings required to power the operations of large-scale mines that supply raw materials

to international markets. Places like Huasco, I will argue, have come to constitute the geographical imprints of an expanded urban reality where the fetishisation of urban infrastructural networks—initially observed by UPE—has reached a global extent. In very much the same ways that flows of matter and energy are rendered invisible when circulating throughout the city (see Kaika and Swyngedouw 2000), I will argue that an up-scaled metabolic relation has severed even further the process of transformation of nature from the process of urbanisation. This disconnection, however, is an intrinsically contradictory process that tends to manifest itself in the form of crises and disruptions where the fetish is dismantled and the violence that transforms nature into urbanisation is cast into stark light.

Foregrounding the geographical embeddedness and immanent contradictions of these expanding metabolic flows by looking at the case of Huasco is therefore at the core of this paper. For that reason, I will underpin my argument by the findings of a three-month fieldwork period conducted in Chile between November 2013 and January 2014, where semi-structured interviews, data collection and informal conversations were carried out with various activists and members of Huasco's local community. The first section of the paper elaborates on notions of urban metabolism in the face of an expanding planetary urban fabric. In so doing, it also reflects on its immanent contradictions, proposing to re-scale Kaika's (2004, 2005) notion of the "urban uncanny". The second section provides some empirical context on the case of Huasco and its transformation into an industrial hinterland supporting processes of urbanisation unfolding at broader spatial scales. The third section reveals the limits and contradictions intrinsic to such metabolic exchanges, pondering on their potential for emancipation.

The Planetary Expansion of Urban Metabolism

The notion of the urbanisation of nature arguably constitutes one of the most central contributions of UPE to the field of urban studies, because it debunked the myth of the urban as being the putative outside of a supposedly pristine and untouched natural world. In what could be considered one of UPE's founding statements, Kaika and Swyngedouw contend that as natural resources become commodified and integrated into the city through technological networks, "nature itself becomes re-invented in its urban form ..." (2000:121), while at the same time being severed from its raw state as a mere use-value (see also Heynen et al. 2006). The modern city then becomes a network of pipes and conduits through which water, energy and raw materials become part of dense metabolic flows that are socially mediated (see Swyngedouw 2004, 2006). The urbanisation of nature would then be predicated on the social mobilisation of these metabolic processes under capitalist and market-driven social relations, where "nature" (ie a glass of water, steel, concrete, an orange, etc) assumes the social form of commodities (Heynen et al. 2006; see also Swyngedouw and Heynen 2003). Crucially, the urban also becomes subject to the same process of fetishisation of commodities described by Marx (1976)[1] and for that reason, the networks that facilitate such metabolic flows attain a

phantom-like character, being usually hidden from view and relegated to the "underbelly" of the city (see Kaika and Swyngedouw 2000; see also Bridge 2009a; Kaika 2005).

Despite its success in bringing this radical political-ecological critique to the city, Angelo and Wachsmuth (2015) have recently argued that UPE has overlooked Lefebvre's process-oriented view of urbanisation, because its research agenda has remained tethered exclusively to large urban agglomerations, in both site selection and analytical framework (see also Ibañez and Katsikis 2014). A reformulated UPE therefore becomes the more urgent in a context where the urbanisation of nature has broken free from the fetters of self-contained, geographically distinct urban areas and extended to vast stretches of the Earth. Thus, as Ibañez and Katsikis argue, under contemporary globalised urbanisation, cities appear more connected to a planetary system of production and exchange than to their surrounding hinterlands. As urbanised regions expand and become denser, these authors note, they extend their metabolic reach and "become increasingly interdependent with the development of specialised regions of service and supply (agricultural regions, resource extraction zones) ..." (2014:6; see also Brenner 2014).

An emerging strand of critical urban theory that reconceptualises the Lefebvrian notion of generalised urbanisation would offer an appropriate toolkit to extend UPE beyond already consolidated urban areas (see Angelo and Wachsmuth 2015; Brenner 2013, 2014; Brenner and Schmid 2014, 2015; Merrifield 2013; Schmid 2014a, 2014b). These authors argue that urbanisation increasingly supersedes the urban/non-urban divide, enacting "operational landscapes" for resource extraction, agro-industrial production, energy and information circulation, waste management and geopolitical strategies (see for example Brenner and Katsikis 2014). For that reason, the global urban condition should no longer be understood in terms of urban/non-urban, but in terms of *concentrated* and *extended* forms of urbanisation. The former refers to the formation and restructuring of densely concentrated agglomerations (ie cities, city-regions, megalopolises, etc). The latter, on the other hand, refers to the creation and reorganisation of operational landscapes that simultaneously facilitate and result from the dynamics of urban agglomeration (Brenner 2014; Brenner and Katsikis 2014; Brenner and Schmid 2014). With this distinction, these theorists intend to foreground the richly patterned ontological differentiation that results from the growth of the urban system, and as the case of Huasco will reveal, it constitutes an important analytic to understand new forms and scales of urban fetishisation.

Indeed, operational landscapes like Huasco, which have been completely engineered to provide low-end energy for the extraction of raw materials destined for consumption in remote corners of the globe, are the geographical imprints of these expanded, wide-sweeping metabolic exchanges. Like the sewage and piping networks that feed the life of cities, subsequent sections will show how Huasco—as a provider of cheap energy—has also been hidden from view, and thus the fetishism of urban technological networks that was initially described by Kaika and Swyngedouw (2000), has been ratcheted up to the global level by the mediating powers of neoliberalising capitalism (see also Kaika 2006). According to Bridge (2009b) anthropogenically driven material flows now rival in scale those occurring

independent of human agency. Activities like industry, mining and fossil fuel burning, Bridge (2009b) argues, have reached material footprints comparable to rock weathering, volcanic emissions and water erosion on a planetary scale.

In that vein, Jason Moore (2014) proposes a world-ecological reading of metabolism in which capitalism is recast as both producer and product of the web of life. More than as an economic system, Moore insists that a world-ecological framework would reconceptualise capitalism as a way of organising nature (2014:12). Capitalism therefore internalises to some extent the relations of the biosphere, and in so doing, becomes the metabolic engine that yields patterns of geographical organisation that lead to the planetary extension of the urban form. Thus, on a continuous basis, Ibañez and Katsikis (2014) note how buildings and cities, dams and highways, mines and oil rigs become interwoven in global metabolic exchanges of energy, food, people, metals, and so forth (Ibañez and Katsikis 2014). Such relentless upscaling and intensification of metabolic flows has been driven by new international divisions of labour, as well as by processes of technological innovation in finance, cybernetics, systems of machinery and logistics. For Deborah Cowen (2015), a global revolution in logistics and labour organisation has eroded the boundaries between production and distribution such that commodities today are manufactured "across logistics space" rather than in a singular place. This leads Bridge (2009b) to view the capitalist global economy as a powerful, pulsing metabolic engine for mobilising and transforming materials.

This framework resonates in certain ways with traditional accounts of Political Ecology (see Peet and Watts [2004] for a programmatic statement), and especially with the notion of global political ecology developed by Peet et al. (2011), basically because it emphasises global capitalism as its main causal theme. Accounts of Political Ecology, Peet et al. (2011) suggest, need to be attuned to global flows of labour, capital and information, as well as to the complex workings of power-knowledge within a crisis-prone capitalist system. The problem is that despite their resonances, the methodologies and ontological commitments of UPE and Political Ecology have been repeatedly at odds, because whereas the former ignores wilderness and rural areas, the latter ignores cities, and this divergence has, paradoxically, precluded the establishment of any fruitful dialogues between them (see Angelo and Wachsmuth 2015). The view of global metabolism that this paper intends to foreground is therefore aimed at disassembling the (spatial) epistemologies upon which much of the scholarship on critical socio-environmental politics has been underpinned, and hopefully set the foundations for intellectual cross-fertilisation between UPE and Political Ecology.

The global scope of contemporary environmental politics, however, does not imply that the urbanisation of nature has ceased to be site specific. As Ibañez and Katsikis argue, the more seamless the global metabolic system of exchange becomes, "the more it is engraved in a geographically discontinuous organization of the earth's surface" (2014:6). The result of these expanding flows is a series of distinctive and sclerotic fabrics of urbanisation in which geographical difference becomes coupled with uneven patterns of capitalist development (Ibañez and Katsikis 2014). Therefore, just as the spatial arrangement of the city is profoundly uneven, with circulation networks, garbage and marginalised populations being continuously rendered invisible (see Heynen et al. 2006; Kaika 2004), so does the

urban fabric tend to occlude some of the operational landscapes that facilitate the socio-ecological mediations that make possible the functioning of the urban system. Thus, massive industrial estates, mining districts, oil extraction sites and agribusiness complexes are usually pocketed in remote places where they remain obscured.

Contemporary Latin America is perhaps one of the regions of the world where the urban fabric has been expanding most intensely as a result of the commodity boom. Just as processes of metabolic urbanisation that take place within cities are profoundly uneven, with marginalised populations assuming the negative effects of socio-ecological change (see Heynen et al. 2006; Loftus 2012; Swyngedouw 2006), these up-scaled metabolic flows in Latin America have likewise ravaged and plundered massive territories, most of which are usually far away from large urban areas—as polluted shantytowns are also far away from financial districts. Such processes of socio-ecological transformation in the region are well documented, and include accounts of proletarianisation, dispossession, violence and disruptions in public health among others (see for example Arboleda 2015a; Bebbington 2012; Gudynas 2009; Hinojosa 2011; Padilla 2012; Perreault 2013).

The World-Ecological Uncanny

At the other side of the spectrum, in the receiving end of the networks supplying raw materials torn from extraction sites, we find ourselves before a world of megacities, suburbs, and various sorts of concentrated agglomerations, where the capitalist mode of production ceaselessly spawns veils upon these dense metabolic exchanges and hides them in plain sight. In the western, urban household, Kaika (2004) notes, the sense of ease and familiarity of the dwellers is premised upon a violent exclusion of socio-material networks that continuously pump in *good nature* (water, gas, electricity) while pumping out *bad nature* (wastes). At a world-ecological level, our modern lifestyles are likewise premised on the irrational consumption of the latest electronic gadget, cheap food and cheap clothing. The very existence and overabundance of commodities like these, it should be noted, also rely on the visual and ideological exclusion of extended forms of urbanisation, usually in the form of massive holes in the ground—such as the ones surrounding Huasco—and whose geographies are often shaped by explosives, pollution, brutalisation of workers, state violence, enclosures and market volatility.

The phantasmagoria that becomes attached to these infrastructures, however, is often demystified, and the urban dweller is abruptly made conscious of the violence that tends to be occluded when things are working smoothly. At the level of the city and of the (urban) household, Kaika notes how in times of crisis, "hidden elements can surface unexpectedly, and familiar objects can behave in unusual ways" (2004:276; see also Kaika 2005). Sometimes urban infrastructural networks erupt to the surface in the form of an apartment block explosion, a gas tank leaking to ground water, or an urban oil pipeline fire (Bridge 2009a). It is precisely in such moments of intrusion when the normalised character of the fetishisation and commodification of nature is put into question, provoking feelings of uneasiness and anxiety

(Bridge 2009a; Kaika 2005). Kaika (2005) refers to these situations of disruption and their associated feelings of agitation as "the urban uncanny". In a context of planetary urbanisation, the sense of uneasiness and anxiety provoked by clogs or disruptions in the system can be as supersized as the infrastructural networks that connect operational landscapes with the rest of the world. I will refer to this type of disruption as a "world-ecological uncanny", because the spatial scale on which it unfolds supersedes distinct spatial categories of households, cities and operational landscapes. Whenever a transoceanic oil tanker sinks, or there is a failure in a tailing dam that results in millions of cubic metres of toxic slurry spilling uncontrollably through villages and forests, the world watches in awe, and the uncanny is so pervasive that it often leads to financial collapses and full-on political crises, with the 2010 British Petroleum oil spill in the Gulf of Mexico being a case in point.

The threat of global doom that looms large over discussions on climate change also constitutes a world-ecological uncanny of sorts, albeit one with different temporalities and trajectories. It haunts us like a ghost, but one whose presence has not yet been actualised. News of state crackdowns on environmental protest, face-melting air pollution in Asian industrial towns, slave labour on agro-industrial complexes, malformations in children living close to genetically modified crops, are but a few of the issues that reconfigure our attachments to everyday objects and activities. The ecologies of the Anthropocene are, in sum, riddled with new ways of experiencing anxiety and distress, and the planetary urban fetish becomes the more ruthless, the more remote the exploited and plundered ecosystems are from the point of consumption. Like Timothy Morton's (2013) book *Hyperobjects*, the events that set into motion the world-ecological uncanny are non-local, massively distributed across time and space, and tend to occupy a high-dimensional phase that exceeds all manner of stable representation.

There are, however, definitive limits to how much resources can be depleted and communities dispossessed in order to support a bourgeois mode of existence that depends on the continuous fabrication of an illusion of autonomy from the natural world on which it depends. To the extent that the global metabolic system is an open-flow system that continually exhausts its sources of nourishment (see Foster 2000; Moore 2014), the up-scaled process of urbanising nature is intrinsically fractured and rests on shaky foundations. As David Harvey (2006) has forcefully argued, space constitutes at once the *locus* and platform for accumulation, as well as the barrier that needs to be circumvented. Within a world-ecological framework, Moore (2014) argues that the amount of new work that can be squeezed from new working classes, forests, aquifers, oilfields and mineral deposits is by all means limited. In other words, nature is finite, while capital is premised on the infinite, and this simple fact constitutes a crucial historical determination for the unfolding crisis of capitalist civilisation. A sense of world-ecological uncanny is, in fact, increasingly manifesting itself across Latin America as a result of uprisings and failures in mega-infrastructures that reveal not only the social frailty of large-scale resource extraction, but also the intransigence of human freedom and of extra-human natures. Here is precisely where the Lefebvrian dialectic bursts into view, because there is an immense emancipatory potential underlying the relentless urban explosion that follows investment flows for resource extraction.

For Lefebvre (2003), what distinguishes the urban from the non-urban are precisely the possibilities for assembly and encounter, for the unexpected and the playful to erupt. Following Lefebvre, Merrifield (2013) argues that the more urbanisation continues to cover the world, the more encounters are likely to take place, and the more political opportunities will then intersperse the urban landscapes of the future. In facilitating interaction, mobility and communication, the expansion of the urban fabric also carries with it enormous possibilities for radical and emancipatory change. With those things in mind, the following section provides some empirical context of how Huasco was transformed into a place for power production that supports large-scale resource extraction.

Huasco and the Geographical Embeddedness of Global Metabolism

With 13% of GDP, 60% of total exports and 25% of fiscal income, mining is one of the foremost sources of revenue for Chile (Chilean Copper Commission [COCHILCO] 2013a:5). In the context of the global increase in commodity prices that began in the early 1990s, Chile went from supplying 30.1% of the world's copper in 1995, to 47.5% in 2004 (Urkidi 2008:67), most of which goes to Asia where it is employed in industrial and electronic processes. During the last decade, Chile has been implementing a set of strategies aimed at attracting further capital allocations for mineral extraction, which means that mining operations have intensified substantially. Besides copper, the country has diversified its mining matrix and is beginning to supply gold, silver and titanium among other metals to international markets. According to COCHILCO, the investment portfolio for 2021 has reached US$112 billion, which represents an almost threefold increase in mining investments in comparison with the portfolio for 2009, which amounted to US$45 billion (COCHILCO 2013b:16). For Anna Tsing (2005), trajectories of investment like these tend to perform a globalism of sorts in the sense that they entail opening-up processes where remote places submit to international finance. Within the force field of these wide-ranging flows, Tsing insists, the dreams of financiers and investors are reimagined as "transcendent, circulating, beyond culture" (2005:74).

Mining is an activity that requires large amounts of energy, meaning that alongside mineral extraction, Chile's energy matrix has also shown a burgeoning growth during the last decades. The mining sector currently demands more than one-third of the country's total energy production, and it is estimated that by 2020 it will consume 80%. For that reason, the rate of energy production has been increasing dramatically, going from 1600 megawatts (MW) per year during the last decade to around 5.300 MW in 2012 (COCHILCO 2013b:22). In order to attract further mining investments, the country has sought to intensify the development of low-cost power sources, and this means that thermal energy projects—especially coal and petcoke powered plants—have become the main drivers of resource extraction in Chile.[2] Between 1983 and 2000, there was a strong boom in the construction of thermoelectric plants, a boom which stagnated for three years and by 2004 showed a steady recovery.

The Huasco Valley, which acts as the natural boundary for the southern end of the Atacama Desert—the driest in the world—and is approximately 660 km north of Santiago de Chile, has become one of the most important mining districts in the country during the last three decades. This valley runs transversally to the Andes, covers an area of 19,066 km^2 and has a population of 66,491,[3] distributed among four villages. Central to the valley's economic and social development is the Huasco River, which springs directly from glaciers located high up in the mountain range. Due to abundant water sources, steep slopes and dry climate, the soil offers very good conditions for fruit production, and for that reason agriculture was the main economic activity before the mining boom. Even though fruit production has been heavily undermined by the negative environmental effects of mining and energy projects, the valley still produces olives and grapes, although to a much lesser extent than in the past. Herding is also common among the communities living in the highlands surrounding the valley (Molina and Yáñez 2008; Urkidi 2010).

Huasco is one of the four villages in the valley. With a population of 7945,[4] it is located on the coast, near the mouth of the Huasco river. Before the irruption of the urban fabric in the 1980s, Huasco was among the main producers of olives and olive oil in the country, and it was known for the diversity of its fauna—with over 21 species endemic to the region—and for its beautiful beaches.[5] Huasquinos (the name for the people of Huasco) worked either at olive plantations, artisanal fisheries or in small-scale mining. Because Huasco is far from large urban areas, the community still retains a deeply engrained rural identity with very close ties to the land.[6] The arrival of large-scale transnational mining to the valley, however, distorted the patterns of metabolic exchange that had always gravitated around agriculture, and thus changed the fate of Huasco forever. This does not mean that previous histories of metabolic exchange in the valley as a result of migratory settlement, colonial rule and state-developmentalist projects, among others, were not problematic in their own right. Yet, engaging on a discussion of previous trajectories and historical periods not only goes beyond the scope of this paper, but could shift the focus of attention from the unprecedented patterns of sociospatial transformation that have followed the current hyper-globalised, financially driven and industrially rejuvenated commodity boom.

Huasco's history with planetary urbanisation therefore dates back to the late 1980s, when international metal prices rose and foreign direct investment flowed haphazardly as a result of investor-friendly regulatory frameworks enacted during the Pinochet dictatorship (1973–1989) (see Alcayaga 2005; Budds 2004; Infante 2011), when the need for low-cost energy became more pressing. Although the first two thermoelectric plants arrived during the mid-1970s, they did not cause considerable harm to the local community because aside from their small capacity, they were not working full power at the time. The first large-scale thermoelectric plant, Guacolda I, began operations in 1997, and although it was coal powered, it had to switch to petcoke after an international crisis with Argentina resulted in the suspension of gas exports to Chile. The government of Ricardo Lagos sought desperately for low-cost ways to power thermoelectric plants and in 2001, approved the use of petcoke as the fuel for thermal energy production in many towns of Chile, including Huasco (Ramos 2011). Petcoke is a carbonaceous solid that is left

over from oil-refining processes and despite being extremely toxic and polluting, it is usually sold in international markets as a low-end fuel with an average cost of US$1 per ton. The use of petcoke is currently banned in most countries with the exception of India, China and as of 2001, Chile (Ramos 2011).

The above were the first steps in a process of extended urbanisation where infrastructures and built environments of this sort began to be projected aggressively across the once pastoral geographies of Huasco. Today, Huasco has six thermoelectric plants, three industrial sea ports, a large iron refinery and several industrial tailings ponds, as well as their concomitant road infrastructures, transmission lines, piping networks and heavy machineries.[7] The beautiful sceneries that once characterised this village are now interspersed with enormous chimneys, high tension towers, freight trains, cargo trucks and massive ships that continuously load and unload all sorts of materials. Besides the projects that are already in operation, there are further plans to build in Huasco's vicinities a titanium mine, a pig-processing plant with the capacity for three million animals,[8] and Punta Alcalde, the largest thermoelectric plant in the country—with an estimated cost of US$1.4 billion and a projected capacity to produce 740 MW per year.[9] Huasco's sea ports, it should be noted, constitute the pivot that facilitates the ongoing metabolic interfusion between local environment and global flows. They constitute at once the entry point for fixed capital investments—in the form of systems of machinery—and for the petcoke and coal required for electricity generation, as well as the point of departure for raw materials that are continuously shipped to manifold destinations across the globe.

The devastating effects of these metabolic flows have not only transfigured the mountains and coastlines of Huasco, but also the very texture of the everyday among locals. Thus, as Ibañez and Katsikis argue, contemporary accounts of metabolism not only need to be reflexive to the spatially transcendent systems of flows, but also to emphasise "the physical configuration of human occupation 'on the ground'" (2014:6). In Huasco, the human body itself bears the imprints of these emerging patterns of exchange. Reportedly, Huasquinos have been increasingly dying from cancer, leukaemia, strokes, heart attacks, as well as from several respiratory diseases, and children have been increasingly showing signs of cognitive damage.[10] A 2005 study of urine samples from children living in towns with petcoke-powered thermoelectric plants concluded that children living in Huasco presented "significantly higher" levels of nickel (see Pino 2005). This, the study argued, could be attributed to a synergistic effect caused by the combination of coal and petcoke fumes with the particulate matter emitted by the iron refinery (Pino 2005:28). Combined, these fumes release into the atmosphere 118.2 tons of carbon dioxide on a daily basis (Ramos 2011).

As a 2006 study by Universidad de Chile noted, mortality rates for women aged 20–44 in Huasco exceeds the national average by far. If the national average is 65.91 per 100,000 inhabitants, in Huasco the figure goes up to 236.78 (quoted in Ramos 2011:58). Also, the rate of hospitalisations for respiratory conditions is twice that of the whole country, and deaths by cancer have been said to be 400% above the national average (see Ramos 2011:58). According to members from the local community, there are no official morbidity reports for Huasco

(allofficial statistics are aggregated at the regional level), because that would force the government to regulate emissions, ultimately undermining mining activity in the area. Non-humans have also assumed the burden inflicted by these energy undertakings, because on the one hand marine fauna has either disappeared or is highly contaminated, and on the other olive trees have been greatly affected by air pollution, with harvests reducing to unprecedented levels (PUC and DICTUC 2013).

Expanding patterns of metabolic exchange have not been circumscribed to capital and raw materials only, for energy undertakings have also unleashed dense migratory flows. Many Huasquinos have been proletarianised, being forced to leave their families behind in order to work in mines located in other regions of the country. Also, as energy projects require large amounts of unskilled industrial labour force to work "7×7" shifts (seven days working at the industrial site, seven days away), the village has become the recipient of large numbers of floating populations. These temporary workers—informally called "*faeneros*" by the local community—come from all across Chile, and sometimes even from other countries, have no attachments to the host town, are usually underpaid and face overcrowding in their accommodations. As a result, social ills that were completely unknown to Huasquinos before the mining boom such as prostitution, theft, street fights, drug abuse and sexual assaults, are now common.[11] As Tsing (2005) observed in the case of Indonesia, the phenomenon of temporary work in extraction sites mixes locals and migrants in an anti-local regionality, resulting in a tendency to obliterate local places, knowledges, flora and fauna.

These processes of transformation of nature and of space on a massive scale have been, however, completely veiled by an entrenched neoliberal rationale among national decision-makers and regulators. Government officials have not only ignored the situation in Huasco and several other operational landscapes throughout the country, but have implemented policies to intensify thermoelectric power production. For a movement leader, "although it is evident that emissions in Huasco exceed national and international standards by far, officials have been reluctant to do any serious measurement because they know that would jeopardise 'business as usual'". One of the last regulations passed by former President Sebastián Piñera before the end of his term in office consisted of allowing a threefold increase in the amount of particulate matter that can be released by power plants into the atmosphere (50 to 150 $\mu g/m^3$).[12] These processes of state-led sociospatial engineering not only affect Huasco but several other towns that have also been swept under the carpet as they have been overburdened with thermoelectric plants. Ventanas, Coronel, Mejillones and Tocopilla are only a few of the villages that, like Huasco, have been banished from collective consciousness as government institutions make every effort to intensify resource extraction. Places like these, where nature is ceaselessly transformed into urbanisation at very large scales, are the geographical embodiments of up-scaled metabolic processes.

None of those places, it should be noted, are featured in Chile's touristic guides, or even celebrated as foundations of the country's economic growth. Just like Kaika and Swyngedouw (2000) argued that there is an aesthetic disconnection between the "ugly", "dirty" and "unsafe" urban networks from the actual city, places like Huasco have likewise come to be transformed into the underbelly of whole country.

This myth of progress, however, has been fiercely contested by civil society organisations such as Oceana, which in 2012 launched a campaign labelled "No More Sacrifice Areas" (*No más zonas de sacrificio*).[13] Its purpose was to raise awareness on the way in which poor, remote and rural areas—like Huasco—were being redesigned as industrial hinterlands to supply the low-cost energy required to power Chile's burgeoning economy. As framed by mainstream measures of economic success, Chile's macroeconomic performance during the last 20 years has been nothing short of outstanding. With an average growth rate of 5.7% of GDP, a fivefold increase in per capita GDP, huge reductions in public debt and recent admission to the OECD, Chile is praised by many as one of the most dynamic economies in the world (Chile's Ministry of Finance 2009:13).

The notion of "sacrifice area" is then aimed at piercing through a deeply entrenched urban fetish in which the socio-ecological plunder that underlies Chile's "economic miracle" is actually pocketed in mountains or buried in the vowels of the Atacama Desert, where neither tourists nor investors can see it. Yet, like the layers of cables, pipes and sewages that support a city, sacrifice areas like Huasco are nodes in a black-boxed network of operational landscapes that are fundamental for supporting processes of urbanisation unfolding at broader spatial scales. The more expanded the transformation of nature that infrastructural networks perform, the stronger the tensions and the contradictions embedded in the metabolic relation. In all possible ways, Huasco contrasts starkly with Santiago de Chile—which has become one of the most modern, wealthy and dynamic hubs in all of Latin America. However, and as the following section intends to illustrate, such processes of urban fetishisation have been contradictory and highly problematic.

The Limits To Capital (As World Ecology)

According to Moore's (2014) world-ecological reading of metabolism, there is an unbroken coincidence between the production of consciousness and global metabolic flows of matter and energy. In the case of Huasco, it is not difficult to note how the subjective experience of these expanding patterns of exchange profoundly punctuates the ways in which members of the local community conceive politics, society and the global economy. They frequently point out how their everydayness is marked by loss and tragedy, as they all claim to have friends or relatives who are dying or have died from cancer, tumours or any other catastrophic disease. Furthermore, the sheer magnitude of these industrial complexes also inflicts a sense of visual distress that is reminiscent of Edmund Burke's (1968 [1757]) idea of the sublime as an aesthetic category that excites ideas of pain, danger and terror. In the words of a local musician and activist,[14] those gargantuan chimneys, tailings ponds, cargo ships and high tension towers have the appearance of something "devilish" that evokes an apocalyptic underworld of sorts.

Within the household, water canisters are as indispensable as is the stove or the refrigerator, because water from the tap cannot be consumed under any circumstances due to high levels of pollution. Constant traffic of freight trains and cargo trucks that pass through the village to load and unload materials not only produces anxiety among adults but has enclosed the spaces that were used by children to

ride scooters, play football or do any other outdoor activities. For Huasquinos, the experience of these socio-natural relations is a thoroughly politicised one. They are well aware of how the immediacy and seeming banality of these everyday events is intimately connected to the ebbs and flows of global capitalism. Their words, the way in which they relate to themselves and to others, the tones of their voices and even their gazes reflect these manifold determinations. Since 2009, they have been taking to the streets, developing campaigns and forms of collective action aimed at defying oblivion and demanding their right to the city. Among the fumes, the dispossession and the socio-ecological destruction produced by energy megaprojects, Huasquinos have been prefiguring new worlds and ways to be otherwise.

The construction of a pig-processing plant in Freirina—the village contiguous to Huasco—constituted a tipping point in the way in which communities produce everyday urban environments and relate to their territory. A 70,000 ha plant with an established capacity for 2,500,000 pigs—the largest of its kind in the world—was built next to Freirina, a village with around 5000 inhabitants.[15] When the plant began operations in 2011, Freirina was immediately covered by foul smells and water sources suffered severe contamination. In other words, the externalised and hidden relations of under regulated agro-industrial production erupted into the surface, revealing the presence of the excluded "outside" as a constitutive part of the "inside" (see Kaika 2004). The sense of urban uncanny was intense not only in Freirina, but also in neighbouring villages—including Huasco—that were also affected by the trenchant smell of decomposing pigs.

Huasquinos were the first to show their solidarity and contributed actively to the campaign to stop the plant. In early 2012, they joined their comrades in Freirina in marches and demonstrations and after continued indifference from authorities, they decided to block the highway that connects Huasco to the rest of the mining district. What began as an urban uncanny unfolding at the local level quickly metastasised into a full-blown world-ecological uncanny that was widely covered by the media in Chile and led to severe market disruptions at the international level. Huasquinos were broadcasted amidst tear gas, setting barricades on fire, clashing with anti-riot police and putting into jeopardy the smooth functioning of all power plants, agro-industrial complexes and mines operating in the area.[16] Using Kaika's (2004) terms, one could say they put the normalised character of the transformation and commodification of nature into question as they brought into view the hidden costs—both social and environmental—that underlie something as apparently mundane as buying pork at the supermarket. The case shocked public opinion, and made politicians, journalists and other commentators outspokenly condemn the practices of the plant owners.

At the end of the fifth day of road blockages that resulted in massive losses for mining corporations, as well as in market disruptions in many parts of the world—especially in China, where most of the pork meat, the copper and the iron ore are traded—the owners of the plant issued a statement declaring an indefinite suspension of all activities. It should be noted that this world-ecological uncanny was not only limited to glitches in market transactions, because analyses from Chile's Criminal Investigations Police determined that the pork meat that was being

exported to China contained levels of mercury poisoning that were 1700 times above the norm.[17] The pigs had been bred with underground water sources which carried wastes and chemicals used in mining activities nearby. Thus, the extent of these metabolic relations also became embedded in the bodies of consumers in China who inadvertently bought meat from pigs that had been bred with highly polluted water recycled from mining and energy complexes, thousands of kilometres away from the point of consumption.

Yet, out of the chaos of such contradictions in the planetary system of metabolic exchange, this case allows viewing how the Lefebvrian whirlwind of multiplied encounters facilitates new possibilities for association and emancipation to emerge. In the words of a movement leader, "it was in the heat of these confrontations where new bonds of brotherhood and solidarity with Huasquinos began to take shape, as well as new forms of belonging and of relating to our territory".[18] Indeed, the creation of the Huasco Valley Socioenvironmental Movement (Movimiento Socioambiental del Valle del Huasco), an advocacy network for the whole Huasco Valley whose sole purpose is to defend the access to water, was one of the outcomes of those roadblocks. Currently, the community is seeking to stop a transnational corporation from building Punta Alcalde, a thermoelectric plant with a projected capacity to produce 740 MW and an estimated cost of US$1400 million.[19] On 1 August 2013 the Court of Appeals of Santiago revoked the license to build the plant on the grounds of flawed assessments of environmental impacts.[20] Even though the litigation process continues and has had several setbacks, Huasquinos remain fully mobilised.

It should be noted that these processes of social mobilisation have a fundamental material substratum, because the advance of material infrastructures for energy production has served as a springboard for the enactment of vibrant networks of interaction not only among the community, but also with neighbouring villages. Roads, internet connection, commuting networks and so forth, have followed the arrival of investment projects.[21] This resonates with Marshall Berman's (1990) claim that the modernisation of the city goes hand in hand with the modernisation of its denizens' souls, because Huasquinos have adopted the fluid and open character of these sprawling infrastructural networks and have developed lively forms of communitarian and political organisation. Far from being circumscribed to the case of Huasco only, this phenomenon is instead becoming endemic to many parts of Latin America, where infrastructures for resource extraction—especially information technologies—are replacing isolation and parochialism with layers of political organisation and revolt (Arboleda 2015a; see also Arboleda 2015b). In Chile alone, and as of December 2013, local communities had been able to put on hiatus US$37 billion on energy and mining investments as a result of multiscalar mobilisation strategies and legal measures.[22]

Social resistance has also been coupled with the intransigence of the natural environment, which in many cases has led to cost overruns for companies, making several megaprojects financially and logistically unviable. Penelope Harvey and Hannah Knox's ethnographic study of mega-infrastructures in Peru illustrates how engineers on the ground are constantly negotiating an engagement with the unpredictable, unruly forces of the biophysical environment, which takes on an

"increasingly anthropomorphic guise as variously capricious, resistant, and exhibiting distinct likes and dislikes" (Harvey and Knox 2012:528). The failure in Freirina's pig-processing plant, for example, was a result of miscalculation and of the unpredictability of the biochemical composition of water sources, and attests to the very limits that for Moore, constitute insurmountable frontiers for capitalist expansion. In the Huasco Valley, a combination of geographical and social factors has managed to stop a range of large-scale investment projects that includes not only two power plants in Huasco and the pig-processing plant in Freirina, but also Pascua Lama and El Morro, two gold mines whose combined capital expenditures to date amount to nearly US$10 billion. The great accomplishment of the capitalist mode of production, Moore suggests, "has been not to pay its bills" due to the existence of vast social and ecological frontiers. The end of these frontiers today, he concludes, "is the end of 'cheap nature', and with it, the end of capitalism's free ride" (2014:17).

New Urban Morphologies, New Urban Phantoms

As a bleeding wound in the surface of the Earth, Huasco encapsulates all the tensions and contradictions that underlie the relentless explosion of spaces that ensues market-driven forms of urbanising nature. Above all, this small village is the patent reminder that despite their apparent hyper-mobility and interconnectedness, contemporary processes of metabolic exchange effect profound socio-natural transformations upon spatially fixed physical environments. The case of Huasco, however, signals a break with some of the assumptions on which much of the scholarship on urban metabolism is grounded, because processes of metabolic exchange are no longer circumscribed to distinct regions evolving in relations of physical proximity or juxtaposition. The minerals extracted from the mines contiguous to Huasco are not shipped to Santiago or to any other city in Chile, because its three international sea ports are there precisely to dispatch them to manifold destinations across the globe where they feed various layers of urbanisation processes. In that sense, UPEs focus on cities needs to be radically decentred in order to include other morphological expressions of urbanisation.

Such unbounded expanse of metabolic exchange—which is not reducible to cities—has crucial implications for confronting the study of political ecologies in a context of planetary urbanisation. First of all, if urban infrastructural networks and the metabolic flows they perform have reached an unprecedented density and breadth, then this implies that the phantasmagoria that is attached to them has been equally up-scaled. Aerial images of tar sands in Northern Alberta, Canada, for example, epitomise how nature is being fetishised perhaps to an unparalleled extent, because despite their sheer size and devastating effects, we know they exist only because activists and politically committed photojournalists[23] have made serious strides to debunk their fetish. This new urban phantasmagoria becomes the more ruthless and eerie, the more familiar we become with the apparently banal and mundane objects that fill our (urban) everydayness. Maybe the pristine computer screen on which you are reading these words contains copper torn from soils near Huasco, and yet its geological, ecological and social traces have been simply erased by a more pervasive form of commodity fetishism. Questioning our most familiar

environments, Kaika (2004) reminds us, is in itself an act of subversion, one that needs to be reinstated as a key priority in any project oriented towards human emancipation.

Second, it is important to pay attention to the fact that the global up-scaling of social and ecological infrastructures is riddled with contradictions that not only lead to severe crises but also provoke intense feelings of anxiety and distress. Such scenarios of crisis and malfunctioning—which I have referred to as the "world-ecological uncanny"—are crucial opportunities for reconfiguring our political engagements with the natural world, as they render visible the practices of exclusion and violence that underlie global forms of urbanising nature. Therefore, the task of Marxist critique in the face of these swarming, global metabolic flows is to expose their immanent contradictions and supersized phantoms, revealing the processes of environmental destruction, enclosure and dispossession that underlie them. In that sense, UPE's legacy is perhaps now more relevant than ever, because as Heynen et al. claimed in programmatic statement, the message that emerges from UPE is a decidedly political one. Accounts of urban political ecology, these authors argue, "always need to consider the question of who gains and who pays", as well as to ask multiple questions about the manifold power relations under which urban environments are produced (Heynen et al. 2006:9). With the case of Huasco, I have intended to foreground the urgency of extending such political-ecological critique to the realm of the non-city as well.

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Endnotes

[1] For Marx (1976), the social relations that lead to the production of commodities become fetishized—that is, they acquire a seemingly autonomous objectivity—as soon as they leave the sphere of production and enter the sphere of circulation. Despite being the congealed state of social labour, a commodity in the sphere of circulation appears to the senses as completely independent from the social relations that produced it.

[2] There are no disaggregate figures of energy production for Huasco, and for that reason it is not possible to know exactly how much of it goes to powering mining activities. This information is only available at the national level. Members of the local community argue that the unavailability of local figures of morbidity and energy production is a deliberate attempt by the government to mask what happens in places like Huasco.

[3] See http://www.subdere.gov.cl/divisi%C3%B3n-administrativa-de-chile/gobierno-regional-de-atacama/provincia-de-huasco (last accessed 12 January 2014).

[4] Chile's Library of Congress (BCN in Spanish) (2012) *Reportes estadísticos distritales y comunales: Comuna de Huasco*.

[5] Interview with a member of Freirina Conciente, 5 December 2013.

[6] Interview with a member of SOS Huasco, 5 December 2013.

[7] Interview with a member of SOS Huasco, 3 December 2013.

[8] Interview with a member of Freirina Conciente, 5 December 2013.
[9] See http://olca.cl/articulo/nota.php?id=101658, and also http://olca.cl/articulo/nota.php?id=102650 (last accessed 17 January 2014).
[10] Interview with a member of SOS Huasco, 4 December 2013.
[11] Interview with a member of SOS Huasco, 4 December 2013.
[12] See Supreme Decree No. 20, published on 16 December 2013, in the Official Gazette.
[13] A video clip of the campaign is available from this website: http://vimeo.com/40473561 (last accessed 18 January 2014).
[14] Informal conversation with one of the leaders of SOS Huasco.
[15] Interview with a member of Freirina Conciente, 5 December 2013.
[16] See report by DiarioUchile at http://radio.uchile.cl/2012/05/19/vecinos-de-freirina-se-enfrentan-con-carabineros-en-protesta-por-empresa-agrosuper (last accessed 29 September 2014).
[17] Interview with the leader of Movimiento Socioambiental Valle del Huasco, 5 December 2013.
[18] Conversation with a leader of Freirina Conciente, 6 December 2013.
[19] See http://olca.cl/articulo/nota.php?id=101658, and also http://olca.cl/articulo/nota.php?id=102650 (last accessed 13 March 2014).
[20] See http://olca.cl/articulo/nota.php?id=103375 (last accessed 13 March 2014).
[21] Interviews with a member of the Latin American Observatory of Environmental Conflicts (OLCA), 23 December 2013; with a member of Semillas de Agua, 27 November 2013; and with a member of Consejo de Defensa Huasco, 29 November 2013. For example, one of the interviewees noted how Barrick Gold—one of the mining corporations operating in a neighbouring village—installed free wireless internet for everyone.
[22] See website entry available online at the OLCA website: http://olca.cl/articulo/nota.php?id=103832 (last accessed 22 December 2014).
[23] See for example the work of Garth Lenz (http://www.garthlenz.com/).

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