

Chapter 16

Landscape - Infrastructure: formal - informal Entanglements across political Ecologies of Resource Use.

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Summary

The essay looks back at the emergence of the landscape-infrastructure nexus across philosophy and landscape practice. The nexus is proposed as a vehicle for assembling institutionalised urban regimes and informal practices in the political space of the ecologies and economies of resource use in urban regions as well as in their discourse in urban studies. To illustrate my argument, first, I explore opportunities for circumventing dualistic ontologies through assemblage thinking and Actor-Network-Theory (ANT). Then, I argue that, when studied through ANT, formal regimes and informal practices can be defined as quasi-objects that exist and acquire meaning in the landscape-infrastructure by virtue of their radical relationality and mutual dependence. Finally, urban political ecologies of water in Mexico City are discussed as a paradigmatic case for illustrating the entanglement of formal regimes and informal practices for resource use and management. I use the example of grassroots initiatives for decentralised water management at the household and community level to detect the insurgence of wicked problems in urban studies when the formal-informal distinction is addressed through definitive problem formulations. I conclude that the proposed actualised reading of the landscape-infrastructure nexus can help to look critically not only at the divide between informal practices and institutionalised resource-management regimes but also at the way urban studies are conducted.

Keywords

Resource Management; Water Governance; Landscape Urbanism; Urban Political Ecology

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1. Introduction: a landscape constellation

In her 1990 essay *Landschaften*, German philosopher Ute Guzzoni (1990) unfolds the lexicon of a new *landschaftliches denken* (from the German *landschaft*, ‘landscape’, and *denken*, ‘to think’ or ‘the act of thinking’). Here the landscape is described as a ‘manifold contemporaneity of spatial and temporal relations between things’, a ‘mutable multiplicity of relations’, through which the entity that we name ‘landscape’ becomes one, sole, precise, and complete in all its elements. Approaching the landscape as a network of material and immaterial relations among a heterogeneous range of elements suggests a sensorial experience rather than a univocal definition of the notion of ‘landscape’. The philosopher subsequently introduces the metaphor of ‘concrete constellation’ (building on the Hegelian notion of the ‘concrete universal’) as a means to address the question of the relation between the individual and the universal in the landscape, between the entirety of the constellation and every single element that composes it. As a result of the combined action of all the individuals that form the universal, the concrete constellation is the image of the landscape universality: an entity that only comes into existence by virtue of the relations among its elements and that, at the same time, entails and encompasses a dialogue between them. Indeed, it is these very relations that determine the uniqueness of the combined action - the *jeu d’ensemble* - of the diverse elements in a constellation. Because of the mutability of the relations between the individuals in the universal, Guzzoni’s concrete constellation is neither stable for eternity nor sharply delimited in space. Further, the relational character Guzzoni attributes to the landscape brings into focus mutual dependencies rather than simple cohabitation of elements.

To what extent is Guzzoni’s *landschaftliches denken* reflected into contemporary landscape practice and its theory? Can it prompt an actualised landscape narrative and, through this, shed new light on formal-informal entanglements in urban living, resource management practices, and their discourse in urban studies? To address these questions, first, I will use Guzzoni’s work to navigate landscape and infrastructure epistemologies that led to emergence of the landscape-infrastructure nexus within the landscape urbanism approach and its recent evolutions. To this end, I will discuss the landscape-infrastructure nexus through examples in which infrastructures are conceptualised and orchestrated as landscapes (section 2) and urban landscapes as infrastructures for the provision of essential resources to both human and ecosystems’ life (section 3). Second, I will explore opportunities for circumventing dualistic ontologies across institutionalised regimes and informal practices through assemblage thinking, using urban political ecologies of water as a paradigmatic case (section 4). Finally, I will conclude by pointing at perspectives and ways forward for the landscape-infrastructure nexus to inform a novel understanding of the divide between informal practices and institutionalised regimes in urban studies (section 5).

2. Landscape-Infrastructure 1.0: Infrastructure as Landscape

Critical reviews of the landscape urbanism approach have suggested that its original definition of ‘infrastructure’ can echo Guzzoni’s understanding of the multiple entanglements in the

landscape constellation and its relational connotation (Waldheim, 2016; Perrotti, 2014). In the first landscape urbanism written manifesto (Waldheim, 2006), ‘infrastructure’ is defined as a ‘preparatory substrate’ and a ‘networked system that supports and instigates’ the environmental processes, social dynamics, and economic growth and degrowth of the urbanity. Infrastructure is subsequently described as both a physical vehicle supporting humans’ relational existence and a conceptual instrument to temporarily disentangle philosophy and design (Allen, 2009; Bélanger, 2017a). The landscape urbanism definition of infrastructure reflects landscape architect James Corner’s take on post-industrial metropolitan regions in North America (Corner, 2006). Metropolitan regions are conceptualised as an open-ended matrix of horizontal surfaces which organizes, collects, distributes and condenses the forces operating upon the city. The urban matrix functions as a ‘living ecology’ consisting of a thick living mat of accumulated patches and layered systems, with no singular authority or control. Infrastructural systems are an essential component of the urban matrix, since they support and instigate its development over time. In this sense, infrastructural systems are catalysts that landscape and urban designers can orchestrate to implant new potentials in the urban horizontal surfaces. As an instigator of such ‘surface strategies’, infrastructure can be considered as a model for the whole urban landscape (Waldheim, 2016).

Practical applications of this approach in the design and orchestration of infrastructural catalysts can be found in the work of architect and urban designer Stan Allen. As Allen (1999) points out, in landscape urbanism, infrastructures act as a scaffold for the complex series of events and mechanisms that leverage the growth and functioning of the urban matrix and cannot be anticipated by the architect. On these bases, and echoing James Corner’s view of post-industrial metropolitan regions, he lays down a series of propositions for designers to identify the potential of infrastructural systems to *prepare the ground* and *create the conditions* for the urban matrix to be. Infrastructure systems should be designed as *artificial ecologies* of a flexible (in both space and time) and anticipatory nature. On the one hand, infrastructural systems delineate distinct architectural elements within specific limits. On the other hand, they organize the flows of energy and resources on a site by creating the conditions necessary to respond to incremental adjustments in resource demand and supply due to change in inhabitation or environmental conditions. Like Corner, Allen’s view on infrastructural systems focuses on the dynamic effects they can engender rather than on the forms they can take. He distinguishes between two kinds of effects produced by infrastructural systems that influence the ‘field conditions’ⁱ in which the urban matrix unfolds: the *capillary effects of scales*, generated by a great number of small elements that compose infrastructural networks, and the *effect of synergy* that originates where there is convergence and interchange between different systems in a network. Finally, infrastructural systems should be able to enhance the *collective nature of the city* and its *shared narratives* instead of conveying self-referentiality or representing expressions of individual stakeholder groups. The conversion of the site of a former airport to the Taichung Gateway Park in Taiwan is one of Allen’s project-manifesto to put theoretical speculations to work (Allen, 2008). The development of the 240-hectare multifunctional urban district and its central parkway over time is supported by a dynamic structure of new environmental and social ecologies (ecological reserves, park amenities and local waterways, alongside new event spaces connected by pedestrian paths and roads). This

embodiment of Allen's *landschaftliches* thinking of infrastructure into an urban design exemplifies the way in which infrastructural systems can function as landscapes in the post-industrial urban matrix.

3. Landscape-Infrastructure 2.0: Landscape as infrastructure

The cross-fertilization of Guzzoni's concrete constellation with the landscape urbanism definition of infrastructure offers the opportunity to look critically into the hybridisation between horizontal surfaces and infrastructural catalysts in the urban matrix. The first can acquire the same dynamic connotation of the second (Perrotti, 2014) while the second allows for the maintenance and growth of the urban matrix as a living ecology (Allen, 1999). Similar positions can be found in the work of previous generation's landscape scholars studying the interplay between the making of the landscape and the consolidation of communities. For example, John Brinckerhoff Jackson (1984) describes the landscape as 'a composition of man-made or man-modified spaces to serve as infrastructure or background for our collective existence'. Jackson's use of 'background' refers to the modern meaning of the word: 'that which underscores not only our identity and presence, but also our history.' Jackson's landscape background is a vertical and horizontal palimpsest that enables and sustains the coexistence of historical and present living while instigating future developments through their network of relations.

In recent years, the 'landscape as infrastructure' idea has gained significant popularity in the wake of the widespread of landscape-urbanism design speculations in the late 2000s, inspiring regional planning in post-industrial contexts (Bélanger, 2009, 2017b; Perrotti, 2014). 'Across a range of disciplines, landscape has become a lens through which the contemporary city is represented and a medium through which it is constructed, these sentiments are evident in the emergent notion of "landscape urbanism"' (Waldheim, 2006, p. 13). More than a field, the landscape becomes the 'locus of intellectual, ecological and economic change of significance' (Bélanger, 2017a). Examples include making sense of social, economic and ecological mutations in the Great Lakes Region in North America in the wake of the significant logistical, economic and ecological transformations occurred since the second half of the 20th century, while calling into question methods and models for large-scale and long-range design as a response to such radical changes. This region was by many understood as a playground to test hypotheses and design responses challenging the *laissez-faire* dogma of neo-liberalist economics, Fordism-inspired civil engineering, and Euclidean planning policies as a legacy of the 20th century (Berger and Waldheim, 2008).

As argued by Canadian landscape architect and urban planner Pierre Bélanger (2009), the legacy of industrial production, infrastructural decay, and pollutants fluxes on North American metropolitan landscapes (Kirkwood, 2001) has called for a radical re-evaluation of the role of infrastructure within the disciplinary debate about urban management, regional planning and design since the 1990s. For Bélanger (2017b) this legacy has provided an unparalleled opportunity to liberate knowledge and practice from specialized disciplinary precincts and technocratic silos. His analysis draws on the example of two paradigmatic urban environments in the geo-political region of the Rust Belt, Flint (Michigan) and Youngstown (Ohio), which

have both been affected by an extensive deindustrialisation program originating in the post-industrial fallout of the early 1980s. Industrial de-corporation, land un-development, population unemployment and deurbanization have been consequences of a period of global outsourcing and industry relocations outside North America (Friedman, 2005). Flint and Youngstown exemplify two distinct politics of urban management in post-industrial shrinking cities. Flint's administration engaged in a high-cost regeneration project, converting the post-industrial landscape of the General Motors infrastructure into tourism facilities. By contrast, the former steel town of Youngstown worked towards a protracted shrinkage of the city rather than an increase in its former prosperity (Bélanger, 2009). The local administration pursued an urban management and financial investment strategy moved by both socio-economic and ecological motives and prompted the deurbanization process in order to capitalize on high vacancy rates and under-used public spaces. Their goal was to downsize the city by razing derelict buildings, cutting off oversized or unnecessary infrastructure, banking vacant land, and re-zoning heavy industrial districts. In other words, the local landscape infrastructure was used as the basis for the regeneration program.

Pursuing the dual objectives of economic performance and ecological durability, Youngstown's urban management response to the shrinkage phenomenon provides an example of what a *landscape-as-infrastructure* strategy can offer. The decentralization of the urban structure together with the de-engineering of infrastructural systems through landscaping offered the opportunity to work across urban ecology and 'land-waste' economies (Berger, 2006). These global economic and financial reorganisations have triggered the transition from metropolitan regions heavily subsidized from remote supply areas towards an alternative model of growth centred on de-urbanized landscapes as regional, decentralised infrastructural systems for the provision of essential resources such as water, food, energy, and land (Perrotti, 2015). The closing of material loops and resource cycles has involved the production of new politics of the urban space and alternative resource governance models in which landscape operations can underpin a more integrated model of urban economic regeneration and site redevelopment while achieving greater economies and ecologies of scale (Galan and Perrotti, 2019). 'These regional landscape operations can be considered self-generated and self-maintaining. At this precise moment – when these landscape operations are essential - they became infrastructural' (Bélanger, 2009, p. 89).

4. Informality as quasi-object in landscape-infrastructure assemblages

Thinking infrastructure as landscape and landscape as infrastructure (and operating across both epistemologies as planning 'instigators') can generate a universe of reference in which the distinction between formality and informality becomes a wicked problem. Despite the ever-increasing popularity of 'informality'-labelled phenomena in post-colonial studies of cities in the Global South, post-humanist and new materialist ontologies have revealed the inextricability of institutionalised urban regimes and formal mechanisms (structures of power, norms, reference standards, and cultural codes) from informal practices of inhabiting, working, leisure, and being (Lieto and Beauregard, 2016). For example, assemblage thinking (Fariás, 2010; Brenner et al., 2011) and Actor-Network-Theory (ANT) (Latour, 1999) have worked

towards their understanding as co-functioning bodies in the urban arena leading to their incorporation under the same knowledge framework to avoid oppositions (McFarlane, 2011). Both approaches can help recompose formal-informal dualisms in urban studies through the unfolding of flatter ontologies and by making sense of the urban micro-politics (Guattari, 2000 [1989]) that exist in them or for new ones to come into existence. ANT perspectives are even more compelling when landscape is infrastructure and infrastructure is landscape, since the landscape-infrastructure nexus does not seek for a relation between ‘the material’ and ‘the social world’ but acknowledges that this very division is an artefact (Latour, 2005). Following ANT, formal mechanisms and informal practices in landscape-infrastructure assemblages can be understood as entangled hetero-referential objects that establish relations of different types and nature. This idea builds on Latour’s (1993 [1991]) work on said ‘*objets chevelus*’ (literally ‘ruffled objects’) and its genealogy in Michel Serres’s (1982) definition of ‘quasi-object’ - an object which ‘marks the boundary between the subjective and the objective’, an intermediate object that both determines and is determined by the relations with other objects surrounding it. Because of their relational configuration in the landscape-infrastructure (one can only exist and be defined relative to the other), formal mechanisms and informal practices can be seen as *objets chevelus* when studied through ANT. They are objects that look like ‘ruffled beings’ with neither sharp boundaries nor separation between a hard-core and their environment but with a large number of connections, ‘tentacles’ or ‘pseudopods’ (Latour, 1993 [1991]). Therefore, they are, by their own nature, inextricably interconnected with each other and with the environment that surrounds them, and can, through these very relations, be perceived as a wholeness with the ‘universe’ to which they belong (or as ‘actants’ in an assemblage). In this sense, formal/informal quasi-objects can be studied as entities that acquire their form, efficacy and meaning by virtue of their relational configuration sometimes independently from the human’s will (Anderson et al., 2012).

Urban political ecologies of water provide a paradigmatic case for illustrating the entanglement of formal and informal governance regimes and their understanding as ‘quasi-objects’ in the urban arena (Perrotti et al., 2020). When envisioned through the landscape-infrastructure lens, water systems show an ‘intangible and imponderable recalcitrance’ to be dissected and, by their very nature, they resist the divide between formality and informality for classification purposes (Bennett, 2010). Since its inception, the landscape urbanism agenda has pushed for an understanding of watersheds as constructed ecologies resulting from the interplay between socioeconomic and biophysical systems (hydrology, geology, climate) while preconditioning modes of urban production. Watersheds are an irreducible structural element of urban systems. In other words, they act as a basic infrastructure supporting the unfolding of the manifold economic, ecological, and cultural dimensions of urbanization including “informal” ways of living. For landscape urbanists, watersheds have been the repository of new strategies for economic and ecological regeneration at the level of neighbourhoods or entire cities (Bélanger, 2009). They are the lieu of the co-dependence of the environment and the economy, of the landscape (the lieu of our material existence) and the infrastructure (our mode of socioeconomic production).

Grassroot initiatives in Mexico City demonstrate a strong entanglement between informal practices of water management at the neighbourhood or household level and the economy and ecology of the city in its watershed. Here, over a population of nearly 9 millions (2015 census data), approximately 250,000 people live without connection to the water network and many more are estimated to have an intermittent service or receive contaminated water (Isla Urbana, 2019). This condition is at odds with the history of the site since Mexico City lies on a highlands plateau (one of the four basins of the Valley of Mexico, at over 2,000 meters above sea level) that was originally occupied by the Texcoco lake. The lake was gradually drained with the Spanish colonists seeking to expand the settlement area of the original Aztec city (Aguilar et al., 1995). With the fast expansion of the urbanised area and the rapid population growth, the aquifer that used to be the main source of water has been pumped nearly dry and consequently the city has started to increasingly source its water from other basins outside the Valley of Mexico (Bojorquez-Tapia, 2000). To reduce the overexploitation of the aquifer, 30% of the water is supplied from the Lerma-Balsas and the Cutzamala river basins situated in other regions and pumped from 60 to 150 kilometres away and vertically over 1 kilometre (Tortajada and Castelán, 2003). The energy required to pump all the water is approximately equivalent to the total electricity consumption of a city of 1.5 million inhabitants (Isla Urbana, 2019). Even with such high environmental and economic costs, it is estimated that the supply is enough for only one third of the population (around 40% of the water is lost due to leakage in the system). Tank trucks are being used to respond to the Mexico City's water crisis, but the water they deliver is also of poor quality. Bottled drinking water has therefore become part of everyday life. Some families use up to 20% of their income just to buy water (Isla Urbana, 2019). Paradoxically, Mexico City is also struggling with too much water in the form of heavy rains. The Valley of Mexico is one of the few endorheic basins in the world. This means that all storm water is retained on site and converges into lakes or swamps, with no outflow to other external bodies of water (rivers or oceans) (Ezcurra et al. 1999). The problem is exacerbated by the high saturation of the soil and the clogging of the sewer system in many nodes. The progressive sinking of the city cause additional damages to the sewer system (Chelleri et al. 2015). The paradox of the "too little or too much" water is particularly acute in Iztapalapa, the most populous of Mexico City's 16 municipalities whose name (literally 'slates over waters') refers to its location at the lowest point of the Valley of Mexico, corresponding to the former south bank of Lake Texcoco. Here, not only the quality of water is poor and water supply is limited (20% of Iztapalapa's population does not have access to water in their houses). Due to its localisation downstream, the frequency and intensity of flood events are particularly high and the borough's streets and buildings receive significant amounts of storm water that naturally flows in from the higher elevations (de Alba, 2017). Inhabitants of Iztapalapa and four other neighbourhoods in the south-east part of Mexico City (the most vulnerable to flooding) have coordinated a collaborative response to jointly address the problem of water scarcity and flood risk. A local NGO, Isla Urbana, has been working alongside them to promote the self-construction of low-tech rainwater harvesting systems at the household and community level (Fig 1-3). The NGO estimates that these systems can supply a family with water for 5 to 12 months per year while significantly reducing the flooded areas (Isla Urbana, 2019). The joint work of local residents and NGOs such as Isla Urbana in Mexico City shows the wicked problem arising from addressing the role of informal practices in the urban ecology and

economy of water in which they operate. When operating across the landscape-infrastructure nexus, what logic should be applied as to make sense of the contribution of ‘residual’ practices falling outside ‘formal’ or statutory water management regimes?



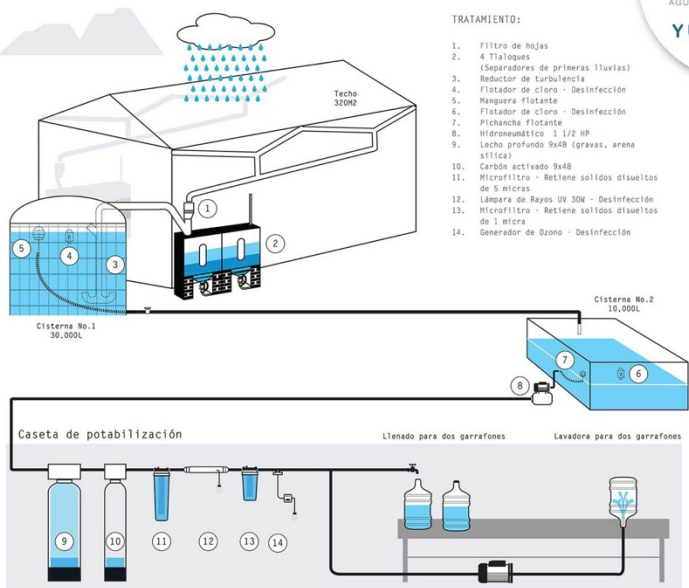
Figure 1 – Community rainwater treatment plant co-built in 2015 on a public building by the NGO Isla Urbana and the local residents in the community of Yuguelito, municipality of Iztapalapa, Mexico City. The plant can capture and purify up to 180,000 litres of water per year (© 2015 Isla Urbana with permission).



Figure 2 - View of the filtering tanks of the Yuguelito community rainwater treatment plant (© 2015 Isla Urbana with permission).

PLANTA POTABILIZADORA COMUNITARIA

DIAGRAMA DEL SISTEMA:



Inaugurada el Sábado 13 de Junio de 2015
En presencia de los Rotarios, Isla Urbana y la gente de Yuguelito.

DUDAS, CONTACTO O MANTENIMIENTO:
Isla Urbana
Proyecto de Captación de Lluvia
Telf: (55) 5640 4831 / (55) 5544 6807
info@islaurbana.org
www.islaurbana.org



UN PROYECTO DE:



Figure 3 – Flyer advertising the opening of the Yuguelito community rainwater treatment plant on 13 June 2015 with diagram illustrating the functioning of the rain collection and purification system (© 2015 Isla Urbana with permission).

5. Conclusion: urban studies beyond wicked problems

Through this essay, I have invited the reader to look at the landscape as a concrete constellation that shares the same characteristics as the infrastructural catalysts in the landscape urbanism matrix. This originates in a reading of Guzzoni's *landschaftliches denken*, which back in the 90s suggested that the landscape can be understood as a network of (neither isomorphic nor isotropic) relationships through which the landscape becomes a coherent wholeness. Therefore, Guzzoni's work has highlighted the need to think transversally across the universal and the individual in order to grasp the concrete constellation in its wholeness (rather than as the sum of individuals). Today, the cross-fertilization between Guzzoni's *landschaftliches denken* and the landscape-infrastructure approach in landscape urbanism theory and practice can provide a strong focus on the landscape as a connective structure that supports and at the same time instigates change in the urban matrix. In this context, new landscape-infrastructure epistemologies can have the dual purpose of re-framing the conventional role of infrastructural systems in the 21st century urban regions and repositioning the landscape as a system of essential services, resources and processes that underpins socio-economic and ecological regeneration. Through the unfolding of these epistemologies, the landscape-infrastructure

nexus can favour a novel understanding of the interlinkages between institutionalised urban regimes and informal practices while helping scholars and designers to engage with the complexity of contemporary urban living. Our understanding of the landscape-infrastructure nexus acquires particular relevance in the wake of the landscape urbanism legacy today. Landscape urbanism has paved the way into a new approach to spatial planning and design (Waldheim, 2016), where landscape is proposed as a medium for urban order in contemporary design practice. Through the landscape-infrastructure nexus, social and ecological questions can be jointly addressed in response to the micro-politics of desire (Guattari, 2000 [1989]) that populate the urban concrete constellation. This involves maintaining the landscape-infrastructure as a functional ‘conveyance or distribution network’ (Aquino, 2011) assembling a variety of living systems for both human or non-human life while making room for future uses, collective and individual imaginaries, and unforeseen windows of opportunities.

Thirty years after Guzzoni’s *landschaftliches denken* and the landscape urbanism inception, reconceptualising the landscape-infrastructure nexus can suggest that its ecology and economy need to be constantly regenerated by heterogenous ‘anomalous/out-of-the-system/more-than-formal’ practices for our concrete constellation to make sense and hold meaning for the urbanity to be. When considered from urban-assemblage or ANT perspectives, informal practices are essential to maintain heterogeneity as a condition for constant dynamic renewal in the landscape-infrastructure (Perrotti, 2012). Actualising Guzzoni’s thinking through ANT can help make meaning of the role of informal practices as quasi-objects in an assemblage, instead of crystallising boundaries between ‘informality’ and its ‘formal’ alterity. In this sense, ANT can bring a clearer focus on the added value of thinking more fluidly through flatter ontologies and across relationships of scales and agencies in the urban realm; such approaches should acquire a more prominent position in urban studies as an alternative to, first, identify and, then, solve ‘problems’ arising from the role of informal ways of living and dwelling through definitive formulations. Hence, an ANT reading of the landscape-infrastructure nowadays can help to look critically not only at the divide between informal practices and institutionalised resource management regimes but also at the way we conduct urban studies. This can point to the limits of dualistic thinking and call into question the definition of boundaries between the ‘formal’ and the ‘informal’ in the political space that makes up the backbone of our cities.

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ⁱ 'Field conditions move from the one toward the many, from individuals to collectives, from objects to fields. The term itself plays on a double meaning. Architects work not only in the office or studio but in the field: on site, in contact with the fabric of architecture. "Field conditions" here implies the acceptance of the real in all its messiness and unpredictability. It implicates architects in a material improvisation conducted on site in real time. Field conditions treat constraints as opportunity. Working with and not against the site, something new is produced by registering the complexity of the given.' (Allen, 2009).