Re-organising the Urban Stratum

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This dissertation explores the ‘Urban Stratum’, a global layer of urban influence that is obstructing the earth’s natural cycles. Going out from urgency to deal with the wicked global environmental problems of our era, this thesis develops strategies for transforming complex urban systems in the condition of planetary urbanisation, based on the potential leverages of shock and necessity. I therefore construct an interplay of four theoretical concept lines: Planetary Urbanisation, Complexity, Transformation and Necessity; and use practical evidence to support my arguments. A central part of the methodology consists of Transdisciplinary Expert Workshops, of which some were conceptualised as ‘active-peer-review’ and others as ‘creative LAB’. The main contribution of this dissertation to the scientific debates is twofold and lies in the new interconnections it makes. First, this thesis establishes the, intrinsic but largely ignored, link between the nature of urban resource flows and the production of urban space. I conclude that to come to an effective transition of our extended urban systems, a transition of urban resource flows (from ‘linear’ to ‘circular’) will need to go hand in hand with a transition in urban space governance (from ‘closed’ to ‘open’ cities). In other words: a paradigm shift regarding resource flows will demand an appropriate (re-)production of urban space: “Closing Cycles - Opening Cities”. Failing to do so will lead to a further cultivation of ‘tree-like’ structures, which lack complexity and ‘de-urbanise’ the city. Based on this, I suggest that the closing of resource cycles can also serve as a possible new driver for the ‘Open City’. Second, this thesis proposes a conscious use of necessity for socio-ecological transformations. Inspite the visibility of counterevidence, the need for innovation or change is currently mostly approached from situations of comfort, safety and predictability. These are, I argue, not able to produce enough energy to push the necessary transformation. Next to posing natural resource (re-)appropriation processes and ‘shrinking cities’ as strategic points of entry, this thesis develops a ‘pressure-point strategy’ which highlights the potential to evolve what has often been an intuitive practice, led by
community or elected leaders into a more accessible strategy for shaping socio-ecological transformation in urban practice. This method for customised complex problem handling starts from stress states in the urban system(s) and uses their initial momentum to encourage systemic change through ‘intraventions’ at selected pressure points. In the discussion, both contributions lead to the need for cities to become responsive again to their social and natural environment. The knowledge to do this is stored for instance in vernacular architecture and other forgotten techniques that answered to the earth’s natural cycles, but most of all in the common sense of aborting the consumption-centered paradigm for respect and simplicity, traits that are hard to obtain without immediate pressure.
als Treiber für eine sozial-ökologische Transformation eingetreten. Dies steht entgegen
gegenwärtigen gesellschaftlichen und technologischen Entwicklungen, bei denen sich
der Bedarf an Innovationen und Veränderungen meist aus Situationen von Wohlfahrt,
Sicherheit und Vorhersehbarkeit speist. Derartige Zustände können jedoch kaum genügend
Energie erzeugen, um eine notwendige sozial-ökologische Transformation voranzubringen.
Vielmehr, so ein weiteres Forschungsergebnis, sollten zukünftig schrumpfende Städte
und ‘Necessity’-basierte (Rück-)gewinnungsprozesse von natürlichen Ressourcen als
Ausgangspunkte für Transformation stärker berücksichtigt werden. Wie dies praktisch
umgesetzt werden kann, verdeutlicht die ‘pressure point’ Strategie, die im Rahmen der
vorliegenden Dissertation entwickelt wird. Sie greift Ansätze zur Gestaltung einer sozio-
ökologischen Transformation im urbanen Raum auf, die oft als intuitives Handeln von
lokalen und gewählten ‘Leaders’ praktiziert werden, und überführt diese in eine anwendbare
Strategie. Sie nimmt ihren Ausgangspunkt in fallspezifischen Spannungszuständen urbaner
Systeme und macht sich das initiale Momentum zunutze, um systemische Veränderungen
durch ‘intraventions’ an bestimmten ‘pressure points’ zu forcieren. Die Diskussion beider
Ergebnisse verdeutlicht letztlich auch, dass urbane Räume notwendigerweise ihre soziale
und natürliche Umwelt wieder berücksichtigen. Erforderliches Wissen, wie dies gehen
kann, verbirgt sich beispielsweise in lokalspezifischer, einheimischer Architektur oder
den vielfach in Vergessenheit geratenen Techniken Wissen, um auf die natürlichen Zyklen
der Erde einzugehen. Vielmehr noch gilt es jedoch ein an Konsum orientiertes Paradigma
zugunsten von Merkmalen wie Respekt und Einfachheit zu brechen; Charakteristiken, die
ohne umgehenden Druck nur schwerlich erlangt werden können.
Complexity

The best way to define complexity is I believe by explaining the difference between something that is simple, something that is complicated and something that is complex. Glouberman and Zimmeman (2002, vi) explain in a simple and illustrative way the distinction between simple, complicated and complex problems: “In simple problems like cooking by following a recipe, the recipe is essential. It is often tested to assure easy replication without the need for any particular expertise. Recipes produce standardized products and the best recipes give good results every time. Complicated problems, like sending a rocket to the moon, are different. Formulae or recipes are critical and necessary to resolve them but are often not sufficient. High levels of expertise in a variety of fields are necessary for success. Sending one rocket increases assurance that the next mission will be a success. In some critical ways, rockets are similar to each other and because of this there can be a relatively high degree of certainty of outcome. Raising a child, on the other hand, is a complex problem. Here, formulae have a much more limited application. Raising one child provides experience but no assurance of success with the next. Although expertise can contribute to the process in valuable ways, it provides neither necessary nor sufficient conditions to assure success. To some extent this is because every child is unique and must be understood as an individual. As a result there is always some uncertainty of the outcome. The complexity of the process and the lack of certainty do not lead us to the conclusion that it is impossible to raise a child.”

Something that is complex is thus non-linear and carries elements of ambiguity, emergence and uncertainty. It is constituted out of many constantly changing, interconnected and interdependent parts in which big changes can occur from small interventions. Complicated solutions to complex problems (e.g. climate change, poverty) usually fail since the linear cause effect chain does not exist for complex problems.
Necessity

The word ‘necessity’, often used interchangeable with the word ‘need’, has a spectrum of interpretations that ranges from a more hard definition: ‘something that is essential rather than just desirable’ to a more soft one: ‘something that is wanted or required’ (Oxford Living Dictionaries). In the same line, its synonyms range from ‘essential’ to ‘wish’, its antonyms from ‘nonessential’ to ‘comfort’ and even ‘luxury’. We could say that the difference comes down to, on the one end, basic human needs (for water, food, shelter, health care, energy, social wellbeing, …) and on the other hand, people’s wishes or dreams.

In this thesis, the term ‘necessity’ is used from the ‘basic human needs’ perspective in the context of earth’s limited and shrinking resources basis. As Gandhi stated: “Earth provides enough to satisfy each person’s need, but not his greed.” If we think of urban areas and go back to the basic functions they need to provide for their residents, we see that these functions can be provided in various ways e.g. from I ‘need’ a car, which I would argue has a a strong ‘wish’ element, to I ‘need’ to be mobile, which goes lot more in the direction of a basic human need. I therefore see a lot of transformation potential by going back from the ‘wishes’ of people to their basic human ‘needs’ and the way in which these are provided for (and not more). This, I am aware, will often mean a clash with existing paradigms and beliefs.

If basic human needs are not met, there is either a physical or a mental stress state. If persistent over longer periods of time, this can lead to diseases, conflicts and in the case of the most vital basic needs, even death. However, there are also good things that come from stress states, as they create a kind of energy that is normally not there. As the proverb ‘Necessity is the mother of invention’ teaches us: when the need for something becomes essential, you are forced to find ways of getting or achieving it. You could call it our built-in survival strategy. The third paper in this dissertation will take exactly this as a starting point to discuss urban transformations, using necessity as leverage.

Space

The word ‘space’ in ‘urban space’ relates in this dissertation to both physical and social space. Urban sociologists will argue that all space is social and that urbanisation in itself is a social process. Key for this dissertation is that physical space defines very much the social interactions that take place (or don’t take place) in it while at the same time, social forces, structures and relations determine how space is produced in a physical way. In practice, we see that segregated societies mostly have physically visible divisions, whether it is a highway dividing a rich and a poor neighbourhood or less obvious, but sometimes even
harsher, a ‘rich’ and a ‘poor’ door to enter a residential building that was originally intended to ‘mix’ the socially divided.

Adding the element of transformation, Castells (2008, 316) argues that “spatial transformation must be understood in the broader context of social transformation: space does not reflect society, it expresses it, it is a fundamental dimension of society, inseparable from the overall process of social organisation and social change.” He illustrates this by a.o. the example of the crises of the patriarchal family which gradually shifts sociability from family units to networks of individualised units, with considerable consequences in the uses and forms of housing, neighbourhoods, public space and transportation systems.

As this thesis deals with urban transformations with a focus on resource flows, I am interested in the interlinkages between urban space and natural resources. Therefore, the third factor which this dissertation brings in as being closely related to the production of physical and social urban space is the way in which a certain society deals with natural resources. One of my key arguments is that if we are to adopt a new paradigm concerning resource flows, we will have to produce and appropriate urban space (both physical and social) to accommodate this new paradigm.
The Urban Stratum

The name ‘Urban Stratum’ originally comes from geologists describing what the boundary layer of the Anthropocene will look like. They question what Earth scientists in the far future would find in the strata of the Anthropocene epoch, and what evidence might lead them to conclude the Anthropocene Earth was markedly different from the planet in the preceding epoch known as the Holocene. The geologists argue that similar to the lava flows that launched the Jurassic era, the fossilised remains of our cities could serve as a stratigraphic marker of the next planetary transition’s root cause.

One could however also see the ‘Urban Stratum’ in a broader way, namely as a global layer of urban influence that has extended all over the planet: from the (mega)city to the small village where urban-made products are consumed; from the vast agricultural lands to the garbage patches in the middle of the oceans and from the petroleum rigs on the Arctic to the logged rainforests of Borneo where a web of roads is woven through as if they were silk strands produced by some erratic spider. Global land, resources and water are claimed and degraded for urban food and material production but also for urban waste and pollution absorption. Tourism is taking over the last remote areas. Even the Amazon is not a jungle anymore but is left to be the lungs of the Global City and a resources reserve for future urban needs. Building on Lefebvre’s radical hypothesis of the complete urbanisation of society, Neil Brenner argues in this respect that the geographies of urbanisation, which have long been understood with reference to the densely concentrated populations and built environments of cities, are assuming new, increasingly large-scale morphologies that perforate, crosscut, and ultimately explode the erstwhile urban/rural divide. He calls it “Planetary Urbanisation”, an unevenly woven fabric of worldwide urbanisation.
This Urban Stratum thickens, changing the planet’s atmosphere, oceans and soils, and it is becoming an increasingly impervious layer obstructing the natural cycles of the biosphere as if it was sealing off it’s processes of exchange. One of the most obvious examples is the sealing of fertile soils by urbanisation, obstructing directly the nutrient and water cycles. However, in a similar way are CO2 emissions, chemical fertilisers, sewage and waste disposal, deforestation, overfishing, etc. all bringing the natural cycles of the biosphere out of balance. Being realistic, within human timeframes it will be impossible to return back to Nature and get rid of the Urban Stratum, or will it be possible to prevent further urbanisation. What we can question however is how we can change the Urban Stratum in such a way that it becomes more of a membrane, a porous layer that doesn’t obstruct the natural cycles of the biosphere but works with them.

The knowledge of how to transform from stratum to membrane is stored for instance in vernacular architecture and other forgotten techniques that answered to the earth’s natural cycles, but most of all in the common sense of aborting consumption-centred thinking for respect and simplicity, traits that are hard to obtain without immediate pressure.

This essay has been published as:

Chapter 1

Introduction

1.1 Introduction

Humankind is a major ecological factor on the planet (Steffen et al. 2007, 614; Crutzen 2002, 23) and urbanisation is its major instrument. Steffen et al. (2007, 620) argue ‘enormous, immediate challenges confront humanity over the next few decades as it attempts to pass through a bottleneck of continued population growth, excessive resource use and environmental deterioration’. At the same time, they recognise that humanity is now becoming a self-conscious, active agent in the operation of its own life support system, what they call the ‘third stage of the Anthropocene’, in which ‘whatever unfolds, the next few decades will surely be a tipping point in the evolution of the Anthropocene’.

Already several decades ago Lefebvre (2003, 1 (1970)) put forward the radical hypothesis that society has been completely urbanised. This reconceptualization of the urban as a global phenomenon – an urban stratum - and not just as ‘in the city’ is crucial, I argue, to deal with the complexity of current global environmental problems and their handling; foremost if we are aiming to see any kind of transformation in the current paths of deterioration of the earth’s natural systems within human time frames. (A sobering fact is of course that in geological terms, human existence on earth is negligible). However, a systematic application of Lefebvre’s fundamental thesis has yet to be undertaken (Brenner and Schmid 2011, 13), scholars such as Brenner and Schmid (2011, 2013, 2014a, 2014b, 2015) are taking the lead in this by pushing their urban theory of Planetary Urbanisation.

This thesis explores the ‘Urban Stratum’, a global layer of urban influence that is obstructing the earth’s natural cycles. Going out from the fact that it is impossible to get rid of the Urban
Stratum or prevent further urbanisation (Angel 2011, 20), I question how we can change this layer so that it becomes more permeable for the biosphere’s natural cycles to flow. Following Sassen’s (2010a, 3) claim that it is not density or urbanisation itself but the urban systems we have created that are at the core of our current global ecological conditions, this thesis argues for a necessary transformation of our urban systems based on a shift from consumption-centred to resource-centred thinking (Nair 2011, 136). This approach stands in sharp contrast to the current dominant strategies that focus on efficiency improvements and start from the current status quo. Systemic transformation, I argue, is needed to tackle the externalities of our current urban systems and to ‘reduce the geographies of extraction and environmental damage’ (Sassen and Dotan 2011, 833) caused through urban consumption and production.

Going out from urgency to deal with the wicked global environmental problems of our era, this thesis develops strategies for transforming complex urban systems in the condition of planetary urbanisation, based on the potential leverages of shock and necessity. To achieve this objective, this dissertation constructs an interplay of four theoretical concept lines: Planetary Urbanisation, Complexity, Transformation and Necessity; and uses practical evidence to support its arguments. A central part of the methodology consists of Transdisciplinary Expert Workshops, of which some were conceptualised as ‘active-peer-review’ and others as ‘creative LAB’.

The remainder of this introductory chapter presents the conceptual framework with the before mentioned four concept lines, further specifies the objective and methods of this thesis and briefly introduces the next chapters.

1.2 Conceptual Framework

Planetary Urbanisation

Brenner and Schmid (2011, 13) follow Lefebvre (2003, 1 (1970)) in his radical hypothesis of the complete urbanisation of society and demand a radical shift in analysis from urban form (settlement type) to urban processes. They argue the last thirty years have witnessed several far-reaching worldwide socio-spatial transformations including the creation of new scales of urbanisations, the blurring and re-articulation of urban territories, the disintegration of the “hinterland” and the end of the “wilderness” and that these require a foundational reconceptualization of our image of the urban. An urban theory without an outside! (Brenner 2014, 14)
Chapter 1. Introduction

Planetary urbanisation theory therefore strongly criticises the ‘Urban Age’ discourse, which assumes the territorial boundedness, coherence and discreteness of the spatial units in which social relations unfold and conceptualises urbanisation primarily or exclusively with reference to the concentration of population within cities or urban settlements. Urban Age theory (e.g. Burdett and Sudjec 2007; 2011) is based on the underlying theoretical assumptions that (1) all spaces in the world are differentiated among distinct types of settlement, (2) all spaces in the world are either “urban” or “rural” (strong version) or classified along the urban/rural continuum (weak version), and (3) spatial change entails the redistribution of population among these ontologically fixed settlement types (Brenner and Schmid 2014, 325-326). Nevertheless, this discourse has become the mainstream in recent decades and its assumptions are also at the basis of the current strong focus on urban-rural linkages (which implicitly assumes an opposition) and the urban-rural continuum (the weaker version of the same assumption) in global and national policy circles and programmes (e.g. UN, BMUB, Habitat 3).

Brenner and Schmid (2014, 314) claim that the urban age thesis is a flawed basis on which to conceptualise contemporary urbanisation patterns and that ‘the geographies of urbanization […] are assuming new, increasingly large-scale morphologies that perforate, crosscut, and ultimately explode the erstwhile urban/rural divide’ (Brenner 2013, 87). They suggest that ‘the conditions and trajectories of agglomerations (cities, city-regions, etc.) must be connected analytically to larger-scale processes of territorial reorganization, circulation (of labor, commodities, raw materials, nutrients, energy), and resource extraction that ultimately encompass the space of the entire world. At the same time, this perspective suggests that important socioenvironmental transformations in zones that are not generally linked to urban conditions, from circuits of agribusiness and extractive landscapes for oil, natural gas and coal to transoceanic infrastructural networks, underground pipelines, and satellite obits, have in fact been ever more tightly intertwined with the developmental rhythms of urban agglomerations. Consequently whatever their administrative demarcation, socio-spatial morphology, population density, or positionality within the global capitalist system, such spaces must be considered integral components of an extended, worldwide urban fabric.’ (Brenner 2013, 103-104) Thus ‘urbanization contains two dialectically intertwined moments: concentration and extension’ (Brenner 2013, 102)

I argue that this proposed shift in the conceptualisation of contemporary urbanisation strongly supports the systemic thinking that is needed to tackle the wicked problems we have to deal with in the ‘third stage of the Anthropocene’ (Steffen et al. 2007, 618). The explosion of the bounded spatial unit is crucial when we want to focus on resource flows and the externalities of the urban systems we have developed. Resource extraction and environmental pollution (air, water, soil) most often lie outside of the administrative boundaries of the city but are
undoubtedly inherently connected to the urban systems of consumption and production. Therefore, seeing an extractive mining landscape as an urban landscape just as much as a city centre is, opens a new way of thinking that actually lies much closer to reality than a mere focus on population distribution and urban settlement types. Similarly are peasant struggles in landscapes of extended urbanisation as much related to urban processes as struggles over local commons in megacities (Brenner 2013, 108). Also the spread of societal phenomena such as the obesity epidemic, until recently strongly associated with ‘cities’, to remote places can be easily understood by the extended nature of current urban food systems.

**Complexity**

Complexity theory has its roots in mathematics, physics and computer science but is now being widely used outside of these disciplines and has made its way into urban studies and the social sciences. Already in the sixties, Jacobs (1992, 428 (1961)) described cities as ‘complex systems whose infrastructural, economic and social components are strongly interrelated and therefore difficult to understand in isolation’. A single complexity theory doesn’t exist but I want to refer to two main approaches, which use complexity theory to study urban areas and phenomena. A first group of scholars sees cities as complex self-organised systems with emerging properties and mathematical regularities (e.g. fractality). They study urban morphology from this perspective (Salat 2011; Salingaros 2005 and 1999) and look for scaling relations that apply to all urban systems (Batty 2008; Bettencourt 2013a and 2013b). A second group of scholars turned to complexity theory because it offers them ‘a new set of conceptual tools to help explain the diversity of changes in contemporary modernities undergoing globalisation’ (Walby 2003, 1). The emphasised core feature of complexity theory here is, as Walby (2003, 3) describes, ‘its anti-reductionist analytic strategy, which is inextricably connected to a fundamental re-think of the nature of systems, so as to better conceptualise the simultaneously dynamic and systematic inter-relationships between phenomena’. Similarly, Gershenson (2008 in Haken 2012, 7) defines a complex system as ‘one in which elements interact and affect each other so that it is difficult to separate the behaviour of individual elements. In each of these systems, the state of an element depends partly on the states of other elements, and affects them in turn’. He concludes that ‘this makes it difficult to study complex systems with traditional linear and reductionist approaches’, which is the mainstream approach in many scientific disciplines. Reductionism is also the way in which urban sustainability is mostly approached in practice: a sectorial set-up (e.g. only focus on energy), expecting predictable outcomes and without anticipating (or ignoring) feedbacks on/from other systems. The complexity of reality therefore often backfires on these approaches, causing rebound effects (e.g. increased energy efficiency leading to more consumption) or other unexpected feedbacks. Also Voss and Kemp (2005, 5) see ‘rationalist problem-solving, with its central feature to eliminate uncertainty,
ambivalence and interference of uncontrolled influence, problematic as a central orientation for governance in modern societies’. They acknowledge that ‘the reduction of complexity of this problem-solving approach has yielded tremendous technological developments, sophisticated patterns of social regulation and a high economic efficiency of production’. However, in the context of sustainability, they argue that ‘the more the process of problem-solving is disengaged with the full messy intermingled natural reality, but oriented towards the worlds of specialists, the larger is the share of interdependencies and dimensions of embeddedness, which are ignored in developing and implementing of what appears as solutions’. Against this backdrop, Voss and Kemp (2005, 4) claim that ‘sustainability should be understood as a specific type of problem framing which emphasises the interlinkage of different problems and scales, as well as long-term and indirect effects of actions that result from it.’ They thus rely heavily on complexity theory and see this as the only way in which to handle the wicked problems of our age, calling the problem of sustainable development the most “wicked” problem of modernity. Wicked problems (as opposed to “tame” ones), a term coined by Rittel and Webber (1973, 160), have a number of characteristics that demand a complexity approach, under which the following: they are difficult to clearly define, they have many interdependencies and are often multi-causal, attempts to address them often lead to unforeseen consequences, they are not stable, have no clear solution, are socially complex, hardly ever sit conveniently within the responsibility of any one organisation, involve changing behaviour and are sometimes characterised by chronic policy failure (APSC, 2012). Next to Voss and Kemp’s (2005; 2006) Reflexive Governance theory, also Transition Management, defined as ‘fostering sustainability transitions’ (Rotmans et al. 2001 in Rotmans and Loorbach 2009, 185), is strongly based on key notions of complex systems theory, such as variation and selection, emergence, coevolution, and self-organization (Rotmans and Loorbach 2009, 186).

Walby (2003, 3) discusses two main ways in which complexity theory has inspired addressing the issue of change: ‘The first involves the concept of the co-evolution of complex adaptive systems, where the concept of co-evolution replaces any simple notion of single directional impact. The second involves the notion of saltation, of sudden, critical turning points, in which small changes, in the context of complex systems, give rise to bifurcations and new paths of development that are self-sustaining.’ Sassen (2009, 49) adds the particularly relevant notion that complex systems are multi-scalar systems as opposed to multilevel systems, and that the complexity of urban systems resides precisely in the relations across scales. She claims: ‘when broad overarching events appear to be closely related to details, a system requires treatment as a complex system’. Because of this, she argues for a multi-scalar ecological urban analysis as opposed to one of multilevel systems based on either/or conditions: local vs. global, markets vs. non-market mechanisms).
Complex system properties such as non-linear cause-effect relationships, unexpected feedbacks and interdependencies are important throughout this thesis. As Sassen (2009, 46) concludes: ‘it is within the complexity of the city that we must find the solutions to much environmental damage and the formulas for reconfiguring the socio-ecological system that is urbanisation’.

Transformation

I focus here on the use of the term transformation in two ways that are of importance in this dissertation. First, to describe the human impact on the planet’s systems in the new geological epoch of the Anthropocene and second, to describe the non-linear fundamental changes that are needed to tackle current global multiple crises.

Anthropogenic transformation of the earth’s systems is now widely recognised by science and society. Scientists claim that this transformation has forced a new epoch in geological time: the Anthropocene (Crutzen and Stoermer 2000, 17; Crutzen 2002, 23), which is characterised by mass species extinction and fundamental changes in geophysical systems. Whitehead (2014,1) describes: ‘for Crutzen, what marked humans out as a force, at least, equivalent to nature were two key processes: 1) the range of different ways in which humans had transformed the environment; and 2) the ways in which these transformations were increasingly expressed at a planetary level’. Also the nine planetary boundaries defined by Rockström et al. (2009, 472), clearly point to the fact that humanity is causing systemic transformations which result in a different state once certain tipping points are crossed. Although both the Anthropocene and the planetary boundaries are in the end a social construct and anthropogenic earth system transformation is marked by persistent uncertainty and functional and spatial interdependence (Biermann 2014), they also mark a clear societal acknowledgment of the scale of human impact and indirectly mean that humanity is now becoming a ‘self-conscious, active agent in the operation of its own life support system’, what Steffen et al. (2007, 618) call the ‘third stage of the Anthropocene’.

The second use of the term transformation is more blurry and encompasses a wide range of understandings of what can or should be done by humanity to address today’s great challenges, not least the ones caused by the first described anthropogenic transformation of the earth’s systems. Brand (2016, 23) calls (socio-ecological or societal) “transformation” an umbrella term, which places the ecological crises in a broader context and unites different fields of thinking and action against business-as-usual strategies in a global context of complexity and non-linearity, urgency and multiple crises. However, Brand (2016, 24) argues, beyond a general consensus that fundamental system change is required; the concept of transformation remains vague and reflects different worldviews and entry points. In a prior review, Brand
et al. (2013, 481) state for instance that transformation implies non-linear change and no prioritisation of any temporal – i.e., short, medium or long term – or spatial scale, e.g., national or international. This statement clearly counters Geels’ (2002, 1259; 2011, 26) multi-level perspective on transitions. Despite the many different approaches, Brand (2016, 24), in his literature review, differentiates between two main uses and understandings of transformations in the current research field: transformation as a Strategic Concept and transformation as an Analytical Concept. He argues that the first (and more commonly used) relies on a liberal understanding of societies and a strong degree of trust in innovation and existing institutions to solve problems and that it fails to pay sufficient attention to the structural obstacles to far-reaching processes. The second more analytical understanding of transformation, he argues, can complement and correct some of these shortcomings in order to better understand the obstacles to policy change by questioning existing political and economical structures and underlying rationales. When failing to incorporate this analytical dimension, Brand (2016, 27) warns in the end, the strategic concept of transformation runs the danger of preparing the epistemic-political terrain for a greening of capitalism that might safeguard acceptable living conditions in a spatially and temporally highly selective form.

This thesis supports the second understanding of transformation and sees the need to rethink the (concentrated and extended) urban systems we have created starting from their very foundations and question their underlying rationales (e.g. consumption-centred thinking, ‘growth’ principle). Most strategies are still trying to solve the problems within the same systems that created them, heavily relying on technological innovations and operating de facto within existing institutional structures and economic systems, often resulting in further exclusion and the strengthening of existing power relations. Eco-cities are a good example of this and will be discussed. If we see transformation as fundamental change, it will therefore intrinsically affect existing power relations and underlying structures. Fundamental transformation will therefore always spark resistance from those that have advantages by staying with the old system, those that are usually the most powerful.

**Necessity**

The fourth line of thought that runs through this thesis is based on the heuristic that in times of necessity or shock, people and systems are much more flexible than we initially think they are.

If we look at history, it takes a disruption in the normal food supply to reveal a city’s real productive potential. Examples are London after the Second World War and Cuban cities in the 1990s after the collapse of the Soviet Union (Steel 2009, 313) when the country
was cut off from 80% of its food imports and 50% of its oil imports. These disruptions also brought different regulations and political changes that facilitated a transition. In these cases, necessity and an environment that facilitated change turned these cities into food producing cities. With the best intentions of the world, the current urban farming movement in the West will not even get close to the city’s real production potential because there is first of all no real necessity and second, there is no facilitation for change.

Taleb (2012, 3) introduces the term ‘antifragile’ (not the same as resilience) as the exact opposite to ‘fragile’ and argues that things or persons that are ‘antifragile’ actually benefit from shock. These positive responses to stress are however often ignored. Basing himself on the wisdom of the ancients (and grandmothers), Taleb (2012, 55) argues that ‘innovation sparks from initial situations of necessity, in ways that go far beyond the satisfaction of such necessity. The excess energy released from overreaction to setbacks is what innovates! His answer to the question: ‘How do you innovate?’ is therefore: ‘First, try to get in trouble. I mean serious, but not terminal, trouble.’ This strongly contradicts modern methods and ideas of innovation and progress: ‘Moderns try today to create inventions from situations of comfort, safety, and predictability instead of accepting the notion that “necessity really is the mother of invention.” Thus in spite of the visibility of the counterevidence, the need for innovation or change is currently mostly approached by the development of new ‘products’ or technological solutions. Referring to the previous line of thinking on complexity, this belief that technology will solve our problems does however not work when we are dealing with wicked problems in complex systems. Also the focus on the copy-pasting of best practices is, I argue, an unpredictable endeavour in complex systems. This thesis focuses on stress states and context-specific necessity as starting points for transformation.

From a totally different perspective, Klein (2008, 6) describes the opportunistic use of shock of the Friedmanites (followers of Milton Friedman, grand guru of the movement for unfettered capitalism) to impose their free market systems on entire populations. One of the examples she describes is the shock doctrine in New Orleans in the wake of Hurricane Katrina, a strategy which resulted in: lower taxes, fewer regulations, cheaper workers, a private instead of a public school system and the replacement of public housing projects with condos. Klein (2008, 6) refers to one of Friedman’s essays ‘Capitalism and Freedom’, in which he observes that ‘only a crisis – actual or perceived – produces real change. When that crisis occurs, the actions that are taken depend on the ideas that are lying around. That, I believe, is our basic function: to develop alternatives to existing policies, to keep them alive and available until the politically impossible becomes politically inevitable.’ Is the same potential available to push our urban systems away from their destructive nature.
Interplay

It is exactly the interconnection of these 4 strands of thinking that fills an existing research gap. This therefore defines the objective and hypotheses of this dissertation and forms its main contribution to the current scientific debates.

1.3 Thesis Objective, Methods and Outline

Objective and Hypotheses

The preceding discussion has highlighted the context and theoretical setting in which this thesis frames its objective:

Going out from urgency to deal with the wicked global environmental problems of our era, this thesis develops strategies for transforming complex urban systems in the condition of planetary urbanisation, based on the potential leverages of shock and necessity.

This thesis starts from the following hypotheses:

• It is the - concentrated and extended - urban systems we created that are at the core of our global environmental problems. (Planetary Urbanisation)

• We need to focus on a transformation of these urban systems. The basis of most current strategies - efficiency improvements, model approaches and optimisation - will never get us far enough given the urgency and severity of current global problems. (Transformation)

• It is within the complexity of the urban that we must look for the formulas for reconfiguring the socio-ecological system that is urbanisation. Failing to do so will lead to unexpected feedbacks and ‘de-urbanise the city' (Sassen in Guadalupe 2013, 66) (Complexity)

• To activate the urban potential for change, we need to look in places of necessity, which can serve as leverages for systemic change. (Necessity)

Research Methods

The two central research methods of this dissertation are: Theoretical Analysis and Transdisciplinary Expert Workshops. As Parnell and Pieterse (2015, 237) argue:
“understanding the fundamental issue - of what ultimately shapes the city (and the associated question of the impact of a city or system of cities) - is also a prerequisite for knowing what can be done to effect city change. Theory is thus key to any transformative urban engagement”. In line with the thought that “by definition, research in ‘the urban’ traverses disciplines, scales and philosophical and methodological paradigms” (Parnell and Pieterse 2015, 242), the construction of the interplay between the four theoretical concept lines - planetary urbanisation, necessity, transformation and complexity - has been central to the theoretical analysis of this dissertation, and more specifically, their joint relation to urban space. However, rather than engaging into a spatial analysis, adopting a researcher perspective towards a specific “social arrangement” that appears to be “geographically fixed” (Baur et al. 2014, 11), this work invites to find the normally hidden reality of space (Appadurai in Graham and McFarlane 2014, xii). Similar to the analytical lens that the authors of the volume ‘Infrastructural Lives’ (Graham and McFarlane 2014) take to make infrastructure more visible by tackling it not as a dimension of urban technology but as a dimension of urban everyday life, this dissertation aims to bring the topic of urban systems transformations out of its experts seclusion of engineering and technology development into the more open daylight of anthropology, sociology, political science, and urban studies (Appadurai in Graham and McFarlane 2014, xii).

In addition to the construction of this interplay, a qualitative content analysis (Mayring 2000) of the Transdisciplinary Expert Workshops (described below) was done based on a variety of objects including: protocols, observations, video material and produced materials (boards, drawings, collages, etc.) from these workshops. Different levels of content (Becker and Lissmann 1973) were regarded important in this analysis, including both primary content - the main ideas and arguments - and latent content - e.g. the points of agreement/disagreement, the particular standpoints of the academics/politicians/practitioners and their interactions, the contextual backgrounds of the participants (both cultural and geographical) and their relation with particular argumentations.

The methodology of ‘Transdisciplinary Expert Workshops’ contains two different kinds of workshops, a first kind, defined as ‘active-peer-review’, and a second kind, defined as ‘creative LAB’ with unusual suspects.

Both the 2012 ‘Closed Cycles - Open City’ and the 2014 ‘Pressure Point Strategy’ workshops were ‘active-peer-review’ workshops. Their role was to directly test the hypotheses and proposed strategies of this dissertation with practical experience, tacit knowledge and theoretical rigour. These workshops brought together both scholars, from different strands and methodological backgrounds, and practitioners in a transdisciplinary setting. I, as the researcher, facilitated the workshop process through a series of structured sessions.

As one method of collecting expert opinion, the emphasis of these workshops is on identifying differing opinions and divergent responses through a process of debate rather than
on consensus finding and aggregating expert opinion as in for instance the Delphi Method or Nominal Group Technique. Gathering expert opinion in a group setting rather than by conducting separate expert interviews has the advantage of allowing different perspectives and opinions to be mutually confronted and discussed. This can be particularly interesting in areas where no clear cut solutions are likely to be found, as stimulating discussions can result from the numerous angles the participants look from. For the purpose of this work, the ‘experts’ were chosen for their particular tacit or theoretical knowledge. ‘Experts’ included city officials, urban consultants, urban strategists, people from city networks, academics and people with on-the-ground urban experience.

Because of the ‘active-peer-review’ nature of these workshops, their outcomes fed directly into the further development of the related chapters. The discussions clearly brought out the differing opinions and interpretations of the proposed strategies, showed the weak points and inconsistencies in the arguments as well as the need for clarifications and theoretical underpinnings. The constellation of the workshop participants worked out very positively as I could count with active participation from almost all invitees and managed to include people with directly opposite opinions, which lead to the most interesting parts of the discussions.

The second type of Transdisciplinary Expert Workshop was set up in a different context and with a different structure and participant constellation. Instead of the ‘active-peer-review’ setting, which focussed on my own hypotheses and proposed strategies, the context of the ‘creative LAB’ was set in the ongoing process of Habitat III - the United Nations Conference on Housing and Sustainable Urban Development to take place in Quito, Ecuador, in October 2016. The approach was to take a critical and, most importantly, ‘on the ground’ perspective to several issues that are of cross-cutting nature in this process and are at the same time closely related with the hypotheses and proposed strategies of this dissertation.

The invited participants were a different kind of experts, I call them the ‘unusual suspects’. They came from very different local contexts all over the globe, in which they were all strongly involved in ‘on the ground’ action. Most had a hybrid profile, being part academic and part activist/artist/practitioner. Instead of a conventional round-table setting, the physical workshop setting (space, food, working materials) became much more important and also specific practical tasks (e.g. copy-pasting urban patterns, remaking the 1950s ‘3 little pigs’ story in a futuristic 2050 setting, or hacking a municipal water system) were set up to spark creativity, energy and discussion on particular topics. In addition, much more attention was given to the written, graphic and photo/video documentation which resulted in a joint LAB publication and video production from all participants.

Next to the LAB, I organised a series of ‘Public Debates’ of which one was linked with the LAB on ‘Different Urbanisations’ and one was convened around the topic of Planetary Urbanisation (‘Overriding the Urban/Non-Urban Divide’). The disadvantage of such public debates is that the actual public discussion leads its own life and I realised that as a
researcher, I got very little focussed content out of them in comparison to the other expert workshops. This is why I decided to not have another public debate for the third topic that is still to come.

The exercise of targeting critique towards a clear focus (UN New Urban Agenda) became a method in itself and ended up being an excellent approach to spark argumentation around a specific topic. The Critical Dialogues Series will continue beyond the scope of this dissertation further expanding it’s methodology (see: www.criticalurbanagenda.de). In July-October 2016, practical field work in three cities will take place as part of a process which includes co-design, field work, co-production and presentation of the results around the topic of ‘UN-Data’. The Appendix contains additional information on the above introduced expert workshops and public debates.

- Expert Workshop: ‘Closed Cycles – Open City’ (Appendix 1)
- Expert Workshop: ‘Urban Pressure Point Method’ (Appendix 2)
- Public Debate: ‘Critical Dialogue.01: Overriding the Urban/Non-Urban Divide’ (Appendix 3)
- Expert Workshop: ‘Critical Dialogue.02: LAB2: Different Urbanisations’ (Appendix 4)
- Public Debate: ‘Critical Dialogue.02: Different Urbanisations’ (Appendix 5)

**Thesis Outline**

The core of this thesis comprises of three peer-reviewed articles of which two are published and one is in the process of peer-review. These articles, outlined below, are contained in Chapters 2, 3 and 4 and are organised so that they lead from more abstract to more concrete proposals for practice.

**Chapter 2: Resource-Centred Cities and the Opportunity of Shrinkage**

Our planet is being anthroposized at high speed with Climate Change and other global environmental damages as its consequence. As home of most consumers, many are looking at cities for solutions. Urban densification is often seen as ‘the’ way towards more urban sustainability. However, externalities of urban consumption and the complexity of the urban system are mostly left out of consideration, leading to unexpected results. This chapter
advocates a transition from consumption-centred to resource-centred cities. In an age of rapid urbanisation, this chapter further argues how shrinking cities could unexpectedly function as catalysts for change. A shrinking population and a retreat of the current economic system give shrinking cities the potential for becoming front-running resource-centred cities.

This article has been peer-reviewed, accepted and published as:


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http://dx.doi.org/10.1007/978-3-642-37030-4_3

Statement of Contribution: Katleen De Flander is the single author.

Chapter 3: Closed Cycles - Open City

This chapter places the Urban Climate Challenge within the wider context of urban resource flows and draws our attention to the ruptures in the biosphere’s natural cycles that are caused by the specific types of urban systems we have created. This brings us to the task of restoring these ruptures, for which we will need to go beyond mitigation and adaptation to an urban systems transformation that places resources, and not consumption, at its centre. I suggest that to come to an effective transition of our extended urban systems, to tackle global climate change and other global environmental problems, a transition of urban resource flows (from linear back to circular) will need to go hand in hand with a transition in urban space governance. In other words, a paradigm shift regarding resource flows will also demand an appropriate (re-)production of urban space. Closing Cycles - Opening City!

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Chapter 4: Pressure-Point Strategy - Leverages for Urban Systemic Transformation

This chapter understands sustainability as a specific kind of problem framing that emphasises the interconnectedness of different problems and scales and calls for new forms of problem handling that are much more process-oriented, reflexive and iterative in nature. Closely
related with the notion of reflexive governance, we propose an alternative strategy for societal problem handling and change management in the urban context. The strategy starts from stress states in the urban system(s) and uses their initial momentum to encourage systemic change through interventions - rather than interventions - at selected pressure points. This chapter highlights the potential to evolve what has often been an intuitive practice, led by community or elected leaders with unique wisdom about functions and pressure points in their urban system into a more accessible strategy for shaping socio-ecological transformation in urban practice.

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Statement of Contribution: Both authors jointly developed the Pressure-Point Strategy in a working paper and hosted an expert workshop at the IASS Potsdam (November 2014) to critically discuss the approach with a number of experts from both academia and practice, which led to new insights and the further development of the working paper. Katleen De Flander transformed the working paper into a scientific paper and brought in additional theoretical framings. Jeb Brugmann brought in most cases from practice, and specifically the Chicago case.

**Chapter 5** synthesises and discusses the main insights of the previous chapters and presents an outlook for further research.


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Chapter 2

Resource-Centred Cities and the Opportunity of Shrinkage

Katleen De Flander

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Resource-Centered Cities and the Opportunity of Shrinkage

Katleen De Flander

Abstract: Our planet is being anthroposized at high speed with Climate Change and other global environmental damages as its consequence. As home of most consumers, many are looking at cities for solutions. Urban densification is often seen as ‘the’ way towards more urban sustainability. However, externalities of urban consumption and the complexity of the urban system are mostly left out of consideration, leading to unexpected results. This paper advocates a transition from consumption-centered to resource-centered cities. In an age of rapid urbanization, this paper further argues how shrinking cities could unexpectedly function as catalysts for change. A shrinking population and a retreat of the current economic system give shrinking cities the potential for becoming front-running resource-centered cities.

Keywords: resource-centered, complex systems, transition, shrinking cities, closed cycles
Resource-Centered Cities and the Opportunity of Shrinkage

1.0 Introduction

Climate Change has emerged as one of the most challenging political and scientific issues of our times. With ever increasing trends in urban consumption and production practices, a call for action to mitigate climate change is often seen as a way to foster sustainable development. Considerable attention is now being paid to determine what urban sustainability would include. Is a ‘sustainable city’ a city that uses 25 or 50 percent less energy? A city that is carbon neutral, whether with or without carbon offsetting? A city that doesn’t have cars or that has green roofs and solar panels? Many cities/neighborhoods/buildings are called ‘sustainable’ or ‘eco’ because they are doing better than mainstream but is this the right approach?

In response to the question “What is the single most important environmental/population problem facing the world today?” Diamond (2006; p.498 cited in Frey & Yaneske, 2007; p.61) captures the essence in his answer: “The single most important problem is our misguided focus on identifying the single most important problem!” In other words, the real world is full of interactions and connections. “Complexity science is moving us away from a linear, mechanistic view of the world, to one based on nonlinear dynamics, evolutionary development, and systems thinking” (Sanders, 2008; p.276). Climate Change should therefore be understood as a complex system. Interestingly, cities are as well. Bai (2010; p.130) indicates that “cities are increasingly recognized as complex adaptive systems that integrate, respond to, and influence a diverse range of social, economic and ecological processes operating across a range of spatial and temporal scales. Connections between urban systems and regional and global change are therefore characterized by significant nonlinearities and cross-scale interactions among slow and fast moving processes.” This understanding avoids us getting on a reductionist track, which deals for instance only with Carbon neutrality. It makes us focus on a broader transition process in cities and recognize not only their non-linear behavior but also their transformative capacity while staying functional.

2.0 Mythbusters

Although it is widely ignored, we are not going to solve Climate Change and other global environmental problems within our current economic system. The story that more free markets, more consumption and new technology (these are the ones that created our problems in the first place) are going to save us urgently needs some mythbusters. Technology can help, but pretending that we can get away with our current lifestyles because ‘green’ technology will solve everything, is being naive at the very least, especially with an eye on the expected population growth.

“Conventional economics as currently practiced is largely responsible for the increasing strain on global resources. The economic performance of nations is generally measured as gross domestic product (GDP), a large component of which is generated by consumption. The way to increase economic performance is therefore by increasing consumption, which in turn demands

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1 ‘Complex Adaptive Systems’ (CAS) are a specific category of complex systems – open evolutionary systems such as a rain forest, a business, a society, our immune systems, the World Wide Web, or the rapidly globalizing world economy – where the components are strongly interrelated, self-organizing, and dynamic (Sanders, 2008; p. 275).
increased production. In conventional economics, the productive capacity that produces the goods and services is considered to be a function of human-made capital only, excluding non-renewable and renewable natural capital, which is considered to be a free good that cannot be depleted (Daly, 2001 cited in Frey & Yaneske, 2007). Further excluded are the costs for repair of damage to the environment as a result of production and consumption.” (Frey & Yaneske, 2007; p.56)

One of these myth busters is Chandran Nair (2010) who describes the role of Asia in reshaping capitalism, arguing that it is realistically impossible for Asia to follow the same path as the developed countries due to mere numerical facts. “The world has reached a stage where economic growth, and in particular trying to maintain it via consumption-driven capitalism, has become the driver of our problems” (Nair, 2010; p.76). “We have to put limits on the use of limited resources. So as well as focussing on the quantity of consumption, we need to look at its quality - what consumption is composed of and what changes can be made to it” (Nair, 2010; p.80). This of course not a popular viewpoint. Many stakeholders have advantages of staying with the old system, but as Einstein pinpointed: ‘You can’t solve a problem with the same mind that created it’. A change in mind-set needs to take place where consumption ceases to be at the centre. Instead of consumption, what is truly at the center of everything are resources. Natural capital has made our conventional economic system possible in the first place. Natural resources have also made it possible to develop cities. A failure to recognize that natural resources can be depleted has already lead to the demise of several cities and empires in the past. ‘History tells that the destruction of the bioproductive capacity of a city’s hinterland through the exhaustion of its fertility and the available water supply has happened quite frequently, leading to the self-imposed collapse of cities’ (Frey and Yaneske, 2007; p. 80).

Girardet (1999; p.17 cited in Frey and Yaneske, 2007; p. 85) sees Rome’s fate as the direct result of the massive exploitation of its very large hinterland. (next to other major contributing factors such as lead poisoning and plagues). According to Mumford (1984 cited in Frey and Yaneske, 2007; p 85), due to the overexploitation of Rome’s hinterland and the damage done to the environment as a result of this, the empire’s bioproductive capacity became increasingly smaller and resulted in a shortage of food for Rome’s one and a half million or so inhabitants. Mumford sees the disintegration of Rome as the ultimate result of its over-growth, which resulted in a lapse of function, and a loss of control over the economic factors and human agents that were essential for its continued existence. Prosperity and population were declining and the barbarians began to infiltrate the over-extended empire.

Is the same happening to modern cities? The following example shows the massiveness of the problem we are facing in real time: China will build new housing for 400 million people in the next 12 years. If they use brick as the main construction material, they will use all their soil and burn all their coal and they will have cities with no energy and no food (McDonough, 2005).

3.0 From Consumption-Centered to Resource-Centered Cities

As Nair (2010; p.136) suggests: “The big change will lie in putting values on things humans have long taken for free or nearly free - the environment in which we live and the resources it provides us with […] Putting resource management at the center of policy making will shape how individuals consume, how companies do business, how food is produced and water is used, how the balance of rural and urban is reworked.” Sassen (2010; p.3) poses the following crucial question: “Are these global ecological conditions the results of urban agglomeration and density or are they the results of the specific types of
urban systems that we have developed to handle transport, waste disposal, building, heating and cooling, food provision, and the industrial processes by which we extract, grow, make, package, distribute, and dispose of the foods, services and materials that we use?" Combining Nair’s suggestion with Sassen’s question leads us to an approach that focuses on a transition of our urban systems based on rethinking their resource management. This stands in sharp contrast with the common approach of technological fixes and efficiency improvements. While ‘improving efficiency’ starts from the status quo of the current system, and ends up with a 20 or 30 percent ‘less bad’ system, the Resource-Centered City stands for a transition to a new system. Not ‘new’ in the way of building ‘new eco-cities’, but ‘new’ in the way of re-organizing our urban systems.

“The inevitable outcome of the continuing pursuit of economic growth and of increased consumption and production will be an eventual shortage of resources. [...] Attempts to reduce resource wastage in the production and consumption process, a Factor 4 approach (von Weizäcker et al., 1998 cited in Frey & Yaneske, 2007), will reduce resource consumption but will only buy us time, as this reduction will soon be caught up by increasing population and consumption levels” (Frey & Yaneske, 2007).

Another consequence of a resource-centered approach is that it forces us to think about the externalities of urban consumption and the relationship of the city with its hinterland. Because we are offsetting the negative consequences of urban consumption outside the city, they are hidden from the eyes and minds of most of the consumers. Externalities of urban consumption are one of the main causes of inequality, be it rural/urban, rich/poor, North/South. A resource-centered city is not a one-resource exploiting or dependent city but is as far as possible self-reliant when it comes to resources. By tackling consumption at its source, the resource-centered city avoids externalities in the most direct way possible. For instance: “By restricting emissions directly at the source, there would be no need for indirect schemes which tend to reward established companies, in both finance and the energy industry, and have already proved readily open for abuse” (Nair, 2010; p.148).

The rural-urban relationship, or as Sassen (2009) suggests urban and non-urban2, in our current consumption-centred cities could in many cases be described as parasitic. Since natural capital and resources are seen as a free good, the urban hinterland is emptied out from natural but also human resources (in the form of cheap labour working in the cities) at almost no costs. On the other hand, expensive products from the city return to rural areas for consumption. Attempts to avoid rural-urban migration or export urbanity to rural areas have mostly failed. An interesting thesis Nair (2010) brings up is that weakening the links between wealth and major metropolitan centres (by switching to a resource-centred approach) could lessen the pressure to create mega-cities and could rework the urban-rural balance.

4.0 From Consuming to Producing cities

2 “Cities have a pronounced effect on traditional rural economies and their long-standing cultural adaptation to biological diversity. Rural populations have become consumers of products produced in the industrial economy, one much less sensitive to biological diversity. The rural condition has evolved into a new system of social relations, one that does not work with biodiversity. These developments all signal that the urban condition is a major factor in any environmental future” (Sassen, 2009).
At the moment, our cities have a linear approach to using resources. Materials, energy, food and water enter the city from its global hinterlands (leaving its traces there in the form of ao. soil degradation, water pollution and deforestation), are partly consumed and the rest leaves the city in the form of waste, wastewater and polluted air (also affecting of course inner city air quality). This means that the externalities of urban consumption are carried by a large number of global hinterlands and for a large part hidden from the urban consumers. If we are to understand and respect our limited resource base, cities need to adapt from a linear to a circular resource use and evolve from consuming to producing cities where waste doesn’t exist, resource cycles are closed and impacts on the environment (air, water, soil) are neutral or even positive. At the same time, cities need to reduce the geographies of extraction and environmental damage caused through urban consumption (Sassen and Dotan, 2011).

Becoming a Resource-Centered city thus means that cities will have to stop their parasitic behavior and provide their own resources. On the one hand, if markets have to work within set limits of resources, cities will be forced to start harvesting³ their own resource streams such as rain, wastewater, materials and nutrients. This closing of resource cycles is nothing new. In pre-industrial cities it was (and in some parts of the world still is) normal to collect for instance urban organic waste (also from animals and humans) and reuse its nutrients for food production. Modern cities have forgotten their potential of being part of a resource cycle instead of damaging it.

Making the transition from consuming to producing cities, they will have to find space within their urban fabric to produce resources locally: space for energy, materials and food production, space for water treatment and infiltration. This will need to go much further than by just putting solar panels or urban gardens on top of the roofs. The whole city will need to be activated and re-organized, starting from changes in consumption and production patterns, to re-organizing the urban systems and changing urban land-use (for instance by taking space from car-infrastructure for creating a decentralized water treatment system in the neighborhood). All parts of society will need to be tackled, not just private consumers but also companies, industry and agriculture.

Consequently, in the resource-centered city, not efficiency improvement but re-organisation is key. The starting point is therefore not a product or specific material (as in Life Cycle approaches) but includes exploring the ‘function’ or ‘provided service’ for which work is needed; and leaving space for re-organisation and trend-change in the urban environment. ‘Shelter’ for instance can be provided by a building, also by a building that was initially not meant for housing (re-organising space). If we go a step further saying that this shelter should provide a certain thermal comfort level to the people needing its service, this can be solved in different ways. The shelter can be insulated (material) and/or heated (energy) and/or people can wear more clothes (material + lifestyle change) and/or maybe we need to look at a seasonal building use. Each of these solutions will have a different resource demand and decisions have to be taken looking at the integrated outcome. In a closed-cycle approach, using the exergy principle for both energy and materials, Rovers R&V (2011) come to the conclusion that against the regular way of thinking, “It seems more efficient to just heat the non-insulated houses with solar collectors instead of growing materials for its insulation”. Oswalt and Schmidt (2010) come to a similar type of conclusion: “It needs to be weighed whether the energy expended in optimising the buildings does not outweigh the energy saved for its operation.”

³ ‘Urban Harvesting’ is a concept that is based on tracking and harvesting all the resources in the city and bringing them back in an endless resource cycle. Also called ‘Urban Mining’, definitions may differ including or excluding certain resources and methodologies.
By looking at our urban systems through a network of resources (soil, air, water, materials, energy, nutrients), which by nature are highly interconnected (influencing one resource can have both positive or negative feedback on the others), we are forced to take a complex systems approach and avoid the danger of focusing only on one resource, a problem often arising from the compartmentalization in sectors, departments, professions, etc. After all, a change in our food system will probably have a greater effect on our energy consumption than simply aiming for a more efficient domestic energy use. As a repercussion, inter- and trans-disciplinarity becomes a must to realize any successful transition in a complex system. Also production choices in the city will have to be seen from within the interconnected network of resources and priorities will have to be set. For example: producing energy by placing solar panels on fertile soil is not the smartest solution because you block your fertile soil to be used for food production. On the other hand, placing solar panels on existing buildings or placing windmills between food production areas creates a double space function.

So far, instead of rethinking the systems we have developed, systems that resulted in climate change, resource crises and other environmental problems, we are still trying to solve the problems they have created within the same system. A good example is our transportation system that is for a large part based on the car and is a vast contributor to oil dependencies, climate change, health problems, air and water pollution, impervious soils, unliveable cities, etc. Instead of rethinking the system and start thinking in functions (‘I need to be mobile’) and not in goods (‘I need a car’), dependencies on cars are now nurtured under the name of green cars, biofuel or electric mobility and car companies are bailed out in the name of ‘saving jobs’. Instead, the focus should no longer lie on increasing consumption, leading to more throughput of resources. Companies will have to find new ways of creating value. There will be a shift from selling products to selling services, which will give a new meaning to product quality, durability and re-usability. There will also be a shift from taxing income to taxing consumption.

The shift from consumption-centered to resource-centered cities is at the same time an important key to mitigate climate change since changing the way we deal with resources will tackle many causes of climate change. When we re-organise for instance our urban food system by re-localising food production and changing our food habits, this will immensely reduce greenhouse gas emissions because it will reduce transportation distances, reduce packaging and reduce industrial agriculture (producing lots of CO₂ and N₂O emissions because of its high energy and commercial fertiliser use). On top of that, land use changes (from forests to industrial animal and food production or because soils have been exhausted by chemicals and fertilisers) can be limited or turned around. Our diets might have to change but we definitely don’t have to miss out on variety nor on good nutrition. Another example is the change of our transportation system in and between cities, which is a major contributor to climate change. Tackling the ‘car’ is a main challenge but who would have believed some years ago that smoking would be prohibited in public spaces? If cities have to become more self-reliant when it comes to resources, the space for car infrastructure in cities will prove to have a lot of potential. A revival of high quality public spaces and public transportation will be crucial to keep the ‘mobility’ function working and to create new quality of life in our cities by giving again priority to the human scale.

5.0 The opportunity of Shrinking Cities - ‘Less is More’

I argued that we need a transition from consumption-centered to resource-centered cities. Since producing resources demands space, density plays an important role in balancing out demand and supply in a specific system. In this view, shrinking cities have a clear advantage when it comes to closing resource cycles since through shrinkage processes in cities, “concentrations” can be eased so as to accommodate the principle of closed cycles in the city.
Less dense living is often associated with waste of space and resources, but what if that space would not be “wasted” but used to produce the necessary urban resources instead of scavenging outside the city boundaries. What if a shrinking urban population is the ideal catalyst for introducing a Resource-Centered approach? Maybe the question becomes: how much shrinkage is necessary for a city to be able to close its resource cycles and become self-reliant? Could we say: ‘The less people, the better?’

Urban planning and transportation theories such as ‘Smart growth’, ‘Compact City’ and ‘Urban Intensification’ all assert that high-density cities are more sustainable than low-density cities. This is mostly affiliated with the higher petrol use of low-density cities (as for instance many car dependent North American cities), and the greater use of public transportation systems and smaller housing units in denser settlements. However, “the relationship between urban population density and the environment in its broader sense is further complicated by the spatial displacement of environmental costs. Although it is often argued that denser urban settlements make more efficient use of land and other resources, at least some of this can be attributed to their ‘ecological footprints’ outside the spatial boundaries of the city” (Wackernagel & Rees 1995; Wackernagel et al., 2006, cited in Dodman, 2009; pp.3-4). Most cities import the majority of their resources such as energy, food and materials from outside their city boundaries and are therefore mostly consuming places. Resource depletion, pollution, energy use (for example embodied energy) and waste outside the city can therefore often be linked to the linear resource approach of cities which input and output starts and ends outside of the city. Therefore, taking into account the spatial displacement of environmental costs of dense areas, the statement that “higher density cities are more sustainable” becomes questionable and is clearly based on the current linear city system thinking.

From a resource-centered perspective, we want to internalize these environmental costs by moving from a linear to a circular system. The urban system will need to provide as much as possible in its own resource needs, instead of scavenging outside. This perspective puts density into a whole new light. We are not talking anymore about per capita energy use or per capita CO2 emissions but about what density means for the city’s production capacity and about its resource demand and supply possibilities. Less dense cities have a lot more space for resource production and at the same time, they have less demand for resources (mind the ‘rebound effect’⁴ which is a perfect example of an unexpected outcome in a complex system). In short, while in the current linear city system thinking, density might be increasing sustainability, from a changed resource-centered system perspective, lower densities bring many more possibilities. Now this is not an advocacy for reducing density everywhere to suburban levels and stimulating urban sprawl. It is however an argument that by changing our system’s perspective, the roles can be turned around and ‘Less becomes More’. In this perspective, Shrinking Cities show high potential.

6.0 Density in the light of shrinkage

When discussing density in the light of shrinkage, the following points are important:

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⁴ The ‘rebound effect’ is an unexpected behavioral or systemic response that reduces or even turns around the expected result of for instance an efficiency measure. An example in this context: the beneficial effects of a reduced population leading to less demand for resources could be offset by an increase in personal consumption caused by price decreases of goods resulting from excessive stocks.
First, I believe it is important to lose the image of a shrinking city being an empty village that doesn’t have enough children to fill a class-room. Many large cities are also shrinking; especially old industrial cities (for instance Osaka, Liverpool, Detroit) are losing population in favor of service cities. Besides this, shrinkage can take different forms. Next to an overall thinning out, we more often see a polarization within the city: from the center to the periphery or from one part of the city to another. This polarization results often in even bigger social and racial segregation and inequalities. Shrinking cities are already a common phenomenon worldwide and will be even more so in the future. “Since years one can observe demographic decline in great parts of Europe. Even on a global scale urban shrinkage is a widespread phenomenon. According to different studies every 6th to 4th large city worldwide has lost population in the 1990s” (Wiechmann, 2006). While many are focusing their attention on growing (mega-) cities, it has become clear in the last years that it makes a lot of sense to set a parallel focus on current shrinking cities since they are a shape of things to come.

“Even though urban growth will continue to dominate in the coming decades, the number of shrinking cities is continually increasing. An end is in sight, however: around 2070-2100, the world population will reach its zenith and the process of urbanization will largely come to an end. Then the processes of growth and shrinkage will reach a balance, and urban shrinkage will be a process as common as it was before industrialization began. [...] Shrinkage will in future be considered as normal a process of development as growth. It will lose its stigma and come to be seen as a scenario that has advantages as well as disadvantages and that leads to distinct forms of renewal and change. In the discourses on the city in the USA the shift in terminology away from ‘urban decay’ and ‘urban decline’ towards ‘shrinking cities’ indicates that such a change in thinking is underway” (Oswalt, n.d.).

Second, it is important to realize that urban density in relation to sustainability is usually discussed in the light of continuous growth. This seems logic when looking at the booming mega-cities. However, when discussing this in the light of shrinking, it becomes a whole different issue. We don’t have to debate any more if the growing population will be housed by densifying the existing urban fabric, by using inner city brown fields or by developing new peripheral green fields. We are not even in a position to discuss ideal densities for a compact, walkable city and argue against the unsustainable suburban sprawling (although sprawling is one of the main causes of urban shrinkage). Realistically, turning Shrinking Cities into a compact city is often a utopia.

Third, urban density in shrinking cities is mostly seen as a problem: costs of basic services and infrastructure are carried by less people and become too expensive or are simply abolished, public funding is reduced, cultural and social activities are abandoned, etc. All this leads to even more people leaving the city. Because many shrinking cities are falling more and more out of the current economic system, they have been ‘spit out’ or have become ‘disposable’ as some local activists call themselves, they often have no other choice than to rely on themselves. We see examples of local food production, places where local currencies have been introduced as a lifeboat to revitalize a local economy, local bio energy production by farmers, space pioneers with new initiatives, etc. These are all attempts to become more self-reliant and at the same time more resilient to outside factors (such as cutting public funds). Although attempts for re-localization are already found in Shrinking Cities, for some reason, making the complete transition has not happened. Why not? One answer could be the ‘Frog effect’. When you put a frog in boiling water, it jumps immediately out of the water because of the shock. If you put him in cold water and bring it slowly to boil, the frog stays and dies. An example of a shock that resulted in action is Cuba. After the country was cut off from 80% of its food imports and 50% of its oil imports when the Soviet Union collapsed in the 1990s, Cuba transitioned from an industrial to an
organic fossil-fuel independent agriculture in the course of a few years. We could say that shrinking cities are also in a state of shock but since it has been often a gradual process, it didn’t result in action but in a slow death.

Considering the above points, from a resource-centered perspective, density gets a new meaning in the light of shrinkage. With the aim to bring about a resources-based transition, it is more promising to work towards a new system in a place where the old system is already retreating then to change a system that is fully running. Instead of reducing funds, abolishing services and activities in Shrinking Cities, we can switch to a more productive approach to shrinkage. Seeing shrinkage as a catalyst for change, Shrinking Cities can become front-runners in the transition process towards a post fossil-fuel and a resource-centred society. They can become urban labs of how to downscale and re-localize our agriculture, how to dignify food production, how to become fossil fuel independent and decentralize resource production, how to increase quality of life and use the available space for resource production. Not with the aim to create ‘closed cities’ but as catalyst points for a transition that can spread out regionally and beyond.

7.0 Climate Change Mitigation

It might not be obvious at first sight, but as stated and illustrated before, there is a direct relation between a switch to a resource-centered approach for cities and mitigating Climate Change. As a matter of fact, the relationship is a lot more direct then with some systems that were specifically invented to mitigate Climate Change. For instance, the Carbon-Credits trading system often avoids direct solutions at source by offsetting actions (but also externalities) to other parts of the world while stimulating business-as-usual at source. By tackling urban consumption and its externalities directly, by re-localizing production and urban harvesting and, more generally, by placing resources at the center of urban policy and management, we are tackling several priority areas for mitigating Climate Change, including greenhouse gas emissions, land use change and deforestation.

Shrinkage has the potential to accelerate the process of becoming a resource-centered city. Front running cities have proven their exemplary function by rippling their success to other cities. Think for instance of the innovative public transportation system ‘Bus Rapid Transit (BRT) System’ that was first introduced in Curitiba and has since then been taken up in several cities globally. This low-cost (to use but also to construct if you compare with expensive subway lines), separate-lanes and high-frequency bus system has effected a modal shift from automobile to bus travel in Curitiba. It also eliminated a great part of the local informal transport mafias and motivated citizens to take a new view on mobility. It was so successful that many other cities around the world have adopted the BRT system. A city that is able to lead change in its urban systems and in the use of it’s resources can ripple its succes to other cities. In this view, shrinking cities could play an unexpected exemplary role in mitigating Climate Change in cities.

8.0 Conclusions

In the light of mitigating Climate Change and urban sustainability, this paper discussed why it is important to start thinking from a resources perspective and why shrinking cities have a high potential following this viewpoint.

A shift from our current consumption-centered cities to resource-centered cities by putting resource management at the center of policy making will shape how individuals consume, how companies do
business, how food is produced and water is used, how urban space is activated and how our urban systems are reworked. This will have a major effect on mitigating Climate Change.

Whereas in the ‘Smart Growth’ debate densification is seen as ‘the’ way to sustainability (with the main argument that dense cities are more efficient and use less energy per person, however completely ignoring the externalities of urban consumption), a resource-centered approach allows us to look at density in a different way. If we can see the opportunities of shrinking and couple this with the big environmental challenge we are facing in the 21st century, the current shrinking cities can be the front-runners of a system change. Whole new questions emerge such as: ‘How much shrinking do we need for the city to be able to close its resource cycles?’

9.0 References


10.0 Author Biography

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Chapter 3

Closed Cycles - Open City

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Closed Cycles - Open City

Katleen De Flander

Fixing the ruptures

In a context where international and national actions seem to be moving too slowly to ‘seriously’ tackle climate change, cities often find themselves in a situation of ‘necessity,’ one in which local realities simply demand that climate change be addressed. Looming natural disasters, acute air pollution, and water scarcity, among other challenges, are often exacerbated by growing populations and increasing inequality. These challenges often prompt cities to take action, and even unexpected cities might sense the need to take a leadership role in urban climate action.

On the positive side, from engineering to medicine, actions stemming from practical necessity have proven much more innovative and effective compared to theoretically created solutions in places where the acuteness of the problem is more abstract (e.g. national and global political debates on climate change) but not physically present (Taleb, 2012). The fact that much of the key and emerging global climate risks are concentrated in urban areas (Revi et al., 2014), coupled with the possibility of extensive co-benefits, suggests that cities might play a pivotal role in the global climate regime. In practice, however, there is often still a huge gap between climate actions (e.g as direct threat - response) and thinking through urban transformations in a systemic way. Such a systemic approach is crucial to leverage climate actions for an integrated urban strategy, which manages to tackle multiple environmental and social threats and stressors and align efforts towards a city’s progressive transformation (Brugmann, 2009, p. 226).

“For the first time humankind is the major consumer in all the significant ecosystems. And urbanization has been a major instrument” (Sassen, 2009, p.45). While the significance of the city as part of the solution is apparent, our current global ecological conditions are not the result of urban agglomeration and density in itself but they are the results of the specific types of urban systems that we have developed to handle transport, waste disposal, building, heating and cooling, food provision, and the industrial processes by which we extract, grow, make, package, distribute, and dispose of the foods, services and materials that we use (Sassen, 2010). These systems concentrate in cities but extend far beyond their boundaries and form a variegated urban fabric that is now woven unevenly across vast stretches of the globe (Brenner, 2013). So far, instead of rethinking these systems, most current urban environmental strategies are stuck in trying to solve the problems within the same systems that created them. Instead, they could serve as a platform for rethinking these systems. Our transportation system is for instance for a large part based on the car and is a vast contributor to oil dependencies, climate change, health problems, air and water pollution, impervious soils, unliveable cities, etc. Instead of rethinking the system and thinking in functions (‘mobility’) and not in goods (‘I
need a car’), dependencies on cars are now nurtured under the name of green cars, biofuel or electric mobility and car companies are bailed out in the name of ‘saving jobs’. In addition, the proposed solutions are often so well packaged that they seem to be the right way to go. Their externalities are ‘forgotten’ or they are contributing to other non-related factors; a good example is the carbon-offsetting scheme. In Haughton (1997, p.190)’s words:

> External impacts are the least talked about or understood aspects of the sustainable urban development debate at the moment, and yet arguably the very ability to use urban (and other political-administrative) boundaries to avoid accepting responsibility for external impacts helps fuel our current patterns of non-sustainable behaviour, as we transfer the costs of our consumption preferences to other people, other species, and other areas. We need to reform not just the city, but the way in which the city interacts with the rest of the global economy and environment.

Countering the epistemological focus on efficiency improvements and impact offsetting, this chapter explores the conceptual nature of urban systems transformations, placing urban resource flows at its basis. According to Sassen and Dotan (2011), cities have multiple articulations with the biosphere, which produce a number of negative externalities. First, cities produce ruptures in the biosphere’s continuous flows. Second, their consumption of biospheric resources is “unbiological” in the sense that they take more than the biosphere can replace. At the same time, the capabilities of cities can be used to redress the above negatives by activating biospheric capacities in urbanized settings (as well as multiple human-made technical and knowledge innovations and instruments). This framing suggests that taking up the urban climate challenge will require strategies that go beyond adaptation and mitigation to restoring the ruptures in the biosphere’s continuous flows.

The following hypotheses guide this chapter:

* Cities produce ruptures in the biosphere’s continuous flows, and their consumption of biospheric resources is ‘unbiological’ in the sense that they take more than the biosphere can replace (Sassen and Dotan, 2011).

* Urban transformations entail the study of processes, not models. Models, which include replicable ready-made designed eco-cities and other technological ‘fixes’, exclude the citizens from the transition and are therefore likely to fail. Moreover, they greatly simplify the complexity of a city and lead to unexpected outcomes.

* To come to an effective transition of our extended urban systems (i.e. to tackle global climate change), a transition of urban resource flows (going back from ‘open’ to ‘closed’) will need to go hand in hand with a transition in urban space governance (going back from ‘closed’ to ‘open’). In other words, a paradigm shift regarding resource flows will also demand an appropriate ‘(re-)production of urban space’ (Lefebvre, 1991).
Cities are Complex Adaptive Systems

Countering the negative externalities of cities entails a transition from linear to circular resource flows in urban areas. To explore what influences a city’s ability to close its resource cycles (in other words to match resource production with consumption), this section starts with an abstraction of an urban area, outside of any economic or social system, with well-defined boundaries and with a specific supply and demand for the various resources (e.g. water, energy, food, nutrient, materials). Theoretically, in order to close a resource cycle within the edges of this system, we need to match the demand for this resource with the supply of this resource. At a certain point, demand and supply find equilibrium and the cycle closes (Fig 1).

This equilibrium for one resource within a specific urban area is influenced by four key parameters: resource production, resource consumption, scale of the (closed) resource cycle area, and population density. To illustrate this, picture a closed cycle (e.g. energy) as an area in the city within which there is equilibrium between the supply and the demand. Note that this is an abstract system and in physical space; this area does not match any social or administrative boundaries (Fig 2).

If at a certain moment in time the equilibrium is disturbed and the supply cannot cover the demand of the area anymore, there are several ways to react:

1) The area increases its resource production (supply) to be able to meet the demand.
2) The area reduces its demand by reducing resource consumption.
3) The area reduces its size to reduce the resource demand (of course this depends on the physical location of the resource production capacity) or increases its size to be able to produce more resources (Fig 3).
4) The area reduces its population density to reduce the resource demand (Fig 4).
5) Or a combination of some or all of the previous.
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In the same way, when resource supply exceeds demand, several things can be manipulated to balance the production and demand of resources:

1) The area decreases its resource production (supply) or redirects overproduction to another area.
2) The area can allow for a higher consumption of resources.
3) The area increases its size to enable a higher resource demand (Fig 5).
4) The area increases its population density (Fig 6).
5) Or a combination of some or all of the previous.
A first important observation is that when one parameter changes, the others are all affected and play a role in finding a new balance.

An increase in resource production in a certain area allows for a) a higher population density in that area; b) an increased resource consumption in that area or c) an expansion in size of the closed cycle area to take up more consumers (or a combination of these). A decrease in resource production on the other hand, means that a) consumption will need to be reduced; b) the closed cycle area will need to shrink in size to reduce consumers; or c) population density should decrease (or a combination of these).

An increase in resource consumption in a certain area will demand a) an increase in resource production in that area; b) an expansion of the closed-cycle area to be able to increase production; or c) a decrease in population density to allow for a higher per capita consumption rate (or a combination of these). A decrease in resource consumption on the other hand, could allow for a) production to be reduced or partly exported; b) the area to expand to take up more consumers; or c) the population density of the area can increase (or a combination of these).

An increase in the scale of the closed cycle area mostly a) increases the number of consumers, which often leads to a higher resource consumption; b) increases the production capacity of the area (except in the case of resource deserts); and c) changes the overall density of the area. A decrease in the scale of the closed area has the opposite effect.

An increase in population density in a certain area correlates with a) an increased overall resource consumption; b) a reduced availability of production space and therefore a reduced resource production capacity; c) a need to expand the area to increase production capacity. A shrinking population density on the other hand, opens opportunities for a) an increased individual consumption; or b) a reduced production rate or export potential of excessive production; or c) an expansion of the area to take up more consumers.

Besides their interdependencies, each of the four parameters is in turn influenced by a number of variables:

Variables that influence the maximum production capacity of a certain area for a certain resource (e.g. energy) are: current available technologies, (alterations in) the physical environment, possible innovations, etc. The actual production of an area can, however, be very different from the maximum production capacity due to a number of reasons including regulations, private property, technology choices, financial limitations, the NIMBY (Not In My Backyard) phenomenon, etc. Some physical places might not have any production capacity for a particular resource because of physical, natural or other restraints. These ‘resource deserts’ will have to become part of another cycle that can cover their demand (Fig 7).
Variables that influence resource consumption in an area include: financial power of inhabitants, property prices, cultural and social influences, advertisement, accessibility, type of urban systems, etc.

The scale of a closed cycle area can be influenced by variables such as: specific urban fabric; technical, legal or natural restrictions; local actor initiatives; etc.

Population density is influenced by a number of variables such as regulations, property/rental prices, location, transportation options, job opportunity, immigration, social structure, etc. and can change drastically over time. A closed cycle area (dotted area in Fig 8) can have different densities inside (grey-scales in Fig 8), including lower density peri-urban areas or shrinking urban areas, which can boost the productivity of the closed cycle area while not adding much on the demand side.
The preceding suggests that the four parameters and their variables are in reality constantly changing and interacting in interdependent and unpredictable ways, creating non-linear feedback loops in a dynamic urban system.

Through the lens of complexity, we see that cities and communities are not linear cause-and-effect systems, but rather dynamic systems or ‘complex adaptive systems’, where the variables are constantly interacting and changing—for better or worse—in response to each other, creating non-linear feedback loops that either promote or deplete the life energy upon which their futures depend (Sanders, 2008). “This new, more complete, whole-systems approach is replacing the old reductionist paradigm, where scientists traditionally tried to understand and describe the dynamics of systems by studying and describing their component parts. Complexity science is moving us away from a linear, mechanistic view of the world, to one based on nonlinear dynamics, evolutionary development, and systems thinking” (Sanders, 2008, p.276).

This recognition of complexity proves crucial when dealing with urban resource flows. We need to understand that it is not one parameter that determines success or failure of closing resource cycles (e.g. low or high density) but rather the way they work together and the proportions in which they do. This means that there is no ‘right’ density or ‘right’ scale to close a resource cycle, nor does it make sense to define strict rules or prescribe specific urban forms. A well-known example is the rebound effect, whereby improving energy efficiency actually leads, through various feedback mechanisms on prices, to an increase in the demand for energy. This means that the current policy focus of most governments to improve energy efficiency as a means to reduce emissions, may be more difficult than linear calculations suggests (Fanning, 2012). Similarly, Eidlin (2010) describes the danger of ‘dense sprawl’ as an unexpected result of tackling ‘suburban sprawl’ by rigid densification strategies. ‘Dense sprawl’ is the phenomenon where our disconnected cities become denser and denser without becoming more complex, resulting in even poorer urban conditions.

Therefore, urban models that only focus on one of the parameters and expect to have a linear cause-effect outcome when manipulating that parameter often fail. There are plenty of practical examples where ‘Smart Growth’ or ‘Urban Intensification’ implementations have failed, exactly because they didn’t recognise the complexity of the city and only focussed on densification. They tried to reproduce vibrant quarters inspired by old city centres but didn’t recognise that most of all, the urban form of older metropolitan areas is one of great variance, not great density (Eidlin, 2010).

Translating complexity in the City

Adding to the complexity, there are also wider processes that influence the four parameters and make cities move to the left or right of the “resource demand-resource supply” graph (Fig 1). Economic growth and an increasing GDP often lead to increased consumption and make cities move further to the left of the graph. This is the reason for the current attempts to decouple economic growth from resource consumption (UNEP, 2013). Also globalisation, and the underlying principles of
neoliberalism, strongly influences a shift to the left as production is often outsourced to other parts of the world (decreasing local production) and consumption is placed as a central paradigm. The functional specializations of cities or an aging (and shrinking) population are other examples of such wider influencing factors.

Also, taking more than one resource flow into account will lead unavoidably to a competition for production space within the urban fabric. Energy production will compete with food production, with spaces for water infiltration or with other urban functions such as a car park. A simple overlap of a solar potential map (already available in many cities) with a potential map for food production and a map of the existing car infrastructure would show immediately where trade-offs will need to be discussed. In addition, Rovers (2013) argues that when urban areas become resource producers, there is a necessity of seeing urban space in 3D. He uses the example of a high-rise building, which takes the solar potential away from the buildings in its shade.

Approaching the city as a complex system suggests that existing methods to land-use planning have become out-dated and that there is a need to move to a system that doesn’t describe size or form. Instead, it should define the processes around which form can be generated, processes that allow for maximum flexibility in local problem-solving. The idea of creating something whose size or form is not going to be known is alien to engineering and architectural practices. However, scale-free system design has been achieved before, for instance the Internet (Hélie, 2008).

One of the characteristics of a complex adaptive system is its unpredictability. This means that a high degree of uncertainty is a normal circumstance and the idea of prescribing a future (e.g. model approach to cities) or even the idea of roadmaps is too simplistic to serve as an adequate design. “Roads are linear. Roads lead to a certain destination. In a complex and uncertain world it is even dangerous to determine a final destination. Instead, notions like resilience provide guidance to actions but without a fixed point in the future” (in ’t Veld, 2011, p.82). Formulated differently, the structural uncertainties surrounding future development of cities necessitate more explorative, experimental, and reflexive approaches (Loorbach, 2010).

The preceding suggests that urban transformations can be usefully understood as a dynamic process in a complex system with constantly changing parameters (each influenced by its own variables), keeping in mind the uncertainty of the system, leaving space for multiple pathways and without expecting linear cause-and-effect outcomes (Fig 9). When we fail to acknowledge this when working on a transition of our urban systems, there is a realistic danger that the physical structures we end up with are not containing this complexity and therefore fail as urban structures. A “real city is complex and incomplete” (Sassen in: Guadalupe, 2013, p.66) in which simplifications, too much technology or models lead to unexpected outcomes and “de-urbanise the city” (Sassen in: Guadalupe, 2013, p.66)
In ‘A city is not a tree’, Alexander (1965) describes the difference between ‘natural’ cities, which have arisen more or less spontaneously over many years, and artificial cities, those cities and parts of cities which have been deliberately created by designers and planners. He argues that compared with ancient cities that have acquired the patina of life, there is some essential ingredient missing from artificial cities and calls them from a human point of view, entirely unsuccessful. Alexander (1965) then formulates two ways of thinking about how a large collection of many small systems goes to make up a large and complex system and calls them the tree and the semi-lattice. More generally, they are both names for (abstract) structures of sets.

> **Tree**

A tree is a structure in which no overlap occurs. The units of which an artificial city is made up are always organised to form a tree. Whenever we have a tree structure, it means that within this structure no piece of any unit is ever connected to other units, except through the medium of that unit as a whole (Fig 10).
> Semi-lattice

A semi-lattice is a structure in which overlap occurs. The idea of overlap, ambiguity, multiplicity of aspect and the semi-lattice are not less orderly than the rigid tree, but more so. They represent a thicker, tougher, more subtle and more complex view of structure (Fig 11).

Alexander (1965) argues that it is this lack of structural complexity, characteristic of trees, which is crippling our conceptions of the city. He illustrates this by analysing a number of modern ‘designed’ cities and describing them as ‘tree’ structures. Experiments suggest strongly that people have an underlying tendency, when faced by a complex organisation, to reorganise it mentally in terms of non-overlapping units. The complexity of the semi-lattice is replaced by the simpler and more easily grasped tree form (Fig 12).
Eco-cities are a good example to unfold the failings of a tree-type of structure. Eco-cities, mostly all-new developments with clearly defined borders and largely based on high-tech solutions, are one of the contemporary manifestations to tackle environmental problems in cities and change urban resource flows. Although in itself the idea of building ‘sustainable’ cities and creating incubators for innovations is a good thing, one could argue first that from a resources point of view, in many countries, it doesn’t make sense to build cities from scratch. If we look at the demographics of Europe for instance, it is clear that we have to make the systems change in our existing cities.

Second, the design of these eco-cities is often based on units or clusters and sub-units and even though mixed-use is intended, a tree-like translation still endures. The designers of Dongtan Eco-City, for instance, describe a model in which ‘village clusters form the basis of the city plan where the idea is that people live, work and shop in the same neighbourhood, reducing transport and creating a mixed-use street life typical of traditional city centres’ (Steel, 2009, p.287). This sounds nice but will people really live, work and shop in the same village cluster? It might be more complex than this. After analysing the Abercrombie plan for London, Alexander (1965) concludes that ‘the individual community in a greater city has no reality as a functioning unit. In London, as in any great city, almost no one manages to find work that suits him near his home. There are therefore many hundreds of thousands of worker-workplace systems, each consisting of individuals plus the factory they work in, which cut across the boundaries defined by Abercrombie’s tree. The existence of these units, and their overlapping nature, indicates that the living systems of London form a semi-lattice. Only in the planner’s mind has it become a tree.’ Similarly, in her discussion on urban neighbourhoods, Jacobs (1992, pp. 114-117) argues that we must first of all drop any ideal of neighbourhoods in the city as self-contained or introvert units. The often-used ideal unit of 7,000 persons is silly and even harmful for cities as there is a basic difference between city and town life. City people are ‘mobile’, they can and do pick and choose from the entire city (and beyond) for everything from a job, a dentist, recreation, or friends to shops, entertainment, or even in some cases their children’s schools (Jacobs, 1992, p.116).

A third aspect is that closed resource cycles are usually ‘designed-in’ to these Eco-Cities lacking consideration of the ways in which cities inter-act with their regional and global hinterlands. ARUP, for instance, planned Dongtan Eco-City (China) as a self-sufficient city, generating all its energy from renewable resources, growing all food and recycling all waste (incoming packaging will be stripped and recycled in consolidation centres at the borders) (Steel, 2009). However, questions can be asked about the ways in which the design principles will accommodate the complexity of urban life. Interestingly, the designers at ARUP have already raised concerns that populations living in Dongtan

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1 The Dongtan Eco-City project has not been executed as planned by ARUP

2 I do not want to claim that cities were 100% self- sufficient in the past but they had a much stronger connection with the natural resource cycles and had a much stronger component of primary and secondary resource production
will ultimately be tempted to purchase cheaper food coming from outside the city (Steel, 2009, p. 289).

Fourth, here there is a danger that closed resource cycles will exacerbate differentiation and exclusion among different socioeconomic groups and communities. Eco-cities such as Masdar (United Arab Emirates) are already being criticized for being the gated communities of the 21st century (Hodson and Marvin, 2009, 2010). Hodson and Marvin (2010, p.310-311) argue that “this style of development is much more concerned with integration at the scale of development than with the wider transformation of the existing city or its incumbent infrastructure networks”. As such, they continue, “we should see them (eco-cities) as the purest attempt to create neo-liberalised environmental security, not at the scale of the whole city or even the planet, but a more bounded divisible security in order to try to guarantee ecological security for elites”. These critiques seem very similar to the one Marx had on the proposals for Utopian Cities, which he believed were necessarily doomed to failure because they attempted to create a perfect world, rather than change the existing one (Steel, 2009, p. 297). (Fig 13, 14, 15).

FIGURE 13: LILYPAD FLOATING ECOPOLIS
SOURCE: VINCENT CALLEBAUT ARCHITECTE; HTTP://VINCENT.CALLEBAUT.ORG
Finally, what seems to be missing in tree-like cities, including the ready-made eco-cities, is the dimension of time. Ready-made cities short-cut the process phase of transition and ignore the transformative nature of cities. The power of a complex system lies in its ability to transform itself while remaining functional through this transformation. Idealised cities are simply too naïve with respect to the workings of the development process (Batty, 2008). This was the case during modernist planning, but we could say the same about the contemporary master-planned Eco-Cities. The notion that cities are managed by urban planners with master plans has always been a fiction (McGranahan, 2005). (Fig 16)

Alexander (1965) warns that tree-like city structures create lifeless cities. Similarly, Christiaanse (2007) raises the concern that “The City has become a tree’, a patchwork of disjoined, sterile, and partially inaccessible sectors”. With the emergence of the automobile as a private mass-transit technology, many cities have transformed from walkable to car cities (as cars often replaced rail service and pedestrianism). This allowed at the same time for a great acceleration of urban sprawl and functional separation. In addition, “a heightened demand for security has promoted restricted access to increasingly larger urban spaces, which are only open to certain people during certain times of the
day or night. Circulation within the city increasingly means traveling along main transportation axis, and turning off only for the purpose of entering gated or enclosed sectors” (Christiaanse, 2007, p.13). Since access to services and access to the city are closely linked with physical structures, this physical separation in the urban fabric has contributed to the segregation and differentiation of socio-economic groups in urban areas. “Cities are no longer the spatial backdrop against which social inequalities may unfold, today the built environment itself is a means to determine inequality” (Esen, 2009, p.20). At the same time, the role of public space as a place of social interaction has changed radically. People in the streets are almost exclusively of one kind: consumers (Christiaanse, 2007). We could say that cities have evolved from ‘open’ to ‘closed’, not just literally in the form of gated communities, campuses and shopping malls (that are divided by highways and other boundaries), but also in the form of social segregation and functional specialisation.

The leading consumption paradigm is one of the reasons behind this evolution. In many instances, marketing professionals have applied the logic of market segmentation to consumption patterns within the city (de Mello Franco, 2011). Factors such as social class, income and age, including sexual orientation, are often used to define the specialized character of new urban developments. The city becomes fragmented into specific marketing niches, which, in their intrinsic logic, group similar people and avoid the confrontation with different social values and models of behaviour while dissolving the common forms of coexistence (de Mello Franco, 2011, p.186).

**Closing Cycles – Opening City**

I suggest that this transformation from ‘open’ to ‘closed’ cities went hand in hand with a transformation of the urban metabolism from ‘circular’ to ‘linear’. In other words, resource flows evolved at the same time from ‘closed’ to ‘open’3 (e.g. water, nutrients, food). It is particularly noteworthy that both transformations were facilitated by the availability of cheap energy and resources in a globalizing world. This changed metabolism means that the urban populations have become completely disconnected from the externalities of urban consumption and thus from the biosphere’s natural cycles. Many cities have lost their role in both primary and secondary resource production and live off their global hinterlands. This has in turn a considerable negative influence on urban resilience (e.g. resource provision), which is becoming increasingly important with global Climate Change.

**(Re-)production of space**

Several urban environmental strategies are now advocating a return to a circular metabolism (e.g. WFC, 2014). However, many pay inadequate attention to the role of urban space. This paper suggests that to come to an effective transition of our extended urban systems (i.e. to tackle global climate
change), a transition of urban resource flows (going back from ‘open’ to ‘closed’) will need to go hand in hand with a transition in urban space governance (going back from ‘closed’ to ‘open’). In other words, a paradigm shift regarding resource flows will also demand an appropriate ‘(re-)production of urban space’ (Lefebvre, 1991).

Lefebvre (1991) criticized Soviet urban planners for failing to produce a socialist space, having just reproduced the modernist model of urban design and applied it onto that context. Could the same be said from current environmental strategies and eco-cities? Are they failing to produce an appropriate urban space to a new paradigm concerning urban resource flows? Are they fostering ‘tree’-structures or ‘closed’ cities while they intend to tackle environmental problems?

The reason why both ‘resource flows’ and ‘spatial’ transitions should go hand in hand is the intrinsic link between the urban systems we have developed to handle transport, waste disposal, building, heating and cooling, food provision (Sassen, 2010) and the way we organise, use and move in urban space. Take, for instance, the fact that currently over 65-70% of public space in many cities is reserved exclusively for car infrastructure (Rueda, 2007). This exceptional spatial dominance of the car has a large impact on urban mobility and therefore on urban resource consumption (not only in terms of energy but also in terms of materials and embodied resources). Allocating urban space for automobile use precludes using urban space for other purposes, such as the production of resources, water treatment, etc. Another example is the urban water system, which evolved from an integrated system on various city scales (water was supplied and treated on a local level, rainwater was collected and stored, drainage was part of the street and alley design and there was a close link to agriculture) to a centralised, invisible ‘big pipes’ system where several scales have been erased. The urbanites became completely disconnected from the biospheric water cycle because it has physically been reduced to the opening of a tap.

(Re-) appropriation of resources

Urban contexts in need of solutions have produced alternative streams of action that could trace another path to act on climate change and urban resource flows. Although focusing mainly on urban space and infrastructure development, schemes such as participatory budgeting enjoy a certain acceptance on multiple levels of the political sphere. Could this scheme of participation also work on a broader level, integrating the biospheric water cycle in the urban political discussions? Water, for instance, is being re-appropriated by communities in poverty belts around many cities. In Medellin (Colombia), the ‘right to water’ features as a continuous conflict between the service provider and the inhabitants of some sectors of the city, who are re-claiming water as a natural resource rather than a commodity service provided by the state (Lopez, 2014). In this particular process, several ideas spark as people seem to finally understand where the water comes from, how to handle it and how to preserve and protect its sources. Contrary to megaprojects bringing entire watersheds into dams, small communal water reservoirs and micro-distribution systems seem to have found a way to re-
appropriate water into the physical realm of the urbanites; often of course led by necessity. Could we similarly argue for the ‘right to energy’, allowing communities to engage in re-appropriation processes for understanding, managing and producing electricity?

Conclusions

This chapter places the urban climate challenge within a wider context of urban resource flows, exploring the idea that the current ruptures in the biosphere’s cycles are caused by the urban systems we have created. This brings us to the task of restoring these ruptures, for which we will need to go beyond mitigation and adaptation strategies to urban system transformations centered on resources. I argued that changing urban systems should start from within the existing cities, trusting the transformative potential of the city and taking the citizens along in the process. Furthermore, an urban transition that is based on a paradigm change regarding urban resource flows (from ‘open’ to ‘closed’), will need to go hand in hand with an appropriate (re-)production of urban space (from ‘closed’ to ‘open’). Failing to do so will lead to a further fostering of tree-like structures, which ‘de-urbanise’ the city.

Thus, finding a balance between the four interdependent parameters this chapter started with (resource production, resource consumption, scale of the (closed) resource cycle area, and population density), should not be taken as a rigorous goal but as a guiding principle for a long-term transformation of a complex adaptive system (the city); one that leads towards different urban systems, a change in urban lifestyles and consumption behavior and a recognition of a considerable urban productivity potential once the possibility of a re-production of urban space is taken seriously. Only an integrated urban strategy, which manages to tackle multiple environmental and social threats and stressors together in an ongoing and incomplete process, can support the complexity of a semi-lattice and will avoid tree-like structures.

The ‘where’ and ‘how’ these transformations can be initiated within cities opens a new research field that goes beyond most current urban environmental methodologies. Since models have proven not to work, we should turn to more experimental and reflexive approaches, which will demand transdisciplinarity at its process basis. The Closed Cycles – Open City cannot be designed, it has to be produced via an ongoing process of intraventions, triggering learning in real time how to optimize and reapply the learning. This is a very different process to planning. Intraventions, therefore, are attempts to transform the system from within, as opposed to interventions, which attempt to influence a system from outside (in ‘t Veld, 2011). Incremental demonstration through project-specific planning, and the learning that stakeholders derive from innovation at the project scale, provide us an important technique in urban strategy practice, because the focus is more on aligning interests and inventing new practices in pursuit of policy objectives. Lessons from successful project-scale interventions can then be used to determine how policy, regulatory and institutional contexts can be changed to support the scaling of new forms of development (Brugmann, 2009).
The introduction of the ‘superblocks’ in Barcelona, a new urban unit joining several existing urban blocks, is an example of re-thinking urban space together with re-organizing resource flows starting in specific pressure points in the city. These units do not just change the local mobility system by blocking all pass-through car traffic, but they also push new learning: how to rethink the way people use and move in public space and become citizens again (and not just consumers), how to rethink resource flows and make these units more self-sufficient, how to re-activate urban space?

Another example to learn from is the ZEIS tool (Special Zones of Social Interest), which originally appeared since the 80s in Recife, Brazil. ZEIS are demarcated areas in the territory of a city consisting of low-income housing settlements (arising spontaneously, existing, consolidated or proposed by the Government), which are given the possibility of upgrading and land tenure regularization. This tool eased the urbanization process (led by the massive rural migration to cities), which would have been a catastrophe if those cities were following the conventional planning legislation, and activated participatory processes to improve urban space. Could such a tool be used for demarking areas in the city to start closing resource cycles, sparking local organization and a re-appropriation of resources to the citizens while empowering public space?

We may find answers on ‘how to close resource cycles’ while studying cases of struggle for resources. The closing of a resource cycle is not a process that should be in the hands of a private service provider, neither by top-down city management structures, ‘owning’ the resources. The transgression of this status quo (service provider owning the resource, urban segregation, etc.) relies on further research focusing on local social movements and successful cases of resource appropriation, which could inform new organizational processes and dynamics to urban climate and resource governance.

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References

Chapter 3. Closed Cycles - Open City


Chapter 4

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Chapter 4. Pressure-Point Strategy

Article

Pressure-Point Strategy: Leverages for Urban Systemic Transformation

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Abstract: Sustainability can be understood as a specific kind of problem framing that emphasizes the interconnectedness of different problems and scales and calls for new forms of problem handling that are much more process-oriented, reflexive and iterative in nature. Closely related with the notion of reflexive governance, we propose such an alternative strategy for societal problem handling and change management in the urban context. The strategy starts from stress states in the urban system(s) and uses their initial momentum to encourage systemic change through intraventions—rather than interventions—at selected pressure points. This paper highlights the potential to evolve what has often been an intuitive practice, led by community or elected leaders with unique wisdom about functions and pressure points in their urban system, into a more accessible strategy for shaping socio-ecological transformation in urban practice.

Keywords: pressure points; urban; sustainability; transformation; reflexive governance; complexity

1. Introduction

In line with transition discourses that are based on complexity theory, Voss and Kemp [1,2] argue that sustainability, as the main second-order problem of modernist problem-solving, calls for new forms of problem handling and that these differ from the forms that are adequate for delimitable, decomposable problems that can be managed in a linear way. They suggest that if we understand sustainability as a specific kind of problem framing that emphasizes the interconnectedness of different problems and scales, then ‘sustainable development is more about the organisation of processes than about particular outcomes’ [2] (p. 4). This paper proposes such a strategy for complex problem handling and change management in the urban context. The result of such a strategy is a set of intraventions—rather than interventions—at selected ‘pressure points’, to facilitate desired systemic ‘transformation’ [3,4].

We follow Sassen [5] in her argument that our current global ecological conditions are not the result of urban agglomeration and density in itself but they are the results of the specific types of urban systems that we have developed. These infrastructures, and their related consumption patterns and management processes, have become institutionally globalised, reproducing relatively similar and even predictable environmental transitions in the worldwide process of urbanisation [6,7]. As with globalised production generally, urban systems today are scaled through widely standardised forms of technology, design, and business models, supported by globalised institutional arrangements in the arenas of regulation, finance, and governance [8–10]. These systems reproduce globalised patterns of consumption and lifestyle that are widely understood as being unsustainable for a growing human population. If we set out to tackle the (local and global, social and environmental) externalities of these urban systems and processes, then we will clearly have to go beyond efficiency strategies and move towards transformations in the production and renewal of urban places and systems.
Such transformations, we argue, involve a shift from the scaling of standardised typologies and systems to the development of capacity for more customised urban development [11]. The question is ‘where to start changing urban systems’ [12] (p. 56), considering their planetary nature [13–16], their tensions among scales [17,18] and their vested power relations [19,20].

We learn from times and places of shock that people and systems are more flexible for change than we normally consider them to be. We also see that most innovations do not come from places of abundance and equilibrium but from the places where necessity (‘the mother of invention’) and low budgets demand new and sometimes radical interventions that go way beyond high-tech fixes. The latter are often sold as niche innovations but are more often co-opted experiments by the existing neoliberal system [21]. Klein [22], in addition, underlines that shock is commonly used as an “effective” strategy in neoliberal tactics. Based on this simple underlying idea that it is more difficult to affect significant change in a situation of relative comfort than in a situation where the current systems (including social and institutional systems) are under stress or in decay [23], this strategy starts from stress states in the urban system(s). This active state of necessity produces the initial momentum for change in the system(s). Systemic change however, goes much further than only symptom relief. Pressure points are those places in the system(s), either directly or indirectly interconnected with the stress states, which are found to have the most potential to push the initial momentum in the desired direction through intravention. In’t Veld [24] defines ‘intraventions’ as attempts to change real-world configurations from within, as opposed to interventions, which attempt to influence a system from outside. However, ‘since any governing intervention into a system is necessarily part of that system and system boundaries can always be drawn wider’ [25], we use the term intravention here to highlight the fact that the iterative process of locating and analysing the stress states in the urban system(s) and designing the set of intraventions is a process that should be strongly based on local knowledge, leadership and ingenuity. Referencing the evidence from documented cases and practices, this paper highlights the potential to evolve what has often been an intuitive practice, led by community or elected leaders with unique wisdom about functions and pressure points in their urban system, into a more accessible process strategy for shaping socio-ecological transformation in urban places.

The proposed Pressure-Point Strategy leans closely towards the notion of ‘reflexive governance’, the strategy elements and procedural requirements of which provide a useful framework for it. Reflexive governance refers to the problem of shaping societal development in the light of the reflexivity of steering strategies and ‘acknowledges that governing activities are entangled in wider societal feedback loops that are partly shaped by the (side-)effects of its own working’ [1] (p. 4). At the same time, the focus on stress states and intraventions in pressure points answers to the critique of Karvonen et al. [21] (p. 114), who state that, to date, ‘urban experiments […] have largely reinforced rather than reoriented existing power geometries […] and on the whole exhibit the paradoxical qualities of promising radical change while practicing business as usual’, by proposing that experiments initiated at times and places of stress have more potential for systemic change (in one direction or another).

After giving a short background on the use of pressure points as an intuitive practice, we present a framework of elements that underlie a methodological approach of such a practice, followed by the introduction of the strategy itself with its three consecutive steps: identifying, understanding and designing. We discuss a practical retrospective case from Chicago to illustrate the method and end with a discussion.

2. From Intuitive Practice to Strategy

The idea of finding and beginning a process of change through identified pressure points has been used, often intuitively, in many locations and settings throughout the world. Excellent leadership, deep local knowledge and often a very low budget forced practitioners to focus limited resources on small opportunities that were ripe for intravention and change, and which would also carry maximum possible social, political and economic influence at larger urban scales and across the
arenas of community organising, policy, planning, design, and public investment. For instance, the former mayor of Curitiba, Brazil, Jaime Lerner, has been a leading practitioner of a pressure point approach, which he has described as ‘urban acupuncture’ [26]. Lerner’s approach involved the selection and orchestration of site-specific intraventions to advance both civic understanding and material demonstration of new system-wide development concepts (e.g., the downtown pedestrian mall, BRT integration stations, flood plain land swapping, establishment of ethnic community cultural facilities and identities in public parks) within the context of limited means. Lerner argues that tackling urban problems at appropriate pressure points can cause a positive ripple effect throughout entire communities. ‘Sometimes urban planning is too slow’, he states, ‘The idea is to create energy’ [26]. One well-known intravention involved the night-time demolition of a block of downtown roadway to establish the first demonstration of the city’s central pedestrian mall. The stress state arose from chronic congestion of the main downtown avenue by cars and private bus operators (often in violation of their concession terms) and the status quo auto-focused demands of downtown commercial interests, on the one hand, and the municipality’s strategy for transit-oriented growth and transformation of the bus concession regime on the other hand. In this instance, the intravention—a middle-of-the-night bulldozing of one block of the downtown avenue and its repavement as a pedestrian street—created evidence of the commercial potential of the new form of streetscape. It surfaced the public support for transformation and the political pressures both for and against it.

A second example is the transition of Barcelona’s modernist typology of illes (i.e., blocks) into a new typological unit, the ‘super-ille’, joining nine urban traditional illes [27]. The source of disequilibrium was the increasing congestion of residential areas and their narrow streets and neighbourhood plazas (increasingly used for parking), along with changing residential demographics. The desired systemic outcome is to route cars around the neighbourhood illes and to re-establish pedestrian-friendly living at the neighbourhood scale, reinforcing traditional neighbourhood relations, uses of public space and commercial life. The introduction of the super-ille began with the first strategic project in the Ribera district following extensive neighbourhood discussions, upon which basis the physical design, traffic planning, and stakeholder engagement process for transitions in other districts could be understood and ultimately codified.

Such intraventions at local-scale pressure points are also a fundamental method in various community-organising traditions, be these the building occupations of squatters in central Europe, the neighbourhood-scale intraventions of community organisers who pushed for change in the face of entrenched political machines in the cities of the northeast and midwest United States (e.g., Chicago), the 1990s squatter movement in Berlin which surfaced the demand and need for affordable housing at a time when international investment was flooding into the city, or the ‘Wächterhäuser’ scheme in Leipzig [28].

These examples of pressure-point intraventions supported the emergence of new models of urban (re)development and thereby had impacts that reached far beyond a specific point in space. In the following section we discuss the strategic elements and steps of a more explicit process method, building upon the lessons from such successful cases.

3. The Pressure-Point Approach

Before introducing the three steps of the Pressure-Point Approach in more detail, we take a step back to discuss the strategic elements that lie at its basis.

3.1. Strategic Elements

The six strategic elements presented by Voss and Kemp [1,2], as criteria to evaluate the actual working of reflexive governance arrangements, apply to this approach. We touch upon several of them here in a contextualised manner and add elements that are more specific to this strategy.
Local Process. The mapping of symptoms, their analysis, and the design of the intravention set to trigger transformation at pressure points should be executed by local people, drawing upon their local tacit knowledge and ingenuity.

Transition Brokers. A critical ingredient for urban change processes is ‘transition brokers’ (or ‘change agents’ as they are often called) [29,30] such as Salvador Rueda (director and founder of the Barcelona Urban Ecology Agency, instigated the first super-illes project in Barcelona) or community organisers (referenced below) in Chicago. These are important community leaders (not necessarily public officials) who facilitate the transition process and the transfer and exchange of knowledge, using narratives to inspire and create co-responsibility and usually acting at multiple scales. The mapping, diagnostic and intravention processes will most definitely need the agency of such local transition brokers.

Iterative Nature of the Process. Urban change is itself a constant negotiation. The Pressure-Point Approach is a process that should be cycled through several times, taking into account the flux of urban reality, the high probability of unintended side-effects of the intravention set, changing values and perceptions and feedback loops.

Time Factor. One of the key notions of shock is ‘time’. Openings for intravention are often bound by specific ‘opportunity time frames’, which can be very limited in length. This means that the mapping and diagnostics are in constant flux, linking back to the need for an iterative process strategy.

Opening up before Closing down. Responding to the efficacy paradox of reflexive governance, namely what Voss and Kemp [1] describe as the contradicting requirements of opening-up problem handling for conceptualisation (to adequately grasp the factual embedding of decision-making in complex contexts with heterogeneous values and distributed power) and closing-down for keeping up action capacity, this Pressure-Point Approach handles the sequential opening and closing as follows: the first two steps of identifying and understanding are meant to ‘open up’ the process to grasp the complexity, let the information flow openly, and understand interconnectedness, power relations, different viewpoints, layers and contradictions. Depending upon the degree of conflict manifest in the problem context, the opening-up process may be more or less explicit and open to broad public engagement. The third and ‘intravention’ step is the ‘closing down’ phase, necessary to be able to take coordinated action in the urban reality. In effect, such a process is typical of successful local leaders, who may spend years taking a broad ‘reading’ of the environment on which basis they may then make a strong, decided intravention at a critical window of opportunity. In a similar way, Stirling [31] pleads for more plural and conditional approaches before the actual decision-making process, arguing that when knowledge is uncertain, one should ‘keep it complex’ in order to see the range of perspectives and divergent interpretations for decision-making on complex and contested issues.

Set Guiding Direction. Once there is a sufficient level of understanding and a desire to intravene, the third step of designing the set of intraventions at selected pressure points will need to be preceded by a decision on the guiding direction in which change is pushed. This is the guiding direction for the alignment of the intraventions as we will introduce below.

3.2. A Three-Step Iterative Process

The Pressure-Point Approach is an iterative process which consists of the following three steps as visualised in Figure 1: (1) identifying stress states through symptom mapping; (2) understanding complexity through diagnostic mapping and symptom analysis; and (3) designing the intravention set at selected pressure points. In what follows, we go deeper into each of these steps.
3.3. Step 1: Identify Stress States—Empirical Symptom Mapping Section

The first step is a straightforward mapping process of the symptoms of the complex problem. A symptom reflects the presence of an “unusual state” or “stress state” in the urban system, such as an area of concentrated air pollution or food security disturbances. This active state of necessity gives an initial momentum for change in the system. In practice, it is unlikely to find the necessary willingness and resources to tackle a complex problem in places where there is an overall state of equilibrium and comfort as a starting point, or even where vulnerabilities are considered to be high (e.g., the perceptions of downtown shop owners when considering pedestrianisation, as in Curitiba). Systemic change, however, goes much further than only symptom relief. We can identify several types of stress states:

- **Need to Act: Active State of Necessity.** There is risk in the current situation that requires change, either because of the potential loss of function or imposition of costs that will destabilize systems beyond the accepted limits of tolerance. The consequences of inaction are clear. Symptoms or stresses can be of a social, demographic, environmental, political, technical or economical nature or often a specific combination of these.

- **Shock.** In some cases this ‘need to act’ can come very sudden, as a shock. These ‘breaking news’ stress states can be of natural origin such as a hurricane, a flood or an earthquake (of course, human influence on, for instance, climate change could increase their frequency and intensity), or of manmade origin, such as the collapse of the financial system or the housing market, or an epidemic or an embargo (e.g., the well-known US embargo against Cuba). Note that systemic shocks can be interconnected.

- **Latent Need to Act.** There is fragility in the urban system that will exacerbate the impacts of a shock, ‘it is just a matter of time’ [32].

- **Managed Creation of Stress or Socio-Political ‘Heat’.** This is basically self-induced stress, which represents a commonly used tactic to trigger action in the system, such as Lerner’s bulldozing of the downtown avenue. Media can play an important role here.

3.4. Step 2: Understand—Diagnostic Mapping and Symptom Analysis

There are no easy linear causes or solutions to complex problems. A failure to recognise this often leads to unexpected feedbacks [33] (e.g., the well-known example of building traffic flyovers to solve a traffic problem, only leading to increased car use). This diagnostic step intends to prevent...
simplistic solutions for complex problems and seeks to unravel the interconnections, potential triggers, relations, interdependencies and forces at work that underlie the manifestation of the symptoms that were identified in step 1. We propose the use of both diagnostic mapping and symptom analysis for this.

**Diagnostic Mapping.** Once the symptoms are mapped in step 1, diagnostic mapping seeks to visually reveal the underlying causes, flows and interconnections of the identified symptoms that have accumulated in specific urban systems. The function of mapping here is less to mirror reality than to reveal and realise the potential and triggers for change [34]. We are not mapping design or form but strategic dynamics, potential triggers and interconnections that can be leveraged later to advance a transition process. Depending on the landscape, the diagnostic mapping can go beyond the city’s administrative borders in the extended urban systems. Whether specific interventions will be able to influence these extended systems is not the question being explored at this stage. This is the stage of opening up in which we should accept complexity. Experts might identify different triggers or interconnections than community actors or public officials but these different interpretations are all respected items of the same map.

**Symptom Analysis.** In association with diagnostic mapping, symptom analysis seeks to analyse the forces in the particular symptom that are facilitating or restraining the momentum moving out of its stress state. Symptom analysis falls in the realm of ‘momentum analysis’. Since a momentum is a vector quantity, it is described by both magnitude and direction. We can evaluate the following forces in the specific symptoms:

- **Size of the net facilitating forces (for a given moment of time)** that are increasing the momentum (moving away from the stress state).
- **Size of the net hindering forces (for a given moment of time)** that are restraining the momentum (from moving away from the stress state).
- **Direction of the net forces and the ability for their alignment.**

Figure 2 is a visualisation of a symptom analysis breaking down the different kinds of forces and attributing them a size and extent of direction. Note that this is a snapshot in time as the dynamics in a particular point in urban space are constantly changing. This step is still part of the ‘opening up’ phase. The analysis should be done in an open and descriptive way. It is all about describing the present situation.

![Figure 2. Symptom analysis (based on the force field analysis, originally created by the psychologist Kurt Lewin in the 1940s for use in social situations).](image_url)
3.5. Step 3: Set Direction and Design the Intravention Set at Selected Pressure Points

After ‘keeping it complex’ [31], having mapped and diagnosed the symptoms and analysed the interdependencies and the forces that are working within them, this third step is the moment where the strategy needs a ‘closing-down’ phase, necessary to allow for action to be taken in practice. On the basis of the diagnostic analysis in step 2, a joint decision to act or not, and in which direction to act, should be taken.

Pressure points are those places in the urban system(s), either directly or indirectly interconnected with the symptom(s), which are found to have the most potential to push the initial momentum in the desired direction through intravention. They are the points where you apply pressure (via intraventions) to relieve the stress state. Designing the set of intraventions is all about deciding where and how to instigate change in the system, amplify the useful and dampen the less useful forces, and align forces towards the chosen direction. Pressure points are thus used as levers for pushing the momentum in the desired direction, and to release and steer energies from the existing stress.

A pressure-point intravention may be a single, bold measure, such the citizen occupation of a building. However, to affect a truly new momentum, an effective intravention is typically a designed set of actions meant to harvest, apply, direct, and align forces in one or several pressure points of an entire system to push in the desired direction. For instance, in the Curitiba case, the effectiveness of the intravention depended on the new streetscape design and the establishment of a ‘24-Hour Street’ (a gallery with shops, bars and restaurants which was open 24 h), which attracted people and created safety in the new pedestrian zone while addressing the business concerns of local commercial interests. One may therefore speak of an ‘intravention set’. The intravention set has three key components (Figure 3):

A. Intraventions that create openings to weaken or by-pass the hindering forces towards the desired direction. The hindering forces, which are often systemic dependencies or vested power structures, are impeding systemic change. These hindering forces can be weakened or by-passed by creating openings (disruptions) in the current systems to make space for alternative systems to develop and ideally outcompete the old system.

B. Intraventions that strengthen or add facilitating forces that increase the momentum towards the desired direction.

C. Align the pressure point intraventions collectively towards the desired direction. The openings and forces of the intravention set should be aligned in such a way that they reinforce each other and do not adversely affect each other.

Figure 3. The three components of the intravention set.
An intravention thus does not necessarily need to be a ‘project’; it can just as well be ‘taking away’ something (e.g., taking away 3% of parking places per year in Copenhagen [35]), ‘facilitating’ something that was not possible before or ‘consequently changing priorities’ from the existing to an alternative system.

Questions that can guide actors to conceptualize and design intravention sets are: What is the balance of losers/winners of this intravention set? How would the intravention set affect the power relations in its context and would it create openings for new alignment or alliances? Can we foresee externalities of the intravention set? Would there be a demonstration value? We have to accept that it is impossible to predict the exact outcomes of an intravention set as there will always be unintended consequences and unexpected side-effects. These should be evaluated and taken up in the next round of the iterative process.

4. A Case Example: Neighbourhood Regeneration in Chicago

This section discusses the mix of measures that kick-started the regeneration in Chicago’s Edgewater neighbourhood in the 1980s and provides a fascinating, retrospective example of the use of stress states and the discovery and consolidation of pressure-point intraventions.

4.1. The Local Context

The Great Depression and then all-out production for the Second World War left post-War Chicago with a base of early 20th century infrastructure, plants and equipment that could not compete in the late 20th century. Between 1965 and 2000, Chicago lost 70% of its manufacturing jobs to newly built suburban areas. Chicago’s residents followed. Between 1960 and 1990, Chicago’s population dropped by almost 800,000 people, gutting the city’s mixed-use residential/industrial/commercial neighbourhoods [36].

Adding to the momentum of decline, over the course of two decades, four business models stripped the remaining value from neighbourhood buildings. Predatory finance for home mortgages on inner city properties filled the void of regulated bank finance, driving inner city households further into poverty. Then local real estate agents used ‘blockbusting’ racial scare tactics to secure properties at reduced prices from fleeing white households and then sell them at a premium price to African American households. The resulting high rates of loan defaults and tax delinquency created openings for slum lords to secure properties at minimal prices in foreclosure sales or city tax auctions. The slumlord’s basic business model was to squeeze as much short-term cash rent as possible from a building, without making any capital investment in its maintenance. Finally, once a slum building was all but uninhabitable, the slumlords hired arsonists to burn their building and collect on their fire insurance policies. Drug dealers inhabited abandoned buildings and took territorial control of cleared lots and unmaintained parks [36].

Together these models of stripping value from the city created a continuous cycle or momentum of decline. Chicago’s unrivalled grassroots community organisers had to discover how to map and read the emerging stress, triggers and interconnections in this cycle of decline, how and where to intravene to stop the negative momentum, and how and where to create openings for alternative models of reinvestment.

4.2. The Process

In the formerly middle-class, European Edgewater neighbourhood in the north shore area of Chicago, one of the first actions taken by the new neighbourhood and block associations that formed in the late 1980s was detailed mapping of each building, park, and street corner under stress from the value-stripping disinvestment process and crime. An inventory was taken of every lot, park, and building—300 buildings involving 10,000 units. A special focus was given to the corridor constituted by Kenmore and Winthrop Avenues, infamously known at the time as ‘Arson Alley’. The mapping exercise (i.e., a broad-based ‘opening-up process’) documented ownership, occupancy, and each building
and unit’s status and underlying interconnections within the context of the above-described cycle of decline. The community associations then evaluated the remaining use-value in each building and lot (i.e., ‘understanding complexity’), and developed a set of strategies and tactics (i.e., interventions) for pursuing the renewal of that value and the regeneration of their neighbourhood. These strategies and tactics implicitly reflected a resident analysis of the facilitating and restraining forces at work in various systems and levels, and a careful selection of aligned points for interventions to push the momentum towards their desired direction.

To trigger the transition process in the Edgewater neighbourhood, the local activists, as relatively new and poorly resourced change agents, implemented interventions both simple and complex. One of these was to establish a neighbourhood source of funding for community planning that was independent of the infamous political machine of Mayor Richard Daley. They leveraged one of the new forces that was changing the direction of momentum in the American urban landscape: the establishment of federal government programs for community-based organizations and initiatives. The securing of this source of support, external to the existing local political-economic machine or regime, established a local planning capacity that ultimately resulted in the Edgewater neighbourhood establishing its own Planning and Zoning Committee. Today, that committee still previews development proposals prior to consideration by the respective, official city council committee.

With their mapping exercise they identified and made interventions, at first around specific buildings, proactively recruiting new owners for buildings and training them to manage the buildings according to their plans and objectives. In some of the more troubled parks and street corners, they took direct intervening action to pressure the police to intervene. For instance, when neighbourhood activist Mary Ann Smith was first elected to the city council, she took to setting up a lawn chair and sitting at notoriously dangerous locations and called the police while sitting there to let them know. This triggered discussions with the police to schedule more regular patrols of these areas, and to make arrests.

Eventually, the model of new building ownership recruitment and training was institutionalized as a city-wide process through the establishment of the Chicago Community Investment Corporation (CIC). In other words, the initial tactical interventions tested a foundation of practices for a new city-wide strategic process.

It is to be highlighted that the interventions to increase positive momentum in the neighbourhood (i.e., for the most part by strengthening the capacity and know-how of local associations) were matched with interventions to weaken the power of hindering forces (i.e., by securing funds that were independent of City Hall, and by recruiting and financially aiding alternative owners and political powers in the neighbourhood).

The above, initial intervention set formed part of a growing number of similar strategies in other stress areas across the city at the neighbourhood scale. These were then steadily scaled up citywide, initially through grassroots transfer from one block or from one neighbourhood to another. Ultimately, they were merged into a new body of practices for urban regeneration at a great scale, across the city, and finally embraced in the 1990s by the reform of Chicago’s governing regime. As long-time activist and University of Chicago scholar Terry Nichols Clark put it, ‘Few governments have changed as deeply and as rapidly as Chicago’s—without a visible or violent revolution.’ Chicago politics between the 1970s and 1990s have ‘been revolutionized in many similar respects to the revolutions in Eastern Europe, Latin America and Asia’ during the same years [11], [37] (p. 2).

This case example [36] is based on in-depth interviews undertaken in 1988 and 2008 by Jeb Brugmann, including: Lee Botts, Alliance for Great Lakes (2008); Walter Burnett, Alderman, City of Chicago (2008); Gail Cincotta, National People’s Action (1988); Prof. Terry Clark, University of Chicago (2008); Forrest Claypool, Cook County Commissioner (2008); Mayor Richard Daley (2008); Dave Doig, Park National Bank (2008); Prof. Paul Greene, Roosevelt University (2008); Greg Harris, State Representative, State of Illinois (2008); Jack Markowski, Community Investment Corporation
5. Discussion

This paper outlines a method for complex problem handling based upon what has heretofore been an intuitive process used by successful city leaders. The method focuses on explicit mapping of symptoms in urban system(s). An analysis of those stress states is then undertaken to inform the design of an intravention set at selected pressure points for the desirable transformation of systemic functions, uses and dynamics. Practitioners, from city planners to community activists, will likely agree with the simple underlying idea of this strategy, namely that it is easier to start change in places that are confronted by a range of accumulated stresses than in places where the system is in a stable equilibrium (even if there is a consciousness in the latter that this system has obvious environmental and societal externalities). Therefore, for people dealing with complex urban problems, this approach can be a useful tool (for both top-down and bottom-up initiatives) to instigate systemic change.

The question as to ‘who’ uses this approach and who decides on the direction in which change is to be steered is a contested one. Societal discourse on sustainability has highlighted the ambiguity of social goals and, at the same time, sustainability itself is a moving target [1,2]. We propose a process with strong input of local knowledge and leadership throughout the three steps but we are aware that every transformation process includes a struggle over power and opportunistic behaviour with the danger of the process being co-opted or dominated by the views and interests of the most powerful actors.

Typically, the development of specific pressure-point intraventions to reinforce momentum and to create new openings for desired change is a process of trial and error, as it is not certain how ‘the system’ will respond to each intravention or set. This brings us to the difficult question of the possibility of ‘upscale’ a successful intravention set to other places or systems. As we argued, urban systems today are scaled through widely standardised forms of technology, design, and business models, supported by institutional arrangements in the arenas of regulation, finance, and governance. The strategic premise underlying this article is that fundamental changes in sustainability outcomes require the development of capacity for more customised urban development. The pressure-point approach is proposed to support the customisation of problem handling to a specific context. We do envision that the resulting intravention set could have a high demonstration value and could trigger pressure and learning in other places or communities.

However, uncertainty is intrinsic to this approach and we argue hereby for an increased tolerance for failure, which overrules the current trend of best-practice imitation. A culture of trying and failing should become part of urban change management together with a stronger trust in local ingenuity and phronesis. The art of urban ‘acupuncture’ is still little developed and most certainly has its limits. The cases we have used are retrospective and not based on its application specifically. Therefore, further investigation should focus on the practical testing and evaluating of this approach in different contexts and with different types of stress states, which will also bring forward its limitations more clearly.

6. Conclusions

Based on the urgency to deal with the wicked problems of our era, this paper has developed a strategy for transforming complex urban systems based on the potential leverages of shock and necessity. While there is an emerging academic interest in ‘urban experiments’ and ‘living labs’, they are at the same time being criticised for largely reinforcing rather than reorienting existing power geometries. Similarly, high-tech fixes are often sold as niche innovations but are more often co-opted experiments by the existing neo-liberal system. We welcome the move to a context-based and customised approach, but argue for a need to go back to heuristics. Most innovations do not come from places of abundance and equilibrium but from the places where necessity (‘the mother of invention’) and low budgets demand new and sometimes radical interventions that go way beyond
high-tech fixes. The energy needed to leverage the transformation towards the widely shared vision of sustainability will come from the political power from underneath, from the slums and from crises, which will force us to adapt. Thus, we suggest consciously leveraging the momentum and energy that times and places of stress create to move towards transformations in the production and renewal of urban places and systems.

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Author Contributions: Both authors jointly developed the Pressure-Point Strategy in a working paper and hosted an expert workshop at the IASS Potsdam (November 2014) to critically discuss the approach with a number of experts from both academia and practice, which led to new insights and the further development of the working paper. Katleen De Flander transformed the working paper into a scientific paper and brought in additional theoretical framings. Jeb Brugmann brought in most cases from practice, and specifically the Chicago case.

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25. Watson, M.; University of Sheffield, Sheffield, UK. Personal communication, 2014.

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Chapter 5

Conclusions, Discussion and Outlook

This thesis set out to explore the ‘Urban Stratum’, a global layer of urban influence that is obstructing the earth’s natural cycles. Going out from the fact that it is impossible to get rid of the Urban Stratum or prevent further urbanisation, I questioned how we can change this layer so that it becomes more permeable for the biosphere’s natural cycles to flow and started from Sassen’s (2010) claim that it is not density or urbanisation itself but the urban systems we have created that are at the core of our current global ecological conditions. Consequently, this thesis argued for a necessary transformation of these urban systems, framing its objective as follows: “Going out from urgency to deal with the wicked global environmental problems of our era, this thesis develops strategies for transforming complex urban systems in the condition of planetary urbanisation based on the potential leverages of shock and necessity.” To achieve this objective, this dissertation constructed an interplay of four theoretical concept lines: Planetary Urbanisation, Complexity, Transformation and Necessity; and used practical evidence and expert knowledge to build its case in three chapters guided by the following four hypotheses: 1) It is the concentrated and extended - urban systems we created that are at the core of our global environmental problems; 2) We need to focus on a transformation of these urban systems. The basis of most current strategies - efficiency improvements, model approaches and optimisation - will never get us far enough given the urgency and severity of current global problems; 3) It is within the complexity of the urban that we must look for the formulas for reconfiguring the socio-ecological system that is urbanisation. Failing to do so will lead to unexpected feedbacks
and de-urbanise the city; and 4) To activate the urban potential for change, we need to look in places of necessity, which can serve as leverages for systemic change. The three chapters each approached these hypotheses from different angles, supported them with practical evidence and produced proposals for urban transformations ranging from conceptual entry points to a strategic method for urban practice. This chapter summarises and discusses the main contributions of this dissertation in two sections and points out its limits and remaining research needs.

5.1 The intrinsic link between the nature of urban resource flows and the production of urban space

The first main contribution of this thesis is the establishment of the, I argue necessary but largely ignored, link between the urban metabolism and urban space. Underlying this argument is the intrinsic connection between the urban systems we have developed and the way we organise, use and move in urban space.

Over the course of the last decades, the transformation from ‘open’ to ‘closed’ cities; the latter characterised by strong physical, functional and social separation; went hand in hand with the transformation from a ‘circular’ to a ‘linear’ urban metabolism. In other words, resource flows evolved from ‘closed’ to ‘open’. Both transformations were facilitated by the availability of cheap energy and resources in a globalising world and the strong rise of the consumption paradigm in modern societies. I suggest that the change from consumption-centred to resource-centred cities and the closing of resource cycles can serve as breeding grounds for the ‘open city’. However, through the lens of complexity, I discussed that cities and communities are not linear cause-effect-systems but rather complex dynamic systems. This implies that existing methods to land-use planning have become out-dated and we should move to a system that doesn’t prescribe form or size but instead, defines processes around which form can be generated. In the same line of thinking, there is no ‘right’ density or ‘right’ scale to close a resource cycle, and closing one cycle might have unpredictable feedbacks on another. A real city is complex and incomplete, in which simplifications, too much technology or models lead to unexpected outcomes and de-urbanise the city. Because of the unpredictability of complex systems, there is a need for more explorative, experimental, and reflexive approaches to urban transformations, rather than those that determine final destinations.

I concluded that to come to an effective transition of our extended urban systems (i.e. to tackle global climate change and other wicked problems), a transition of urban resource flows (from ‘linear’ to ‘circular’) will need to go hand in hand with a transition in urban space governance...
(from ‘closed’ to ‘open’ cities). In other words: a paradigm shift regarding resource flows will demand an appropriate (re-)production of urban space: “Closing Cycles – Opening Cities”. Failing to do so will lead to a further cultivation of what Christopher Alexander called ‘tree-like structures’, which lack complexity and de-urbanise the city. Ready-made eco-cities are a good example of such failure. They have a circular resource approach (to a certain extent and mostly based on high-tech solutions) but they greatly simplify urban complexity (leading to unexpected outcomes) and are more and more recognised as places of exclusion to the extent that they are termed ‘the gated communities of the 21st century’ (meaning ‘closed cities’). Eco-cities thus assume a new approach concerning urban resource flows but they fail to produce an appropriate urban space to go with this new paradigm.

The importance of this contribution is that it brings together the work of two largely separate research fields. On the one hand, the work on ‘open cities’ based in the social sciences (e.g. social production of space) and urban studies, but also lending from open systems theory (cities as complex adaptive systems); on the other hand, the work on resource flows and circular metabolism, based mainly in environmental and natural sciences.

This contribution is also very timely. In the framework of Habitat III - the United Nations Conference on Housing and Sustainable Urban Development to take place in Quito, Ecuador, in October 2016 - a manifesto is being prepared. Sennett, Sassen and Burdett are currently writing a ‘New Charter of Athens’, which is supposed to be a new mental guide for urban development in the 21st century addressing emerging issues as environmental crises, the uses of technology and big data, and the challenge of social inclusion. The manifesto aims to replace the guidance given by Le Corbusier and others nearly a century ago, in a document they called ‘The Charter of Athens’, which had a huge influence on Urban Planning and Development after WWII. Le Corbusier’s guidance was largely based on the rationalisation of urban space, resulting in an over-determination of form and function. The original charter supported a strong functional and circulation segregation with a distribution of the population into tall apartment blocks at widely spread intervals, erasing life on the ground plane and creating what I called ‘closed’ cities. If you look at the resources side, this was only possible with the introduction of the automobile as ‘the’ mode of transportation and of new industrial construction methods and materials (steel, plate glass and reinforced concrete) allowing for skyscraper construction, standardisation, large infrastructure projects, etc. This paradigm is until today strongly influencing global urban development and has been largely internalised by international housing and infrastructure developers who copy-paste ‘closed’ settlements throughout the globe (currently booming in Africa), while ignoring completely any local cultural, resources or climatic specificities. In an exercise of copy-pasting urban patterns during the LAB on ‘Different Urbanisations’, participants matched several of these ‘closed’
settlements in various cities and experienced how disconnected and indifferent contemporary urban planning works in comparison to carefully studied and locally committed interventions.

Interestingly, the ‘New Charter of Athens’ will be based on the idea of the ‘open city’ and will bring in the elements of porosity (ambiguous edges between spaces, places and functions instead of separation), incompleteness (against the over-determination of form and function) and informality, borrowing strongly from complexity theory. A focus on ‘open cities’ is therefore active and several drivers for an open system are being identified. This thesis has made the case for the missing connection between urban resource flows and urban space and suggests the closing of resource cycles as a possible new driver for ‘openness’? More research is needed on the ‘how’, which has I believe a lot to do with the question how cities can become responsive again to their social and natural environment. Think here of the difference between vernacular architecture and the standardised building typologies that came with globalisation and have made our cities all look the same. At RE_PUBLICA 2016 in Berlin, Sennett describes this homogeneity of built urban form the most familiar sign of cities becoming closed systems and contributes it mainly to the new dominant mode of investment called ‘core investing’, meaning exogenous investors invest in space and specifications (e.g. 40 stories, grade B building quality, x square feet), not in built form. These specifications are completely delinked from the actual place of construction and are not reactive to anything locally on the ground besides to the available territory. There is no feedback into the nature of the form from what the place is.

One of the answers lies likely in the reinvention of craft and craftsmanship and the potential of cultural practices to overcome the problems of the 21st century cities. Indian architect Radhakrishnan (2015), one of the unusual suspects of the creative LAB on ‘Different Urbanisations’, argues that against the background of increasingly homogenous urban development, craft is pivotal to preserving local identities. Craft is organic, informal, community-based and evolved out of need as opposed to greed. It is traditional, vernacular, informed by oral processes and, more importantly, always responsive to climate, the prevailing culture, local politics and social values. He makes a clear link to resources, explaining that craftsmanship is not just the skill of making things well; it is also about the responsible use of local materials. He concludes that the process of ‘making’ is highly conscious of resources and their relation to time, and that therefore, there is an urgent need to transfer the knowledge of ‘making’ to our urban practices. Further research on this would be very useful.

Also the route of ‘Choice Architecture’, which changes the focus from consumer responsibility to changing the environment of action has a great potential for further exploring the link between urban resource flows and urban space. Urban morphology and the organisation of
public space have a great influence on how people use the city and move in it, which in turn affects matters such as lifestyle, safety, pollution levels and consumption patterns. These insights are not new. In the sixties, Jacobs (1992 (1961)) described in great detail what makes a street safe and what makes a public park popular. The work of Gehl (2004) focuses on the “life between buildings” and demonstrates how (small) changes in public space change the behaviour of people in the city. This is not because they were told to do so, but because the context in which they make choices (e.g. on how to move through the city) has changed. In other words, the ‘choice architecture’ changed. This term, which was first coined by Thaler and Sunstein (2008), is used to describe the different ways in which choices can be presented to consumers, and the impact of that presentation on consumers’ decision-making.

Applied to an urban context, the way we design, construct and operate urban systems and the way we organise urban space creates a socio-technical environment that shapes the ‘way of life’ of the citizens, how they use and move in the city, and how they procure, use and dispose of the resources they require. In behavioural change theory, Thaler and Sunstein (2008) differentiate between two systems of the human brain that generate behaviour: the ‘automatic’ system, which is uncontrolled, effortless, associative, fast, unconscious and skilled, and the ‘reflective’ system, which is controlled, effortful, deductive, slow, self-aware and rule-following. They claim that the former is far more important than the latter, which would favour shifting the focus away from facts and information towards altering the context in which people act. Questioning to what extent we can apply the idea of changing ‘choice architecture’ to urban space and urban systems to bring about a transformative change concerning resource cycles would be highly interesting? A connecting question is the role of different actors (e.g government, citizens) in this respect.

Another area where more research is needed is how we can turn the current prevailing paradigm of ‘smart cities’ and ‘smart’ ways of dealing with urban resource flows around. Sennett (2012) describes smart cities as stupefying, as systems of control (repressing) rather than enablement (empowering). They ‘close’ the city in. Now this is not a problem of the technology in itself, but the way technology is applied in social systems. Think for instance of the pre-paid water meters which are making sure that the water companies don’t have to deal with the poor people themselves. These people can just self-disconnect from the water ‘network’ when they are unable to pay and are subsequently stigmatised as ‘the disconnected’, those excluded from public services. Interestingly, these ‘excluded’ have in their need of solutions produced alternative streams of action and have found ways to re-appropriate water into the physical realm of the urbanites and integrate the biospheric water cycle into the urban political discussion. Studying such cases of struggle for resources and processes of re-appropriation of resources (often of course led by necessity), may inform new organisational processes and dynamics to resource governance in urban space, ones that are more organic, locally responsive and ‘open’. This idea to learn from places of struggle links strongly to the second main contribution of this thesis, which I will discuss in the next section.
Related to this growing phenomenon of exclusion, in her latest book ‘Expulsions’, Sassen (2014) discusses the new systemic logics she sees arising since the past two decades, in which we are not anymore talking about increasing poverty or growing inequality but we are talking about larger subterranean trends leading to radical expulsions (be it social, economic or biospheric): elementary brutalities produced by complexity, expelling everything and everyone that stands in the way of ‘corporate’ economic growth. Similar to Brenner and Schmid (2013), who plea for a new conceptualisation of the urban under the name of planetary urbanisation, Sassen pleads for the need for new tools to interpret these new planetary conditions (expulsions of people, economies, life spaces), and understand them as material moments of a more complex dynamic of larger transversal subterranean trends that cut across our familiar and well-established conceptual/historical boundaries. She argues that since the spaces of the expelled are invisible to the standard measures of our modern states and economies, they should be made conceptually visible as they are potentially the new spaces for making – making local economies, new histories, and new modes of membership. Sassen’s book reveals how the complexity of the global economy makes it hard to trace lines of responsibility for the displacements, evictions and eradications it produces – and equally hard for those who benefit from the system to feel responsible for its depredations. Exactly because of this complexity, I am wary of all the global political promises of reaching the goals (e.g. SDGs) of an equal and sustainable world. This is also why I expect that shock and necessity will be unavoidable if we are to achieve any socio-ecological transition and why places of stress and strategies of the expelled are the ones we need to start and learn from.

5.2 The conscious use of necessity for socio-ecological transformations

The second main contribution of this thesis is based on the argument that the urgent change, necessary to tackle our global wicked problems, is not likely to happen in times and places of relative comfort, but in times and places of stress. Therefore, this thesis proposes a conscious use of necessity for socio-ecological transformations.

In Chapter 2, I argued that moving from a linear to a circular resource perspective sheds a whole new light on density. While in the current linear system thinking, density might increase sustainability, by taking into account the spatial displacement of environmental costs of dense areas and by changing our system’s perspective, ‘Less becomes More’ (not to be understood as promoting urban sprawl). In this light, shrinking cities, now mostly seen as a problem, show high potential and could unexpectedly function as catalysts for change. In addition, shrinking cities are falling more and more out of the economic system, they have been ‘spit out’ or have become ‘disposable’ as some local activists claim. This at the same time means that they often have no choice than to rely on themselves and are more open to
trying out something ‘new’ (out of necessity). Thus, because of both the new handling space arising from the retreating current systems and the changed meaning of density in the light of a circular resource perspective, I argued for a more productive approach to shrinkage by activating the potential of shrinking cities to make them function as front-runners in the transition process towards a post fossil-fuel and resource-centred society. As comfort is retreating, can shrinking cities be the places where change happens first in the highly developed parts of the world?

As already mentioned in the previous section, Chapter 3 pointed to the fact that urban contexts in need of solutions have produced alternative streams of action that could trace another path to act on climate change and urban resource flows. Out of necessity, the ‘excluded’, in their struggle for the ‘right to water’, have found ways to re-appropriate water into the physical realm of the urbanites and integrate the biospheric water cycle into the urban political discussion. Similarly, we could argue for the ‘right to energy’, allowing communities to engage in re-appropriation processes for understanding, managing and producing electricity. I suggested that we can find insights for ‘Closing Cycles - Opening City’ by studying such cases of struggle for resources. Further research is thus needed on local social movements and successful cases of resources (re-)appropriation which could inform new organisational processes and dynamics to resource governance in urban space, ones that are more locally responsive and ‘open’.

Chapter 4 outlines a method for customised complex problem handling that starts from stress states in the urban system(s) and uses their initial momentum to encourage systemic change through interventions at selected pressure points. We highlighted the potential to evolve what has often been an intuitive practice, led by community or elected leaders with unique wisdom about functions and pressure points in their urban system into a more accessible strategy for shaping socio-ecological transformation in urban practice. The limit of this strategy, widely discussed in the expert workshop, is that it has so far been based on retrospective examples and practical expert knowledge. The next step will be to test the pressure-point strategy in different urban contexts to be able to make the move from retrospective to prospective examples to make its case.

The importance of this second contribution is the demonstration of the, so far non-explicit, connection between necessity and socio-ecological transformations. In the introduction I referred to Taleb’s (2012) term ‘antifragility’, which he describes as the exact opposite of ‘fragility’. Things or persons that are ‘antifragile’ actually benefit from shock. These positive responses to stress are however often ignored and inspite of the visibility of the counterevidence, the need for innovation or change is currently mostly approached from situations of comfort, safety, and predictability. These are, I argue, not able to produce enough
energy to push the necessary transformation. Abundance makes us numb and vulnerable while scarcity makes us alert and strong. Neo-liberalists have long understood the potential of crises for pushing their own agenda of free market systems. Is the same potential available to push our urban systems away from their destructive nature? The workshop discussions showed that this is quite a controversial proposal.

Since a few decades, we are however stuck in a technological and production fetishism in which even the environmental movement has become trapped. According to Zehner (2012, 163), in the 1980s and ‘90s, environmental organisations began to disengage from the dominant 1960 ideals, which entered on the earth’s limits to growth. He refers to the famous Brundtland Commission’s 1987 report, Our Common Future, which stated: “New and emerging technologies offer enormous opportunities for raising productivity and living standards, for improving health, and for conserving the natural resource base”; and signified a new overwhelming reliance on technological fixes.

From green consumerism to eco-cities, mainstream environmental strategies are trying to solve our global crises by focussing on ‘more’ technology and ‘more’ production, missing the point to take a step back and look at the basic functions that need to be provided by our urban systems, and failing to address the underlying causes of our wicked global problems. We see for instance that the answer given to food and nutrition insecurity is a single focus on increased agricultural output, even if the problem is first, often one of access than of availability and second, in great part caused by the very nature of the globalised food system. In the same way, the current answer to our energy production problems is producing more energy. Zehner (2012, 155) argues that the productionist paradigm reduces the energy problem to a contest between alternative energy technologies and conventional fossil fuels and prevents, amongst other, from looking into the negative side effects of alternative energy technologies. An obvious example is the production of biofuels, which externalities have been widely debated over the last years. Few are also questioning the effects of the Energiewende (towards all renewables) on materials. There will obviously be a need for a large increase in metal mining and a likely scenario is this will be sold as ‘development’ in parts of Africa, Asia and South-America. This smells like yet another chapter of extractivism serving globalisation, where a countries’ very few will benefit from large scale resource extraction while most (including natural ecosystems) will have to suffer the negative side effects from these, mostly foreign, mining activities. At the same time, some European countries will receive the award for achieving their ‘Energiewende’ without having to change their own consumption-centred lifestyles.

Another side effect of pitting production against production is that it effectively sidelines reduction options and non-technology alternatives, as if productivity methods are the only
choices available. Since the world of alternative energy and green technology operate in the same economic system which rewards the commoditisation of knowledge and resources for profit, it is clear that conservation and simplicity undermine consumption patterns and corporate interests (Zehner 2012, 162). This duality between ‘green’ solutions ‘for profit’ versus ‘common sense’ solutions features in all urban systems: underground concrete rain water reservoirs with electric pump system (corporate technology) versus gravity-based attic rain water storage tanks (common sense); passive solar energy strategies (age-old wisdom) versus solar panels (corporate technology); natural ventilation (age-old wisdom) versus air-tight passive houses; genetically modified seeds (patented) versus seeds from last year’s crop (not patentable); and ‘drug research (commodifiable) versus preventive health (not commodifiable). Our common sense knows which one of these choices is the ‘right’ one but we also know that as long as the underlying paradigms keep in place, the ‘other’ choice will keep coming out on top (supported by an eco-label).

The same is true for the current Habitat III process that I brought up before, which aims to define the ‘New Urban Agenda’ for the coming 20 years. There is a broad consensus on the vision of having ‘inclusive, safe, resilient and sustainable’ cities (as also formulated in Goal 11 of the Sustainable Development Goals). However, when nobody starts to seriously talk about how to re-shuffle the power relations and break down the fortresses of interests that rule our urban world, the real estate developers and multinational corporations will keep coming out on top (probably with an eco-label but re-creating closed and excluding places, treating inhabitants as customers and thus continue ‘fostering’ - to use UN language - negative social and environmental externalities). As one of the ‘unsual suspects’ of the LAB kept reminding us: ‘What about corporations?’ Getting to the above ‘vision’ is not a problem of financing nor of technology, but instead of leadership and getting priorities right. As Schellnhuber pointed out in the German Habitat Forum (June 2016): “we will transform or be transformed”, bringing in the sobering geological time scale perspective that climate scientists (as well as geologists) have on the world. In the same Forum, Clare Short interestingly pointed to the fact that the energy needed to leverage the transformation towards the shared future vision will come from the political power from underneath, from the slums and from crises which will force us to adapt; thus supporting this thesis. Also history supports this thesis and taught us that it takes the disruption of normal food supplies to reveal a city’s productive potential. Such disruptions produced necessity, which in turn sparked invention and created a political and regulatory environment that facilitated change. Necessity forced the citizens and their political leaders to re-organise their urban systems and brought back the focus to the basic functions: nutrition, shelter, mobility, indoor climate, etc. One of the interesting changes the Cuban crises brought for instance was a re-valuation of the traditional court-yard architecture for its natural ventilation and local material use. This thus goes exactly in the opposite direction of ‘more’ technology and ‘more’ production.
Instead, it goes back to the basics, back to common sense. In contrary to the current approach of ‘adding’ things to our cities, even if they are ‘green’ or ‘eco’, we need to start taking things out. Taleb (2012) calls this the ‘Via Negativa’.

To repeat the last paragraph of the prologue: “The knowledge of how to transform from stratum to membrane is stored for instance in vernacular architecture and other forgotten techniques that answered to the earths natural cycles, but most of all in the common sense of aborting consumption-centred thinking for respect and simplicity, traits that are hard to obtain without immediate pressure.” Going out from urgency to deal with the wicked global environmental problems of our era, this thesis has developed strategies for transforming complex urban systems in the condition of planetary urbanisation based on the potential leverages of shock and necessity.


The contribution of the author to the three core chapters of this thesis (Chapters 2, 3 and 4) is indicated in the following:

**Chapter 2: Resource-Centered Cities and the Opportunity of Shrinkage**
Katleen De Flander is the single author.

**Chapter 3: Closed Cycles - Open City**
Katleen De Flander is the single author.

**Chapter 4: Pressure-Point Strategy. Leverages for Urban Systemic Transformation**
Both authors jointly developed the Pressure-Point Strategy in a working paper and hosted an expert workshop at the IASS Potsdam (November 2014) to critically discuss the approach with a number of experts from both academia and practice, which led to new insights and the further development of the working paper. Katleen De Flander transformed the working paper into a scientific paper and brought in additional theoretical framings. Jeb Brugmann brought in most cases from practice, and specifically the Chicago case.
I would like to thank

my husband Juan Pablo Ayala Cortés for the many inspiring discussions that pushed my thinking and moulded this thesis;

my parents for believing in me;

my supervisors Prof. Dr.-Ing. Angela Million and Prof. Ir. Ronald Rovers for their support and advice when I needed it;

Jeb Brugmann for the pleasure of developing the Pressure-Point Strategy together;

the Institute for Advanced Sustainability Studies Potsdam and especially Prof. Dr. Dr. Klaus Töpfer for giving me the freedom and support to develop my research at the IASS;

and the fantastic people that participated with great enthusiasm and knowledge in the expert workshops and public debates.
Appendix 1

Expert Workshop
Closed Cycles - Open City

Potsdam, 7 December 2012
IASS Potsdam, Berliner Strasse 130, 14467 Potsdam
**AGENDA**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
<th>Presentation/Remarks</th>
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<tbody>
<tr>
<td>09.00–09.15</td>
<td>Welcome</td>
<td>Prof. Klaus Töpfer and Katleen De Flander</td>
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<tr>
<td>09.15–11.00</td>
<td><strong>Closed-Cycles Open City - Urban Systems Transitions in the Anthropocene</strong></td>
<td>Katleen De Flander</td>
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<tr>
<td>20 min</td>
<td>Closed-Cycles Open City. Urban Systems Transitions in the Anthropocene. ‘Approach’ and ‘Closed Resource Cycles as breeding grounds of the Open City’</td>
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<tr>
<td>10-15 min</td>
<td>Jeb Brugmann - The Next Practice</td>
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<td>‘Establishing a new practice’ (vis a vis the technical/design professions) and ‘establishing a new category of performance’ (vis as vis the property industry) and the role that measurement plays in this</td>
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<tr>
<td>Discussion</td>
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<tr>
<td>11.00–11.15</td>
<td>Coffee-Break</td>
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<tr>
<td>11.15–13.00</td>
<td><strong>Scales and Boundaries – Measurement</strong></td>
<td>Katleen De Flander</td>
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<tr>
<td>5 min</td>
<td>Scales and Boundaries</td>
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<tr>
<td>10-15 min</td>
<td>Xuemei Bai - Australian National University</td>
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<tr>
<td>Discussion</td>
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<td></td>
<td>- Do we need to measure?</td>
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<td></td>
<td></td>
<td></td>
<td>- Scales and Boundaries</td>
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<td>- Urban-Rural (or non-urban) relation</td>
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<tr>
<td>13.00–14.00</td>
<td>Lunch</td>
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<tr>
<td>14.00–15.45</td>
<td><strong>Urban Systems Transitions - Re-organisation and Shock</strong></td>
<td>Katleen De Flander</td>
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<tr>
<td>5 min</td>
<td>Stephen Kovats – r0g_agency for open culture and critical transformation, Berlin (@intertwilight) #OSJUBA. Juba. The world’s first Open Source City?</td>
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<td>10 min</td>
<td>Join a special #OSJUBA / FOSSFA Tweet-up on ao.: &quot;crowdsourcing and open access to data for better transparency in government and resource management&quot; (tags: #OSJUBA, #OpenSF, #MMJUBA, #FOSSF, #Africa)</td>
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<tr>
<td>10-15 min</td>
<td>Ronald Rovers - Zuyd University</td>
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<tr>
<td>10 min</td>
<td>Katleen De Flander</td>
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<tr>
<td>Discussion</td>
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<tr>
<td>15.45–16.00</td>
<td>Coffee-Break</td>
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<tr>
<td>16.00–17.00</td>
<td>Concluding Round of Discussion</td>
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<td></td>
<td>Dinner in „Il Teatro“, Schiffbauergasse 12, Potsdam</td>
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Appendix 2

Expert Workshop
Urban Pressure Point Method

IASS Potsdam, Berliner Strasse 130, 14467 Potsdam
IASS Workshop:
Pressure Point Method – Leverages for Urban Transformation

Agenda:

Day 1 – Thursday, 20 November

<table>
<thead>
<tr>
<th>TIME</th>
<th>CONTENT</th>
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<tbody>
<tr>
<td>13:00 - 14:00</td>
<td>Arrival and Lunch served at IASS</td>
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<tr>
<td>14:00 - 16:00</td>
<td>Session 1: Intro</td>
<td>- Kathleen De Flander</td>
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<td></td>
<td>- Welcome and introductions, purpose and expectations</td>
<td>- Jeb Brugmann</td>
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<td></td>
<td>- Urban Pressure Point Method: key conceptual and practice issues</td>
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<td></td>
<td>- Discussion Round 1: Urban system transformations through “places’ under pressure</td>
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<tr>
<td>16:00 - 16:30</td>
<td>Coffee Break</td>
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<tr>
<td>16:30 - 18:30</td>
<td>Session 2: Stories from Practice</td>
<td>- Hans Mönnighoff</td>
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<td></td>
<td>- Storytelling: tell a story from your own practical urban experience relating an urban (systems) transformation to (a) particular place-based pressure(s)</td>
<td>- Klaus Hoppe</td>
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<td></td>
<td>- Discussion Round 2: Story harvesting</td>
<td>- Stephen Kovats</td>
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<td>- Ronald Rovers</td>
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<tr>
<td>19:00</td>
<td>Dinner ‘Il Teatro’</td>
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Day 2 – Friday, 21 November

Mini Design Charrette

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<tr>
<th>TIME</th>
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<tbody>
<tr>
<td>09:30 - 12:00</td>
<td><strong>Session 3: Mapping and Understanding</strong>&lt;br&gt;- Pressure points and Pressure Point Analysis&lt;br&gt;- Presentations&lt;br&gt;- <strong>Discussion Round 3:</strong> “What are the places and/or communities in the city that have the greatest current and latent momentum towards the desired change?”&lt;br&gt;*Coffee served in between</td>
<td>- Breakout groups</td>
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<tr>
<td>12:00 - 13:00</td>
<td>Lunch served at IASS</td>
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<tr>
<td>13:00 - 15:30</td>
<td><strong>Session 4: Designing the Intravention Set</strong>&lt;br&gt;- Design the intravention set&lt;br&gt;- Presentations&lt;br&gt;- <strong>Discussion Round 4:</strong> “What are the elements of an intravention that can release the maximum potential net force at a Pressure Point towards the desired change?”&lt;br&gt;*Coffee served in between</td>
<td>- Breakout groups</td>
</tr>
<tr>
<td>15:30 - 16:00</td>
<td>Coffee Break</td>
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<tr>
<td>16:00 - 17:00</td>
<td><strong>Session 5: Harvesting</strong>&lt;br&gt;- Results workshop&lt;br&gt;- Concluding round&lt;br&gt;- Recommendations &amp; next steps?</td>
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<tr>
<td>17:00</td>
<td><strong>Farewell drink at IASS</strong></td>
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Public Debate
Critical Dialogue.01: Overriding the Urban/Non-Urban Divide

More info, images, videos and report available here:
http://criticalurbanagenda.de/overriding-the-urban-non-urban-divide

Berlin, 20 April 2015.
Scandic Hotel Berlin, Potsdamer Platz, 10963 Berlin
CRITICAL DIALOGUES SERIES
The IASS is initiating and facilitating a Series of Critical Dialogues on the practicalities of implementing the New Urban Agenda – and its possible constraints – in the political context of Habitat III (UN Conference on Housing and Sustainable Urban Development, 2016). Each of these Public Dialogues addresses a topic of central importance to Habitat III from 1) an unconventional angle and 2) an ‘on the ground’ perspective.

The New Urban Agenda ‘on the ground’

CRITICAL DIALOGUES SERIES

1

Overriding the URBAN/ NON-URBAN DIVIDE

This first dialogue takes an unconventional angle by addressing new approaches that transcend the urban age discussion (e.g. 50% live in cities) and break with the idea of the bounded city in which the urban and the non-urban are opposed and spaces are classified, according to their form, on the urban-rural continuum.

What if, as Brenner and Schmid’s critical urban theory on planetary urbanisation suggests, the putative non-urban is internalised in the theory of urbanisation and we no longer talk about form but about processes of concentrated and extended urbanisation? What does this shift mean when we address resource flows, food security and inequality issues?

The practical perspectives from Chennai, Bogota and Jakarta ground the debate in reality and form the basis of a critical discussion on the ‘New Urban Agenda’ and its ‘Urban-Rural Linkages’.

With keynotes from

Dr Pushpa Arabindoo
Lecturer in geography and urban design, University College London; co-director UCL Urban Laboratory; editor (CITY Journal, Geography)
Provincialising planetary urbanisation: situating Chennai between its region and the global

Carolina Chica Builes
Director of regional, national and international integration
Secretariat of Planning - Bogotá
Special Administrative Planning Region - Central Region. A case of new territorial arrangements that seek to overcome the urban-rural dichotomy

Prof. Dr AbdouMaliq Simone
Research professor, Max Planck Institute for Social and Ethnic Diversity and visiting professor of Sociology at Goldsmiths College, University of London
When does the urban come, does it go, or does it simply change course and form, all of the time? Reflections from Jakarta

Introduced by
Katleen De Flander
Institute for Advanced Sustainability Studies, Potsdam

Framed and moderated by
Dr Pieter de Vries
Senior lecturer and researcher, Chairgroup of Sociology of Development and Change, Wageningen University

Critical Public Debate
The event will be in English. Admission is free upon registration at http://iass-potsdam.de/dialogues

Monday 20 April 2015, 14:00 – 18:00
Scandic Hotel Berlin
Potsdamer Platz,
Gabriele-Tergit-Promenade 19, 10963 Berlin
Summary of 1.3/Dialogue Session
The new urban agenda ‘on the ground’ – overriding the urban/non-urban divide

Global Soil Week 2015
Monday, 20 April
1.3 The new urban agenda ‘on the ground’ – overriding the urban/non-urban divide

**Dialogue Session**

**Date**
Monday, 20 April 2015

**Rapporteur**
Katleen De Flander – IASS

**Session Hosts**
IASS – Institute for Advanced Sustainability Studies (Germany)
ANCB – The Aedes Metropolitan Laboratory (Germany)

This session was open to the wider public (upon registration)
31 GSW participants and 85 external participants registered for this session

**Session Description**

**Critical Dialogues Series**

This session is the first in a series of critical dialogues, which the IASS is initiating and facilitating on the practicalities of implementing the new urban agenda – and its possible constraints – in the political context of Habitat III (UN Conference on Housing and Sustainable Urban Development, 2016). Each of these public dialogues addresses a topic of central importance to Habitat III from 1) an unconventional angle and 2) an ‘on the ground’ perspective. The series aims to not only involve ‘the usual suspects’ but particularly brings different expertise into the debate.

**Dialogue.01: Overriding the Urban/Non-Urban Divide**

This first dialogue takes an unconventional angle by addressing new approaches that transcend the urban age discussion (e.g. 50 % live in cities) and break with the idea of the bounded city in which the urban and the non-urban are opposed and spaces are classified, according to their form, on the urban-rural continuum. What if, as Brenner and Schmid’s critical urban theory on planetary urbanisation suggests, the putative non-urban is internalised in the theory of urbanization and we no longer talk about form but about processes of concentrated and extended urbanisation? What does this shift mean when we address resource flows, food security and inequality issues? The practical perspectives from Chennai, Bogota and Jakarta ground the debate in reality and form the basis of a critical discussion on the ‘New Urban Agenda’ and its ‘Urban-Rural Linkages’.
# Programme

14.00  
**Welcome and short intro**  
Katleen De Flander, IASS (Germany), Áine Ryan, ANCB (Germany)

14.10  
**Keynote: Provincialising planetary urbanisation: situating Chennai between its region and the global**  
Pushpa Arabindoo, UCL Urban Laboratory, University College London (UK)

14.35  
**Keynote: Special Administrative Planning Region – Central Region. A case of new territorial arrangements that seek to overcome the urban-rural dichotomy**  
Carolina Chica Builes, Secretariat of Planning, Bogotá (Colombia)

15.00  
**Keynote: When does the urban come, does it go, or does it simply change course and form, all of the time? Reflections from Jakarta**  
AbdouMaliq Simone, Max Planck Institute for Social and Ethnic Diversity, (Germany) and Goldsmiths College, University of London (UK)

15.25  
**Coffee Break**

15.45  
**Critical debate: The new urban agenda ‘on the ground’ – overriding the urban/non-urban divide**

**Critical framing and moderation:** Pieter de Vries, Wageningen University (The Netherlands)

Pushpa Arabindoo, UCL Urban Laboratory, University College London (UK)
Carolina Chica Builes, Secretariat of Planning, Bogotá (Colombia)
AbdouMaliq Simone, Max Planck Institute for Social and Ethnic Diversity, (Germany) and Goldsmiths College, University of London (UK)

17.05  
**Informal Discussions**

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**Video documentation**

Please find the video documentation of this session here:

http://www.anca.de/sixcms/detail.php?id=15509467#VY7nos59021
Dialogue Session

Summary

Katleen De Flander (IASS) opened the session by introducing the Dialogues Series and its intentional critical approach of the Habitat III process, followed by a brief intro to the planetary urbanisation theory. Áine Ryan (ANCB) welcomed the public from the ANCB side.

Pushpa Arabindoo (UCL) reflected on the planetary urbanisation discourse from her 13 years of ethnographic research and experience in the Indian City of Chennai. What happens when we post-colonialize it? What happens when we try to provincialize planetary urbanisation? She reacts on 3 core arguments from Brenner and Schmid: 1) the urban as a theoretical construct; 2) the spatiality/scale of the urban and 3) the urban can not be reduced to a category of practice.

Some extracts:

- In the Indian context, the driving analytical tool of the urban is still the Census (every 10 years) and there is a value to the numbers here:
  - It helps to grasp India’s nature of urbanisation in the last 2 decades (in terms of the speed of urbanisation and in terms of apocalyptic scenarios that are often portrayed).
  - It shows the need to focus on the small towns as much as on the metropolises.
  - It forces us to think what is the rural-urban divide. For every city, the story is different. It is often more a question of governance than the theoretical question of what is urban and what is non-urban.

- Is the right to the city still tenable when the urban condition is planetary and the geographies of the political are being so radically rearranged? An obvious conclusion to draw from this analysis would be to retreat from the right to the city altogether…. But instead, it stands as a challenge to produce new forms of critical urban theory and political practice that can help promote more democratic, socially just, and environmentally sane ways of appropriating, managing, and developing the common resources of our rapidly urbanizing planet. In Chennai, people do fight for the right to the city (the example of slum activists fighting against evictions was given).

Carolina Chica Builes (Secretariat of Planning, Bogota) introduced a practical case of new territorial arrangements that seek to overcome the urban-rural dichotomy: Special Administrative Planning Region – Central Region, an institutional mechanism of territorial-regional management and coordination (created in September 2014).

Some extracts:

- The regions (called ‘departments’ in Colombia) agreed on the following 5 lines of work: 1) Environmental sustainability and risk management (basic aspect of this is water, highly vulnerable to climate change and pollution); 2) transport infrastructure, logistics, public services; 3) Competitiveness and international outreach; 4) Food security and rural economy and 5) Governance and good government (functional network of cities integrated with its rural area in order to assure a de-concentrated model)

- The model is based on the recognition that city sustainability depends exclusively on the good management of its interdependent close links with its urban and non-urban immediate surroundings. The city draws 75% of its water from the Paramo systems (part of 2 different departments), 77% of fresh food comes from 300km radius around Bogota.
This is above all a huge political achievement: the Central Region is a new figure of supra-local government in Colombia with administrative and financial autonomy.

This is the first legally constituted region in Colombia, others are interested in following

Bogota is providing 75% of the financial resources of the Central Region, the other 4 departments bring the other 25%

The decisions of the general council, affect the 4 regions and Bogota directly. So far, the decision making process was consensus-based.

There is now a political conflict with the national government, which feels threatened by this new institutionalised Region.

**AbdouMaliq Simone (Max Planck Institute)** gave a passionate talk exposing the heterogeneity and multiplicity of Jakarta, celebrating urban creativity and plurality and exposing the urban as a force in itself. The City as a fragile, inconsistent and precarious area but at the same a place where people experiment, construct lives, etc.

**Some extracts:**

- Jakarta has many different kinds of interfaces. There are interfaces between the core and the periphery but just as well within the periphery and within the core. These interfaces are often not looked at in terms of their generativity or instability.

- Jakarta often grew on the fact of the heterogeneity of its built environment. Upscaled built environments sometimes provide cover for the poor to live in contiguous and proximate relations. We need to know more about the relationship of these interfaces, what are the dynamics? How do we describe them so we don’t jump to conclusions?

- The relationship between the intensive and extensive is not a matter of one ruling out the other, of an intersection between the top-down and the ground-up.

- The gradation of space into clearly delineated ownership and functions can often impede the elaboration of collaborative work. The only way that Jakarta works is the very way that the Worldbank criticizes Jakarta for not working, which is that there is no urban land. 1% of all of Jakarta land is held in free title. That ambiguity of land status enables the kind of platform that generates the plurality of different kinds of collective possibilities that residents can turn to in order to keep costs down, to enable themselves to keep some kinds of place in the city.

- Built environments become the objects of reshaping so they might mediate the provisioning of various affordances – to act alternatively as residences, markets, community centres, workshops, storage spaces, retail outlets, and social hubs.

- We need to inhabit urban life as a paradox: nothing is completely ruled out or controlled but at the same time, not everything is possible
Dialogue Session

Discussion:

After a short break Pieter de Vries (Wageningen University) brought the introduction and the 3 very different keynotes together.

Some extracts:

- These ways of creating consensuses (as we heard this morning: we have to be united as humanity in order to deal with the crises of humanity) are quite depoliticising, a kind of post-politics.
- What we see is the creation of very strong divides at the planetary level, this policy talk is often used in order to make possible the agendas of very big business interests.
- Expulsions are very important, it is about the emergence of new categories at the global level (the part of no part (author: Rancière), people with wasted lives, think about the boat people in the Mediterranean).
- If we are going to talk about global democracy, it is more about disagreeing than about agreeing with each other.
- Planning always assumes the idea of stability. What to do with a city where people are continuously moving around. Can we make a photograph of a situation that is always unstable, inconsistent? Insurgent planning. Planning in places that are to outcome of auto construction. City planning becomes and intervention in the interventions of people themselves. What is important is the political programs that go together with it.
- Proposes to frame the discussion around Urban commons (following Hardt and Negri, David Harvey).

Extracts from the discussion, question/points raised:

What role do you see at the UN level? (conflict between global and local level)

- Carolina: facilitate coordination between the local agents on the ground, to mediate on our negotiations. Local governments are gaining power, they can make decisions and decide not to follow the directions of the national government. Communities are getting empowered (to stop mining, ...), they are getting more involved in public issues.

- Pushpa: Worldbank was influencing strongly in Chennai. First through Master plans (very Western view). Next came project based poverty eradication. More recently (Washington consensus) public –private partnerships. Consultants flying in showing Miami waterfronts in Chennai (unrealistic policy models). In terms of participatory planning (remains a lip service), all documents are in English (not translated in local language) and meetings are held in 5-star hotels, excluding a large majority of the common population. Jargon is still techno-expert driven. UN Sust. Cities programme influence not clear.

- AbdouMaliq: some decades ago there were more textures of between UNDP, multi-lateral agencies, ... that could be used for more experimentation at the local level. These have more and more disappeared, there is an increased consolidation. You have to enter into that global game somehow, you have no choice. These discourses that are elaborated there are used on a local level e.g. to give coverage, to excuse themselves etc.
Connection between the presentations and Planetary Urbanisation = have to do with operational connections rather than urban form. If you take these linkages (and not form) as an approach to understanding development, what is the next step for planning? We have super tools and data (GIS) at the macro scale BUT we have so much research in the ground but little data that we can work with in planning. How to make the connection between ethnography and planetary urbanisation in terms of resources and tools for urban planning and design?

- **Pushpa**: every city has a history, bring different social science methodologies and ethnographies into the planning process to show that there is no such thing as a ‘blank slate’. We do not need sophisticated tools necessary, we need to use unsophisticated methods but they can be very powerful. This is an answer as to how you can plan the urban as a process rather than urban as a category or urban as a product.

- **Áine**: Could this be a recommendation for Habitat III: start to collect data that is intangible; on things that you can’t see from satellites. It is difficult and time-consuming and expensive to collect this kind of data, and because of this, they often fall out of the conversations. Because of this, it almost should be a mandate to collect cultural data.

- **Pushpa**: if you scale in and out constantly, it should not be such a burdensome task. Urban design and planning has forgotten its elasticity. We have to recover this. We should not be preoccupied with the visualisation tools we have. (also problem with glossy images of planetary urbanisation theory)

- **AbdouMaliq**: 35% of fruits and vegetables in Jakarta comes from and auto-constructed night market (the next morning there are almost no traces that it existed) with no authority that says how this complex system is going to work. Intricate negotiations amongst many actors. Works extremely well and effectively. Meanwhile, the official municipal markets are empty. Why not take some of these municipal employees and let them find out how this auto-constructed market actually works. What are the details? Use this as a basis to think through new elaborations of policy and municipal governance. It is a totally different kind of planning.

- **Pieter**: planning brings us to power

**Global City has not been mentioned**

Isn’t it necessary to reclaim the city as a social space and not as an economic space? Educate the planners and politicians to administrate the city according to this.

- **Carolina**: goal of Bogota (and all changes go according to this) is for guaranteeing the city’s sustainability. That is why the focus is not on the global markets but on the regional structure of market. Not only seen as an economic markets but also seen as ecosystem services. We are a global city but beyond that we have to guarantee the conditions for our communities to survive = different form of planning. Not global but regional!

- **Pushpa**: no Dubaisation of the center in Chennai, it shows alternatives of the multiple city, not the usual template of urbanism as Mumbai, Signapore, ...., politicians will not use the term global city (rather world-class city). We need to pay equal attention to unexceptionalism.

**Soils**

- **Carolina**: Bogota has strong regulations on quality of soil and its uses to preserve certain soils for agricultural use. Legal restrictions to urbanisation (very difficult because in the end the market rules)

- **Pushpa**: you can do a scientific classification of soil types but what does it lead to? It has very limited imagination. You have to rethink in terms of the larger ecology and nature question in the urban context. Rethinking urban nature (project) brings issues of soil, nature, ..... in, but strips it from the scientific straightjacketing.
Final Round

**Pieter:** to what extend does it matter to engage with policies and planning and with these big Habitat shows? Creation of dualism, binaries, ... One of the challenges is how to protect the kinds of commons such as the autoconstructed market in Jakarta.

**AbdouMaliq:** How to use the extending of metropolitan boundaries and scales of governance and planning and coordination as possible mechanisms to facilitate the possibility of redistribution (of economic resources and opportunities) in a world where otherwise redistribution is not on the table.

**Carolina:** We have to think in compensation, about equation mechanisms! The urban/non-urban dichotomy is no longer valid. Urban exists because there is a rural support to it. You cannot refer development only to the urban, we have to switch the idea to compensation mechanisms between the urban and the non-urban in order to bring development conditions to those scenarios. The new policies on development should contemplate the exchange of experiences regarding compensation mechanisms. (compensation to those municipalities which protect water, preserve the soils for agricultural production, ...)

**Pushpa:** we should not be completely dismissive of what UN Habitat is trying to do. They are not naive. They are recognising the urban - rural continuum (and not their dichotomy). What they are missing is a theoretical sophistication. Planetary urbanisation is however the other extreme, where everything is seen as urban, which cannot be absorbed in the current political processes. We need a lot of definitional clarity at the moment. In India, the urban is understood only in terms of urban agglomerations and cities, there is nothing else. How do we define the other landscapes?

Follow-up

This session was the first in a Series of Critical Dialogues, please follow the further development of the Series and its outcomes here:


and in the near future here:

[www.criticalurbanagenda.de](http://www.criticalurbanagenda.de)
Appendix 4

Expert Workshop
Critical Dialogue.02:
LAB2: Different Urbanisations

More info, images, video and publication available here:
http://criticalurbanagenda.de/different-urbanisations

Berlin, 14-18 September 2015.
Spreefeld Haus 3, 10179 Berlin.

DOI: http://doi.org/10.2312/iass.2015.030 (open access)

http://criticalurbanagenda.de/different-urbanisations

http://criticalurbanagenda.de/different-urbanisations
Appendix 5

Public Debate
Critical Dialogue.02:
Different Urbanisations

More info, images and videos available here:
http://criticalurbanagenda.de/different-urbanisations

Berlin, 18 September 2015, 18:30h
ANCB - Aedes Network Campus Berlin Christinenstr. 18-19, 10119 Berlin
DIFFERENT URBANISATIONS

This dialogue focuses on the role and limits of import/export of knowledge, technology and urbanisation patterns between different regions of the world, and questions how ‘culturally different’ the processes of urbanisation are/should be.

Africa is at the beginning of a major wave of urbanisation and is theoretically still in the position to take decisions on how the African Urban Transition will take shape. But what happens when we export European or Asian urbanisation patterns and technologies to African cities (which is already happening)? Which approaches can be shared (imported) and which cannot? What influence do ‘different urbanisations’ have on the resulting urban resource flows?

With keynotes from

Susan Parneil
African Centre for Cities; Professor of Environmental and Geographical Sciences, University of Cape Town, South Africa

Serge Salat
President Urban Morphology and Complex Systems Institute, Paris, France

Ricardo Ruiz Freire
InCiti – Federal University of Pernambuco, Secologias and LABCEUS, Recife, Brasil

Introduction by

Katieen De Flander
Institute for Advanced Sustainability Studies, Potsdam

Áine Ryan
ANCB - Aedes Metropolitan Laboratory, Berlin

Commentator:

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Leader, Regional and Metropolitan Planning Unit, UN-Habitat, Nairobi, Kenya

Framed and moderated by

Astrid Ley
Director, Chair of International Urbanism, Stuttgart University

Critical Public Debate

Friday 18 September 2015, 18:30

ANCB - Aedes Network Campus Berlin
Christinenstr. 18-19, 10119 Berlin

criticalurbanagenda.com
Appendix 6

Operationalising Holistic Urban Concepts

Katleen De Flander

This paper has been published as:


The final publication is available at Springer via:
http://doi.org/10.1007/s13412-014-0193-9