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Time for sustainability? Exploring time, the city and non-humans

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Abstract

This paper argues that the modernist imperative of making time ever more public and connected not only affects humans but also the ways in which we attempt to manage the non-human world. The imposition of anthropocentric timescales is argued to run counter to the pursuit of more sustainable urban development. The paper draws on Nowotny's (1994) use of eigenzeit ('proper' or subjective time) to explore postmodern approaches to time, which resist the hegemonic imposition of clock time and the modernist drive for ever greater acceleration within urban life. Synthesising insights from surface water management, conservation planning and building design, the paper illustrates how the imposition of anthropocentric assumptions about time hamper urban sustainability, and suggests ways in which to open the planning and design process up to accommodate other times.

Keywords

Sustainability, time, eigenzeit, non-humans, urban geography

Introduction

Walter Ruttman's 1927 movie *Berlin: symphony of a city* offers a vision of the modern metropolis caught in a series of coordinated rhythmic flows. Trains, motor vehicles and pedestrians, wove in and around the city with an emphasis on ever faster connection. The city designs of contemporaneous modern architects like Le Corbusier envisaged public spaces flowing between and underneath buildings lifted on pilotis (stilts) and giant elevated roads connecting every part of the city. These visions continued to influence the planning of cities, arguably, until the very recent past.[1] Anyone who ever experienced Basil Spence's Hutchesontown C in Glasgow's Gorballs or Birmingham's inner ring road (both now demolished) can testify that the reality was often far less appealing than the vision.

The association of cities and speed – rapid transit, rapid communication, rapid innovation etc. – is deeply engrained in western culture. Recently, however, there has been resistance against the pressure to move ever faster and consume ever more material brought from afar. This keys into attempts to make cities more sustainable, in contrast to the unbridled, Moloch-like, metropolis of modernity.[2] In spite of this,

notions of speed remain inextricably linked to how we understand urbanism, particularly in the trope of the 24-hour city enmeshed in the rapid flows of international capitalism.

The pursuit of sustainability requires that humans work *with* the natural environment rather than trying to dominate it, yet we argue that our conception of urban *time* remains fundamentally anthropocentric and that we need to take more account of non-human rhythms within the city if we are serious about sustainable urbanism[3].

First this paper explores approaches to time in social theory to shed light on the implicit understandings of time that inform sustainability. We then bring together three case studies of non-humans in the city – sustainable drainage, urban conservation planning and building design – to explore ways in which the pursuit of a sustainable city brings with it the need to conceptualise urban time differently. Synthesising the insights taken from these examples, the paper opens up a discussion about the need to conceptualise urban space as a series of rhythms, some overlapping, some discreet, which challenge the vision of a city as single monstrous flow.

Non-humans and the city

Academic work on non-humans in the city has flourished in the past decade,[4] in part as a reaction to the rather embarrassing neglect of nature in urban contexts (in a systemic sense, at least) that had effectively reproduced a cultural blind spot within the social and environmental sciences.[5] When the Western world embraced sustainable development as its master frame for environmental policy in the early 1990s and policymakers began to consider environmental challenges in urban areas, this blind spot quickly became apparent. Before moving on to discuss the temporal aspects of non-humans in the city, it is worth outlining the social scientific literature on non-humans in the city, much of which has come out of human geography, and much of which has borrowed from wider theoretical trends within the continental social sciences.

Three related literatures can be identified that deal with non-humans in the city: urban political ecology and metabolism; the city as cyborg, and what, for want of a better term, can be called post-structural approaches. Rather than providing any kind of comprehensive review of these bodies of work, we simply want to highlight common themes between them that suggest how theories of time might fruitfully be used to think about questions of urban nature and how they relate to sustainability.

Broadly drawing on approaches to resource use and management, urban political ecology explores how urban natures are appropriated by and for the dominant groups in society and the impacts this has upon disadvantaged groups.[6] In this sense it is a re-working of political economy with a heavy emphasis on the ways in which environments are transformed by political and economic systems. In terms of sustainability, political ecology becomes a question of power – who has access to the control of resources like water and clean air.[7] While this work has been criticised for losing any distinct notion of 'ecology',[8] its emphasis on transformation has been developed into theories of 'urban metabolism', which explicitly cast urbanisation as a process of socio-material transformation.[9] The idea of metabolism systematises the political ecology critique by casting the entire politico-economic system as a motor of socio-environmental change, and asking what system might produce more ecologically and socially desirable forms of urbanisation. Both political ecology and urban metabolism have as their goal more just and environmentally friendly modes of urbanisation.

The cyborg literature represents another attempt to break down the idea of the city as somehow separate from its inhabitants. Drawing on work on techno-science,[10] it is suggested that cities are themselves cyborgs – conjunctions between 'the body and ever more sophisticated assemblages of technological networks'.[11] This conceptualisation of the city as a composite 'thing' and 'being' problematises the notion of agency itself, and destabilises the idea that there is a single, linear form of progress. Resonating with political ecology (and, indeed, tentatively labelling itself as neo-Marxian) the practical question then becomes how to construct 'autonomous spaces' (*ibid*) within which more socially and environmentally desirable conceptions of the city can take shape.

Poststructural approaches resonate with metabolic and cyborg approaches in that they also reject clear distinctions between cities and nature, humans and non-humans, and bodies and behaviours. Drawing broadly on the insights of Actor Network Theory, these approaches seek to make space for non-humans to enter into a 'parliament of things', which seeks to radically undermine the anthropocentrism of modern decision-making procedures.[12] Work on urban nature has endeavoured to allow non-humans to 'act' in various contexts by pursuing their lived spaces, from the smell of water vole faeces to the transitory character of brownfield ecologies, advocating a 'convivial' city life that makes space for other lives.[13]

These approaches have provided powerful ways of understanding cities - as techno-natural artefacts, socio-environmental metabolisms and hybrids – and they all turn in some way to prescribe the creation of spaces in the city in which non-humans and humans can be remade. But in practice they perhaps underestimate the degree to which dominant conceptualisations remain wedded to dualisms and the segregation of city and nature in space. To paraphrase Castree and MacMillans' pithy observation, most of the world continues to behave as if nature and society are largely separate categories despite the theoretical insights of academics.[14] These entrenched dualisms translate first and foremost into a spatial politics or segregation between humans and non-humans. Rather than asking how we can create space for non-humans and new ways of living with them in the city, should we instead try and create time for them?

This might seem like a strange or even dangerous move, given that geographers have spent twenty years or more struggling to 'make space as open as time' within theoretical discourse, rescuing space as a meaningful category from its minor role as inert backdrop against which time unfolds.[15] But time commands closer consideration within the context of sustainability for two reasons. First, while it is a notoriously slippery term, sustainability is the term with which the 'real world' continues to work.[16] The goal of sustaining is to continue through time, and although this blunt definition is easily criticised, it indicates that time is fundamental to sustainability and peoples' understandings of it. Indeed, one of the reasons critiquing sustainability is the theoretical equivalent of shooting fish in a barrel is that it is an applied concept; one which policy makers, planners and communities (amongst many other non-academic groups) grapple with and use every day.[17] In order to improve

cities, work on urban natures needs to speak to the day-to-day practicalities of making urban places more sustainable. Time is a valuable conceptual commodity in this sense - it is easily understood.

Second, while it is almost a truism within geography to say that time and space are interrelated, work on urban natures has tended to work towards this problematic from within a spatial register. Although there are very good reasons why this should be, this tendency nevertheless neglects a number of valuable theoretical resources concerning time and the city that can be brought to bear upon questions of urban nature. This paper explores some of these resources in order to complement the existing literature on non-humans in the city.

Time, space, speed

There is an uneasy relationship between time and space which scholars have attempted to unpick through a number of theoretical lenses. Janelle's early work on space-time convergence looked at the role of technical change in transport technology, in reducing the time taken to travel between different locations, effectively bringing spaces closer together.[18] Harvey refined this into the concept of space-time compression which gave these ideas an overtly political edge.[19] He argued that the capitalist project the attempts to 'annihilate' space in order to further advance production and accumulation. This compression is argued to be particularly threatening to the lifeworlds of communities and individuals, as the constant compression of spatial boundaries brings in new influences which undermine traditional ways of life.

Zygmunt Bauman has identified a threefold typology to examine the evolving relationship between space and time: wetware, hardware and software.[20] The pre-history of time was a situation where time and space were fixed by the capacity of 'wetware' bodies (i.e. whether king or peasant, it was impossible to traverse space faster than could be managed by human- or animal-based locomotion). During the period he identifies as heavy modernity, new machinery ('hardware') changed the relationship between space and time where those with sufficient resources could travel farther in a shorter time than those without. The transition into the contemporary

situation of 'light modernity' has subsequently produced a new 'software' world, with distance irrelevant and communication all but instantaneous. In the wetware situation, time and space were intimately linked since their relationship was fixed by the capacity of bodies. The hardware situation broke that link with time becoming a highly regularised marker in a varying relation to space. Software brings us back to a relationship more akin pre-history, where the relationship between time and space once again becomes fixed, though now through near instantaneous transmission across space. Bauman makes essentially the same point as Harvey in arguing that light modernity brings with it a world based more than ever on transience and a lack of roots.

Acceleration, a key trope of modernity, is a common thread among commentators discussing time and space, though few match the bombastic pessimism of Paul Virilio. The Cassandra of modernism, Virilio's vision of hypermodernity is heavily influenced by growing up in occupied France and seeing the destruction wrought on his home country. For Virilio, modernity is a period of accelerated time of ever more rapid communication and destruction brought on by technological innovation.[21] Dromology, the science of time, therefore fundamentally underpins how Virilio perceives modern society, a view most famously expressed in *Speed and Politics*:

> In fact, there was no "industrial revolution," but only a "dromocratic revolution"; there is no democracy, only dromocracy; there is no strategy, only dromology.[22]

Somewhat like Harvey seeing time as the engine of capitalist accumulation, Virilio sees industrialisation almost as a byproduct of the drive to speed up the world.

Virilio claims that there will be no pause in the pursuit of ever greater speed until a 'generalized accident' – an ecological disaster – takes place.[23] Indeed, in *Polar Inertia* he even goes so far as to claim that speed demonstrates the '*old age of the world*' [original emphasis], indicating 'irreversible atrophy' presaging ecological collapse.[24] For Virilio then, the temporal acceleration of (hyper)modernity is leading humanity to disaster. While his writing can be accused of bombast, the idea of techno-science no longer offering the answers to humanity's problems has a great deal of resonance, particularly among those looking for ecological sustainability.

What is clear from these writings is the emphasis on life speeding up over time. Massey's critique of this kind of position is that this tends to equate 'time' with a form of linear progress – even if that progress is toward destruction.[25] Space/place in effect become the somewhat backward actors, the barriers for capitalism to overcome, while attempts to resist the annihilation of space and associated cultural distinctiveness appear reactionary. The underemphasis of space is problematic. Bauman's vision of light modernity ignores the essential *materiality* of urban forms, which show no signs of being annihilated by this coming together of space and time in a software world.[26] Furthermore, as Nowotny has commented, this destruction of space by time is not evenly spatially distributed, with countries in the developing world in particular lacking the necessary infrastructure to bring this about.[27] This kind of conceptualisation is also somewhat anthropocentric. The emphasis on linearity and progress underplays the rhythmic and cyclical elements to time which are of particular importance when considering the ecological. Similarly the emphasis on ever more instantaneous communication has less relevance to those non-human actors which still operate within the wetware paradigm.

Time and non-humans

The idea that different actors, both human and non-human, operate on different timescales is fundamental to Hägerstrand's conceptualisation of time geography. The Research Group on Human Geographic Process and Systems Analysis was formed at the University of Lund in 1966 and, partly as a consequence of receiving much of its funding from the Swedish government, time geography became quite closely associated with practical issues of regional development, urbanisation and other physical planning policies.[28] We need to distinguish, however, between time geography as an applied technique and time geography as a philosophical approach.[29] The most striking manifestation of the technique comes through time geography diagrams, three dimensional graphs, which plot an individual's movement through space on the x and y axes and the progression of time on the z axis. Thus, for example, when an individual pauses in a particular location, the line of the graph points straight upward, while the more rapid the movement between locations, the more shallow the upward slope on a line moving across the x and y axes. A number

of individuals can be plotted on the same graph, creating 'activity bundles' where groups of people come together in the same location for some common undertaking.

Space and time are depicted as absolutes in these diagrams, but time geography offered a more subtle and dynamic conceptualisation of the lifeworld than these rather 'cadaverous'[30] silent traces of movement might suggest. As Pred argued:

> Because the path concept stresses the physical indivisibility and finite time resources of the individual, it forces us to recognize that participation alterations in one realm of practice invariably bring participation adjustments or changes in other realms of practice – both for self and others. It is thus possible to cast new light on the intimate, intricate interconnectedness of different biographies that is an essential part of the everyday process of social reproduction.[31]

The theoretical power of time geography then, was the potential it offered to link everyday activities at the microscale to broader social processes.[32] It should be emphasised that time geography did not limit itself to considering humans, allowing its fans to make quite big claims for its potential to unravel questions of how actors affect institutions and vice versa as part of a wider debate on structure and agency.

Time geography has received somewhat of a conceptual battering over the years in part, perhaps, because the technique struggled to live up to the philosophical project (particularly around structuration) that became attached to it.[33] Of particular significance for this paper, time geography tended to leave non-human actors relatively silent or conceptualised in an anthropocentric fashion. Yes, one could consider the life path of a chair from forest to sawmill to carpenter to consumer, but this is to consider the path of the object purely as it relates to the people whose lives it passed through and the economic networks in which it was situated.

The way in which time geography considers bodies has been subjected to particular critique by feminist scholars. Rose describes the bodies depicted in space time diagrams as entirely separate things that 'mesh but never merge' – Pred's physical indivisibility.[34] The lack of messy inside-outsideness, makes time geography somewhat passionless. It also causes problems when considering the interaction of human and non-human worlds. Time geography assumes discreet objects, travelling

as one and at the same speed. Certainly during a wooden chair's path from forest to kitchen to beneath someone's bottom it remains a discreet object. But what about more malleable non-humans, the water in the glass, the food that we consume? What about the atmosphere around us, which represents our most intimate engagement with the non-human world as it swirls in and out of us, soaking us with rain, battering us with winds (a relationship which is increasingly commodified)?[35] As with atmospheric gases, water passes through the body, but it also *becomes* the body, dividing itself into countless pathways operating at different speeds, performing different roles.

Postmodern time, rhythmic time

The Newtonian timescapes and Cartesian spaces of time geography fall very much within a paradigm of modernity, as do Bauman's arguments about the effects of the shift from hardware to software (heavy to light modernity). But where Virilio feels that the ever faster world of modern time will only come to end through (imminent) ecological collapse, Nowotny instead offers us a postmodern conception of time.[36] Newtonian conceptions of time have long been seen as problematic as Einstein demonstrated that time is in fact a subjective phenomenon, dependent on the relation between the observer and the universe. Biological systems can also be demonstrated to perceive time differently, with different animals essentially living within different timescales.[37] Nowotny therefore draws on the Einsteinean concept of *eigenzeit* ('proper' time), a postmodern form of time which is fundamentally relational and subjective.

The imposition of clock time on the more flexible timescapes of agrarian societies by the process of industrialisation is a familiar story. Modernity was characterised not only by spatial control – whether bringing the workforce into the factory or conquering territory to annex resources – but also by temporal control. Time became ever more regulated, controlling the behaviour of workers by determining when they could come and go. This squeezed out more traditional subjective time which was more rhythmic, engaged in a more dynamic relation with seasons. Nowotny suggests that subjective, private time is under ever more pressure from *public time* in part because the contemporary world of rapid communication has reduced the significance

of spatial separation. The regulated time of the work*place* is no longer spatially bounded and can thus take over previously private time which becomes 'connectable, available and public', particularly through mobile communications technology.[38] This has two consequences: first, individuals begin to emphasise the importance of finding space for subjective time within increasingly regulated schedules (commonly expressed as a need to spend 'quality time' away from work). Secondly, we start to perceive anthropocentric clock time as being ever more natural and inevitable, which affects how we deal with the non-human world. The postmodern challenge, then, is to find a space within the temporal logic of (post)industrial modernity where eigenzeit can be allowed to flourish.

Nowotny's binary of public time and proper time is not unproblematic, however, as it implies that there is a single public time. Clearly the system of clock time formalised in the late nineteenth century with Greenwich as the prime meridian has achieved considerable global dominance among humans. Public time does not automatically equate to clock time, however, but rather to *shared* time – that time is not dependent on the relationship between the observer and the universe (as in eigenzeit), but between a *group* of observers. These shared times may lack something of the clock time's second-by-second precision, but play a major role in the behaviour of both human and non-human actors.

Shared forms of time ultimately have some form of relationship with astronomical time – the changing spatial relationship between the earth, sun and moon. In fact international standards of clock time are now so precise that 'leap' seconds need to be added periodically to account for changes in the earth's rotation, thus keeping clock time synchronised with the planet. Beyond clock time, however, astronomical movements are responsible for producing the fundamental diurnal rhythms of day and night, summer and winter. These rhythms have major implications for the behaviour of organic entities – plant, human, animal. While these rhythms are somewhat separate to the formal structures of clock time (the sun does not set at the same time every day), the rhythms they produce are clearly shared, whether this be certain plants flowering in the same month or bats leaving their roosts at sunset.

In talking about these shared times it is perhaps useful to think in terms of *rhythms* as these carry with them the notion of a repeating cycle. Young makes an important distinction between linear and cyclical time.[39] Linear time assumes events to be beads on a string, with a notion of constant progress towards an undetermined future. This, Young argues, is a highly western construct with many eastern cultures being based on motifs of cyclical repetition – for example China's 12 year animal zodiac. These cycles or rhythms may have less precise boundaries than clock time but are a major factor regulating our lives. Indeed, even within lives led through the formal temporal landscape of clock time, the influence of rhythms is not absent. As Begole et al. have noted, even within the standard nine to five working day of an office environment people tend to develop rhythms and patterns of behaviour.[40] Colleagues based in the same office often become aware of their co-workers' rhythms; this might be a tendency to take a longer lunch break on a Friday, to have a coffee break mid-morning rather than mid-afternoon or to work late on certain days of the week but not others. Thus one person will get to know when it is a 'good' time to have a conversation with a co-worker, based on a knowledge of their working rhythms. The challenge Begole et al. set themselves was to find ways of allowing people to get to know the rhythms of colleagues who did not work in the same spatial location through modelling patterns of computer use, phone calls etc.

This of course brings us back to Nowotny's point about attempts by capitalists to squeeze out non-clock forms of time – clearly a system monitoring computer use could be used not only for co-workers to detect each other's rhythms but for employers to detect periods of 'non productive' behaviour by workers. Similarly there should not be an automatic equation of a more rhythmic cyclical approach to time and more sustainable – or at least less capitalistic – behaviour. *Time pacing* is a model of product development, whereby companies are involved in a constant cycle of innovation, with replacement products already in development before 'new' products are launched. Eisenhardt and Brown cite the example of microchip manufacturer Intel who have driven constant improvements in processing power through adopting this model of innovation.[41] Firms therefore gain competitive advantage through adopting a cyclical rhythm of product development and release. What this reiterates is that a straight binary between rhythmic and linear time is not automatically helpful when it comes to thinking about sustainability. A firm may

adopt a shared cyclical rhythm of product development, but this in turn assumes increasing consumption through obsolescence.

The question of how sustainable a practice is can depend to some extent on the timescale being looked at. It can be argued that the earth can recover from anthropogenic damage if given enough time – new coal measures are constantly being formed, for example, although over a very long period. The question is whether the resource is being exploited more quickly than the capacity of the earth to recover.[42] This argument, however, runs counter to the deep green vision of sustainability which argues that certain ecological resources are non-substitutable.[43] It is little consolation to those who are watching existing species being wiped out by human intervention that a new cycle of species evolution will eventually take place.

The co-existence of humans and non-humans in urban areas poses challenges for the sustainable management of cities. Frequently, however, human timescales, particularly highly regularised clock time, are allowed to dominate. When it comes to understanding the environment, therefore, we need to be quite careful about our conceptualisation of time. Non-humans are already locked into rhythms which comprise shared time, even without the regulatory mechanism of clock time used by humans; attempting to overwrite these rhythms can be problematic. It should also be borne in mind that human lives are not neatly divided between periods of highly regulated, clock-based, public time and periods of individual relational eigenzeit. Shared rhythms cut across human lives, both within and beyond the arena of public, clock time. This paper is not a call for a shift by humans to a more rhythmic conception of time – this will not magically produce a way of living that is more in tune with the planet and more sustainable. Instead we suggest the need to take more account of the rhythms to which non-humans abide when thinking about how to live alongside those non-humans in a more sustainable fashion.

Non-humans in the city

Humans are not the only inhabitants of urban areas and notions of sustainability are leading to an increased recognition of this cohabitation among those responsible for planning and managing the city.[44] Just as with the creeping advance of highly

regulated public time into the private time of individuals, we suggest that the way non-humans in the city have been treated reflects an anthropocentric undermining of the eigenzeit in which non-human actors operate. Taking more account of these rhythms when planning the management of cities is essential to building a more harmonious, sustainable relationship with non-humans. We turn now to three examples where more sustainable urban policies requires a refiguring of time within certain urban spaces – resisting the hegemonic pressure for a single public time under which all urban systems operate.

i) Urban surface water management

Urban areas and the accompanying very large areas of nonporous surfaces (roofs, roads etc.) significantly reduce the capacity for rain to soak into the ground. Without intervention, surface water from precipitation would pool in anthropocentrically inconvenient places, hindering movement and presenting a public health risk. In order to remove these problems, humans introduced forms of artificial drainage. Traditionally these drains took the form of channelling waste water away from spaces of circulation and into a ditch or covered drain to be taken away and discharged into a watercourse.

This traditional drainage system was refined and massively expanded by nineteenth century engineers who created a web of sewers beneath western cities. The literal burying of urban technological networks of water and energy supply represented a fetishisation of these non-human actors within the city that sought to manage and control them.[45] Today, however, it is acknowledged that the principle of rapidly removing surface water and placing it in a piped drainage system brings with it a number of problems. The first of these is that of diffuse source pollution, where contaminants deposited on urban surfaces (oils and heavy metals from cars for example) are carried into the drainage system by rainfall, causing a pollution event if discharged into a watercourse without treatment. This is of increasing significance today because of the European Union Water Framework Directive, which seeks to greatly reduce diffuse source pollution.[46] Second, and perhaps more interesting for this paper, is that rapid discharge of surface water runoff into a piped drainage system can pose a significant risk during storm events.

The problem arises because of the attempt to discipline surface water flows using anthropocentric timescales. Flows of foul sewage are easy to accommodate because they are entirely anthropogenic and can therefore be predicted from the population size of a given area. It is, therefore, comparatively easy to design a system as the discharges can be treated as essentially Cartesian; the capacity of a pipe can be expressed in cubic metres per second, an essentially human, clock-time measure. Surface water discharges are, by contrast, dependent on the much less predictable factor of the weather. In a modern urban environment rainwater needs to be rapidly removed from road surfaces to prevent it interfering with the circulation of vehicles and people. These systems are designed taking account of the prevailing *climate*, i.e. the kinds of precipitation one would *expect* at any given time of year. The problem is with unusual weather conditions, freak storms, which are expressed by hydrologists as a measure of probability in the form of a return period – one in twenty years, one in a hundred years and so on. Piped drains have a fixed capacity meaning that a sudden peak load from an intensive storm, rapidly conveyed into the drain, produces the potential for system failure and localised flooding. The traditional response to this has been, in a Foucauldian sense, ever harsher regimes of punishment – larger and larger pipes to move more and more water ever faster.[47] The result is a still more catastrophic situation when the regime finally fails to keep things in order.

Designing a fixed capacity system which could cope with any conceivable weather condition would be extremely expensive and technologically difficult, not least because as cities age systems with different capacities are woven together, in some cases actually interacting with culverted watercourses.[48] It should be reiterated that for most of the time fixed capacity systems work very effectively – the rhythms of precipitation can be accommodated within the anthropogenic flow regime. When the amount of precipitation over a given time steps over those boundaries, however, the failure of the system is inevitable as the weather's timescale is out of sync with attempts to impose human timescales on it.

The solution to this is to avoid imposing an inappropriate model of time onto surface water. The approach taken by sustainable drainage systems (SuDS) is to consider *rapid* transit into and through a piped drainage system as part of the problem, not the

solution. There are various different technologies which come under the SuDS umbrella which all have the basic aim of slowing down precipitation runoff as well as, frequently, to filter out diffuse source pollution, by taking it out of the piped system. Swales, for example, are long gently sloping grass trenches which take discharge from roads and car parks and allow it to move slowly to a discharge point. Basins, vegetated depressions, are normally dry but can act to buffer large flows during high rainfall events and can form part of a whole chain of SuDS installations along with ponds and wetlands to slow, store and filter discharge. There are also 'hard' SuDS, such as porous paving which looks like an ordinary brick paved surface, but allows water to filter through it into a porous layer below which can store significant volumes and slow its transit to a point of discharge.[49]

These types of systems try to engage in a more positive relationship with precipitation runoff, disciplining it, reforming its behaviour to stop it from causing damage elsewhere in the city. By providing spaces where water can *pause* in the city, the rapid transit approach is partially undermined and in some cases surface water flows can be disconnected from the piped network altogether. Like conventional drainage, SuDS are still highly technology-dependent; SuDS do not represent a return to some mythical pre-modern natural idyll of drainage unaffected by the influence of humans. What they do is disconnect and buffer flows in an attempt to *mimic* the timescales of a 'natural' system, thus minimising the potential damage caused when trying to move too much water too quickly. Rapid removal was designed for the convenience of humans and is proving unsustainable. The use of SuDS shows an increasing recognition by water managers that surface water cannot be relied upon to work within an anthropocentric timeframe. England and Wales have been slower to come to this conclusion than elsewhere in Europe,[50] but there is now a legislative presumption within Part H3 of the Building Regulations that all new developments should be built using SuDS for surface water drainage except in circumstances where this is not practical.[51]

ii) Urban conservation planning

The realm of urban conservation planning has also been traditionally dominated by tropes of speed and flow. Perhaps because of this, the dominant strategic

conservation tool has remained the wildlife corridor – a linear habitat that allows natural organisms to move through an urban landscape that is largely perceived to be inhospitable.[52] A key factor explaining why corridors have been, and indeed are, embraced by planners of the city is their linearity. Corridors require no fundamentally new approach to planning because linear features such as transport conduits (roads, railways, footpaths, etc) form the basis for plan making. The lineage of corridors runs through almost every planned urban form in history, from cities of classical Greece, to Olmstead's parkways of Boston and the Bronx, and from Ebeneezer Howard's garden city to the greenways of Milton Keynes.[53]

The concept of wildlife corridors was championed in the realm of urban planning by Barker, long-standing urban advisor at the Nature Conservancy and, subsequently, English Nature. Barker's research report, 'A framework for the future: green networks with multiple uses in and around towns and cities', was as much a reflection of the dominance achieved by the corridor concept in strategic urban nature conservation planning as a manifesto for its adoption.[54] The notion of corridors between sites makes *intuitive* sense to humans and, by being championed as multi-functional spaces, their justification is broadened as conduits of people, nature and the countryside through the city. Barker's report argues that the urban landscape supports meta-populations of species and that the habitat mosaics in the urban landscape that nourish them are often older and more established than traditional ecological approaches would conclude.

It appears, however, that the 'common sense' underpinning the adherence of many ecologists to the corridor concept is based upon a gross underestimation of the dispersal capabilities of species in urban areas.[55] Although holding less true for inner city or industrial spaces than residential spaces, the urban landscape is largely ecologically permeable, making questions of connectivity less ecologically pertinent. Hence the city is an ecologically dynamic landscape, rather than one in which nature is confined to greenways: a position supported by urban conservationists exploring the role of gardens, walls, rooftops and other micro-habitats as wildlife refuges and conduits in the urban environment.[56]

Underestimation of species dispersal capabilities is reinforced by overestimation of the barriers to dispersal in the urban landscape. Cartographically, gardens, hedges, verges, abandoned buildings, un-maintained or broken up macadamised areas and so forth are represented as built-up areas for planning purposes, leading to a discursive concealment of connectivity. Conversely, extensive areas of mown grass, such as those that occur in parks and around tower blocks that are marked as green space are actually poor habitats, and can prevent the movement of many species.[57] Hence we have a set of urban patches which operate at different speeds for different species, rapidly traversable and not; more or less porous depending on the species in question. What we do not have is a simple split between 'urban' spaces and 'natural' spaces, with a concomitant split between timescales suitable for humans and non-humans. Ironically, wildlife corridors attempt to impose a singular temporality upon non-humans, based upon anthropogenic assumptions concerning their circulation. In reality, different types of species (plants, animals, insects and so forth) display very different life-rhythms. That this should come as a surprise to urban planners and ecologists is indicative of the power of the myth of singular time. Once again we return to the idea that anthropocentric public time cannot simply be assumed to apply to all actors and all spaces equally.

The cartographical categorisation into built-up and green spaces represents a blind spot in planning perceptions, reproducing an ideological dichotomy between the urban and the natural. While corridors spatialise this discursive separation of city and nature, making it possible to experience nature discretely from the city, the logic of circulation upon which they are built is temporal.[58] The scientific reality of an ecologically permeable urban fabric disrupts these discourses, undermining the ecological basis of corridors and reinstating the habitat patches as sources and sinks for meta-populations operating in the urban landscape as a whole.

By transgressing 'common sense' (i.e. human) understandings of connectivity, patterns of species dispersal within the urban environment reinforce our contention that urban nature cannot simply be partitioned off into discursively 'natural' spaces where their subjective timescales can be permitted to operate. The ecological porosity of nominally built-up human spaces indicates the interpenetration of different

timescales within the city. A notion of sustainability in urban planning based on temporal and spatial segregation is, therefore, fundamentally flawed.

iii) Building design

The speed at which a building operates is a product of its form and function. A temporary shelter, built from whatever materials are to hand may only exist for a few hours or days. Cathedrals designed as a lasting symbol of religious power, built of stone and carefully maintained, have lasted centuries. One should not be fooled into thinking that builders and engineers from previous eras only built things to last. The same Victorians who built the great station at St Pancras also built tens of thousands of back-to-back houses that were falling down almost before they were completed. It is the robustly-built buildings that tend to be the ones to survive the forces of entropy and obsolescence. Many of the buildings produced during the post-war reconstruction were, however, more consciously built with the idea of being disposable. For all that modernist architects wanted to build the perfect future city in new forms and materials, the reality was often speculatively built shopping centres made from the cheapest concrete, with an expected lifespan of around thirty years.[59]

The economics of rapid short term profit creates buildings with short lives, wasting the massive amounts of embedded energy inherent to their construction. Similarly, there is little point in investing heavily in expensive energy saving technologies within the building fabric if obsolescence and rapid replacement are built into your design philosophy. Clearly some of these issues can be addressed through more stringent legislative instruments. The UK government's Code for Sustainable Homes, for example, which was launched in December 2006, set a target for all newly built homes to be carbon neutral by 2016.[60] All new buildings proposed in the UK have to meet basic standards of energy efficiency through the Standard Assessment Procedure (SAP) ratings laid down by the Building Regulations or they simply will not get permission to be built. There is, therefore, some increased incentive to think about buildings having longer lives in order to offset the increased cost of such measures.

There has, however, been a more insidious problem in the way that buildings are used. It is very unusual for the user/occupier of the building to have commissioned its

construction, indeed, particularly in commercial buildings the occupier is frequently not the building's owner with responsibility for maintenance. The division of financial responsibility for buildings has created a situation where they have tended to be considered across different timescales by the different stakeholders. This is key in considering the sustainability of the original design. Developers have limited incentive to install expensive energy efficient technologies over and above legal requirements because the financial benefits of these develop over the longer term, as occupiers benefit from lower heating and air conditioning bills. Hence the timescales of industrial capitalism do not mesh with creating more sustainable buildings because the 'wrong' people end up reaping the financial rewards.[61]

The response to this problem is lifecycle cost analysis. The division between the economic timescales of developer, owner and user is broken down in lifecycle costing by working out the combined cost of both creating and operating a building over its expected life. Lifecycle costing effectively operates at the timescale of the building rather than its stakeholders and in doing so the medium and long term benefits of 'green' construction become more apparent. The private finance initiative (PFI), although controversial in many other regards, has helped drive the lifecycle costing agenda in the UK, by asking the firms that build a new resource (hospital, school, prison etc.) to also pay for the running costs over a fixed period. PFI projects often run across twenty years and more, meaning that high running costs caused by cheap construction costs would eat into the profits of the operating company over the lifetime of the project. Building green suddenly becomes the sensible economic choice. Similarly there has been an attempt to persuade developers who do not themselves occupy a building that energy efficient buildings make for happier tenants, reducing turnover of tenants and therefore making income more secure.[62]

There are, therefore, clear sustainability gains (driven by economic benefits) where the built form is considered within the timescale of the building itself, rather than in the timescales of the separate processes dealt with by different human actors involved with buildings. When compared with the situation elsewhere in Europe, particularly Germany and Scandinavia, the UK is rather late in recognising the benefits produced by conceptualising building timescales differently – just as it is only now coming to grips with sustainable drainage. The recent collapse of the property market in the UK

brings with it an opportunity to embed more of this thinking into practice before the next wave of development takes place.

Discussion: *eigenzeit* and the city

There have been some attempts to apply something akin to Nowotny's notion of postmodern time to the human urban environment, notably with ideas of slow food and slow cities. The Italians who established the slow food movement did so with a distinctly leftist perspective, as Parkins comments:

> Rather than a conservative yearning to return to the good old days of real food and conviviality, it was an attempt to re-brand slow/traditional/local food as the true revolution, and fast/faddish/global food as the passé, the outmoded, the failed.[63]

As such there is an attempt to recapture the meaning of 'slowness', getting away from the associations with backwardness and stupidity inculcated by a modern culture of speed. Slow food not only tries to recapture meaning, but also time itself, demanding subjective time for reflection and pleasure and resisting the highly regularised and highly rapid public time that has increasingly come to dominate – in effect arguing that *not* having lunch is for wimps as it reinforces the hegemony of public, globalised, time.

We suggest there is a need to extend this notion of postmodern time, with its emphasis on the importance of subjectivity, into our dealings with the non-human world. As we have demonstrated above, non-humans stubbornly resist the totalising discourse of public time and we would argue that a sustainable city needs to take this variety of eigenzeit into account. In attempting to escape the dominance of a single public time, urban theorists need to be in conversation with various others who articulate non-human urban futures. Hydraulic engineers spend vast amounts of time and money understanding the city from the point of view of water molecules, even if they would not perhaps articulate it that way. Ecologists are improving our understanding of how the city landscape looks as a habitat matrix to different types of organism. The problem is in translating professional understandings of non-human eigenzeit into the implementation of policy. What happens if the water vole population is not visible during the time that the ecological consultant is surveying a redevelopment site?[64]

While the governance of water in Scotland and other parts of northern Europe has allowed the SuDS agenda to advance, in England and Wales the privatised water companies have acted as a brake on reform in spite of legislative advances, continuing to force surface water into an anthropocentric mode of time. The fragmentation of the owner/operator/user relationship in the building industry reduces the incentives to think about the medium- and long-term benefits of constructing to higher-than-compliance levels of environmental sustainability.

What the urban conservation example demonstrates particularly well is that timescales different to anthropocentric public time seem to be acceptable in urban planning policy only where they occur in specifically delineated zones – wildlife corridors, green spaces an so forth – seen as separate to the *built* environment. Both wildlife and surface water, however, interpenetrate the built environment and bring with them their own particular timescales. Indeed, the built environment itself operates with rhythms which are not always conducive to the timescales of industrial capitalism. A sustainable city accepts this interpenetration of humans and non-humans and in doing so must also accept an interweaving of their (subjective, relational) eigenzeit, resisting the totalising timeframe of anthropocentric modernity.

Ironically, it is the imposition of human time upon non-humans that justifies their segregation in the city. The three case studies show that when the temporalities and movements of non-humans are explored in more depth they overflow these spaces. The challenge of sustainability is to embrace this overflow by integrating different times within and across spaces. Being more responsive to the differing eigenzeits of non-humans requires a more sensitive approach to their lifecycles and characteristics. But this sensitivity must be careful not to reproduce a sense of separation, but rather to understand this lifecycle as a part of the city.

Conclusion

Parts of city life may now operate in Bauman's software paradigm of communication at the speed of light, but the vast majority of urban interactions do not. We suggest that the city, like the world, continues to operate at a variety of speeds and that the logic of capitalist modernity that is driving the attempt to make everything operate at

the maximum speed that it *can* operate is something to be resisted. This isn't the reactionary resistance that Massey sees in Harvey, but rather a progressive attempt to find the most appropriate timescales for the activity/actor in question. The diffusion of slow city ideas has, perhaps appropriately, been relatively sluggish to date, but it represents a small example of an attempt to 'do' time differently, without wallowing in nostalgia for a mythic agrarian society living in harmony with the world.

Sustainability is now in the political mainstream. No one today is going to dismiss the pursuit of sustainable cities as some kind of reactionary attempt to resist the productive logics of capitalism. Policy rhetoric and practical actions do, of course, run on considerably different timescales and one can, for example, endorse the benefits of sustainable drainage at the same time that capitalist developers persuade local planners that it would be too difficult to implement on a particular site.

Perhaps what is required in the drive to sustainability is a more diverse set of planning logics which are not based upon attempting to impose human public time across the whole city. In a sustainable urban environment, parts of the city can be fast and connected like the modern dream, but at the same time other parts can be slow and fragmented – and indeed, these 'parts' may even occupy the same spatial location, their speed of operation depending on who is looking.

Walter Ruttman conceived the modern city as a giant orchestra, the tempo varied, but coming together to form a unified whole. A sustainable city would not have this pleasing unity of form and tempo and instead be a cacophonous space of diverse rhythms and crashing atonalities weaving together the different timescales of both its human and non-human inhabitants.

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