Lichenisation

On suburban ecology

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Lars Lerup is just one or two weather forecasts away from being the urban development expert most frequently interviewed by the international press ever. If Hurricane Rita had not shifted its course at the very last moment from Galveston (the scene of disaster in 1900!) toward Port Arthur to the east, the scenario of doom would have occurred just as he described in such detail in his new book, *Smartacres*, *rethinking Suburbia*. Houston, the oil capital of America with the largest refineries and petrochemical complexes in the USA and awash in a nearly immeasurable degree of suburbia, would have borne the full brunt of the severest category of hurricane. The book, which I read in print preview in order to be fully prepared for this co-lecture, would have been prophetic. Lars Lerup would have been on CNN non-stop.
In a chillingly realistic scenario, he paints a picture of the inevitable chains of cause and effect that unfold when a period of extreme air pollution, already filling the hospitals to capacity, is followed by a hurricane of proportions that meteorologists expect once every five hundred years in Houston.
The concurrence of these two events might have caused a disaster on an extremely vast scale, involving many dead and wounded, immeasurable damage to the global economy and a permanent impact on the environment. As a result of the storm damage and flooding, the petrochemical complexes located in and around Houston would leak chemicals, which would then spread their toxic effects out into the remotest capillaries of the city through the surface water drainage.

Even now that the disaster did not come to pass, there are still many reasons to listen to the lessons of Lars Lerup. Firstly, it is a moot point to debate the necessity of the drastic measures that the authorities took. Simply the possibility that this chain of events might have taken place gives the mayor of Houston justifiable cause to evacuate the entire region.

The lessons we can learn are particularly relevant because the true disaster he writes about is the unbridled suburbanisation, of which Houston is a striking example. Similar to the computer game Sim City, he uses a disaster to demonstrate the inherent disadvantages of the suburban city configuration. His ideas are intensified by the fact that his perspective throughout his professional career fluctuates between an Americanised Swede and a European American. He seems to be torn between a fascination with the phenomenon (and the associated love for his subject of study) and a realisation that this form of occupying the Earth's surface is reaching its limits. There is an awareness that the simple but overwhelming logic of suburbanity will ultimately succumb to its spatial, social and ecological consequences.

There are a great many reasons why it is interesting for the planning discussion in the Netherlands to include the ideas that Lars Lerup has put forth here. In doing so, we will not allow ourselves to be distracted by voices insisting that the situation in America will never happen here. Since I was a child, all I have seen is that – despite all claims to the contrary – the Netherlands is becoming just like America, albeit with a time lag of five to ten years, with adaptations to Dutch or European styles. And yet, whether we are discussing the decline in average home occupancy, the hedonistic culture of the body expressed in plastic surgery, the crime rate, the dream kitchen with TV, the developments in the leisure industry, or the number of cars per capita, what we thought was impossible increasingly has become a reality. And what about suburbanisation? Does that systematic link with a lag apply here too? Is there still time to take a different direction? If professional colleagues like Lars Lerup are developing resuscitation strategies for application in the American cities, where do we stand in the Netherlands? Are we still not yet so far gone that we can use preventative measures to avoid needing CPR? Or have we already been infected with the virus of suburbanisation?

It should first be noted that the paved surface (=city+infrastructure+gree nhouses) has increased two-hundredfold since 1850, while the population has multiplied “only” sevenfold. Whether we call this urbanisation or suburbanisation is splitting hairs; it remains a disconcerting development. And yet, for a long time this process took place in a relatively compact pattern.

Three fears affected spatial politics in this context as strongly as the ideals of spatial planning. The fears of the truly big city – with its uncontrollable disaffected workers and its abandoned values – led to a policy of distribution that then took on a compact form, the famous pooled deconcentration that was behind our growth centres. The fear of suburbanisation, of “Belgian conditions,” is also deeply rooted in history. It can be considered part of the very earliest national planning policies, in the Rural Landscape Act (1930) and the laws against *Lintbebouwing* or discontinuous urban areas along roads and waterways (1937) This fear, together with the modernisation of agriculture after the Second World War, and the necessity of relieving the housing shortage with sequential construction, caused a massive alliance between spatial planning and agriculture. Maintaining a separation between an urban and rural domain was in the interests of both. The third fear, of losing control over how topography is shaped, contributed the lubrication and the consensus in the planning system.

The result is that, in comparison with other urban systems, we had a fairly clear distinction in the Netherlands between city and countryside until the eighties. Whether this is due to the reductions in the growth centres policy, the stagnation of agricultural expansion, the lack of models for metropolitan districts, changing preferences in housing and living environment, or even the changes in how our cities are financed, it is difficult to say. Since 1985,

the municipal finances have been made partly dependant on the profits from their development company.

The fact is that there is a strongly distributed growth from the small and mid-sized cities at present. Because we have not kept strictly to the planning rules and it seems that buildings can spring up almost everywhere, the expected value of the land increases. We now have a situation in which land prices under the imaginary line running from Alkmaar through Amsterdam and Arnhem to Aachen have reached a level at which the land-dependent types of agriculture no longer have the capacity to earn back the price of the land. If nothing happens, we may well be looking at the last generation of land-bound farmers and we will eventually lose the well-known Dutch scenery of the city landscape. Only urban functions and agricultural sectors that involve intensive knowledge and capital, such as greenhouse farming, can pay those prices, which only increases the spatial fragmentation. This occurs at the expense of the recreational environment. The receding agriculture ultimately cedes more room to suburban and urban plans, thus bringing about a self-fulfilling process. Accordingly, in the Netherlands we have to some degree been infected with the suburban virus. Should our immune system jump to our defence, or should we be less concerned about the disadvantages of suburbanisation and instead cherish the liberating sensation that the Spatial Planning Policy Memorandum (de Nota Ruimte) has freed us from the cloisters of the compact city?

The discussion among professionals and executives in essence produces three discernible positions on suburbanisation.

- Staying on the path we have already taken (set out in the Fourth Policy Memorandum on Spatial Planning Extra, known as VINEX, which offers a method for steering urban growth), and continuing to produce relatively

homogeneous typologies of housing products that also happen to afford a great deal of satisfaction with the housing situation. This group does not actually see its product as suburban, but the fact that the housing is being located at increasingly larger distances from the donor cities makes it indeed suburban.

This position is dominant, both in the current home production and in the planning. The two other views represent a sort of "catch-up demand," because market preferences were not properly heeded in the past, and a largely supply-driven direction has been taken for more than seventy years now.

- Increasing the density of the existing urban area. There is a need for purely urban living areas. To keep the cities strong, attractive living areas must be offered for a wider scale of population groups. The city needs to enter into battle with suburbia. This is particularly topical in a number of larger cities. Amsterdam aims to add another 60,000 homes within the city, and a recent study by Adriaan Geuze shows that Rotterdam can easily tuck away another 25,000 land-bound (!) homes in attractive settings on leftover parcels of urban ground in Borneo-Sporenburg-like typologies.
- Living in low densities in rural areas. The estimates of the demand in this category vary from modest to nearly astronomical, an estimate that this is where the true dream house of many Dutch people would be. The backgrounds in this category are equally diverse, ranging from a simultaneous rejection of VINEX and the modernism that goes hand in hand with liberalisation, to an economic incentive in economically disadvantaged regions.

We could ease our concerns with the idea that "our" suburbanisation in the form of the VINEX neighbourhoods is still linked to the city, achieving

an average density of some 35 homes/hectare (as opposed to 8-15 homes/hectare in american suburbs) and still has a collective space. We can also state objectively that the toxic mix that Mr. Lerup describes as combining the transport lobby, the real estate complex and supposed housing and residential preferences is not yet boiling and fermenting in the Netherlands. But it would not be too difficult to imagine the good-natured lobbyist Mr. Hofstra being replaced by a somewhat less benevolent individual, the likeable directors of the corporations, who we all still see as the helmsmen of the housing associations, being listed on the stock market and having to take a much more commercial look at their product, and following housing preferences to the letter, ultimately leading to new product/market combinations in the Netherlands. These three steps would bring us a great deal closer to the American situation. This Pandora's Box will be difficult for us to close again. The key question in this co-lecture is whether we should want this kind of suburbanisation in the first place . If not, what opposing forces can we mobilise; and if so, where and to what degree.

Before I try to formulate an answer to these questions, I would first like to add another element to the equation. This is not in order to complicate the matter, but to work from that starting point to make a statement about the desired direction in our national discussion. Where Mr. Lerup uses the fascinating image of the suburban city as the largest living organism on Earth, he directs his solutions towards a desired new relationship between nature and culture. He therefore proposes an entirely new urban ecology. zNot all the details of that theme have been worked out yet in his book Smartacres, but it promises to be at least as radical as the "Broad-Acre City" by Frank Lloyd Wright, which the title of his book nods to.

I would like to extend this ecological metaphor and to incorporate the indirect effects of the rampant housing fungus into the discussion. If you were to develop something along the lines of a sustainable occupation strategy, you would also need to include the ecological footprint of urbanisation. The geographic setting for this occupation strategy in my argument is the Delta, a situation that links the Dutch Randstad to Houston.

Our country in its entirety is part of the Northwest European delta of the Scheldt, Meuse, Rhine and Ems Rivers. Houston lies toward the bottom of the lower reaches of the San Jacinto River. There are about forty such huge delta regions world-wide. They shelter the best agricultural land in the world: marine and estuary clay soil with the most fertile soil in nature. They have the best flat land and – what may be most important these days – the most environmental space. In other words, it would be possible to realise high production levels using a minimum of resources and without inflicting much ecological damage. We know for certain that these lands are necessary for the world food production. At the same time, the UNESCO calculates that approximately 30% of the total world population will live in these delta regions in 2050. In all of these areas, the accompanying large-scale urbanisation will be able to pay more for the land than the agriculture which is gradually disappearing and, where possible, moving aside by reclaiming remaining wetlands. Besides their intrinsic value in the long term, the wetlands also have vital significance for the marine ecosystem and the fishing industry. The contact zones between the freshwater and saltwater are the richest breeding grounds and fishing waters in the world. In our delta, the room for expansion has been used up by earlier generations. The Wadden Sea and the Markermeer lake will no longer be impoldered; at most, some land will be reclaimed a bit farther into the sea as part of an advisable coastal defence strategy. The issue is complicated further by the fact that all

deltas are vulnerable to the consequences of climate change. Where Houston awaits its killer hurricane, we are faced with the threat of flooding. The task for spatial planning is, in my view, to solve this complex long-term puzzle – and not in the way that the main objective from the Spatial Planning Policy Document might suggest: "the timely provision of sufficient space for the functions that require space."

Which new challenges for society will emerge from the solution to this delta puzzle, and which clues for the suburbanisation discussion can be derived from them?
First and foremost, we will have to realise that it is debatable in this geopolitical perspective that the demographics in our delta system will start decreasing. "Fort Europe" will do no more than slow the influx. Continuing population growth clearly indicates the need for high(er) densities (whether or not in the substrate of low densities, such as in grid cities). In the practice of our profession, this means that we will have to focus on design-oriented research and configuration studies on the subject of "infinite urbanisation." Which configurations of nature and culture do we want to try to achieve in our developing megacity? And which rules should be deployed? In the future, you may well be able to judge the civilisation of a society based on the grain size, the natural character and the degree of structure in the remaining grains of chlorophyll in the urban system. These studies are not only about adding green to the urbanisation process or introducing ecology into suburbanisation, but to transform the entire process of occupation and the associated series of displacements into a sustainable occupation strategy (if such a thing exists).

Secondly, an attempt at setting apart or preserving our sea and river clay areas would need to be orchestrated in a fairly anti-cyclic fashion. These are

areas where agriculture, particularly arable farming, has a difficult time. Living in low-density rural areas may offer an economic boost and enrich the rural landscape, but caution would be advisable. Fragmentation of continuous agrarian complexes should be avoided under the motto: “Keeping big money big.”

One condition for solving the delta puzzle is of course making our country able to survive the forces of climate change. While a hurricane is Houston’s disaster waiting to happen, the threat of flooding is ours. If you add up all the various risks of death in the Netherlands, combining the chance of people dying in terrorist attacks with the chance of dying of H5N1-type avian flu, or from plane crashes, or from collapsing tunnels and viaducts, and multiply all this grief by a hundred, you would wind up with the potential loss of life in the Netherlands due to flooding. This is a reality check that brings the political priorities sharply back into focus. These are good reasons to keep a cool head about all sorts of terrorist threats and make major investments in dealing with the water problems, which will no doubt turn out to be the ultimate lesson in citizenship.

For the sake of clarity, I would like to categorise the problems into issues related to the main water system (coastal defence, rivers and other major water bodies) and issues related to the regional water systems that drain into the main system.
In the main system, the danger comes from the west and from the east, respectively the rising sea levels and the gradual change of the Rhine into a rain-fed river with characteristic fluctuations in drainage. The projects for coastal defence and the – much more complex – projects for the drainage of our river water will require the necessary surface area. In the main system, the concern is primary safety. Without exaggerating, the issue

is the continued physical existence of the Holocene coastal plain in the Netherlands. Despite all the NIMBY ('not in my back yard') scheming by local governments, consensus on these space claims will be reached in due time.

It is more difficult in all the minor sub-systems. In these areas, the danger comes from above – in the form of excessive or insufficient precipitation – and from below – in the form of increasing (brackish) seepage caused by the rising sea levels. The problems in the aquatic sub-systems have grown very gradually. The climate change does not cause the problems; it only intensifies them. It is about the cumulative effect of urbanisation and other forms of surfacing where run-off characteristics arise, as well as about the deeper and permanent levels of agriculture (caused by a half-century of land-reallotment and agricultural re-structuring). Together, these two processes have eliminated every flexible possibility for temporary water storage from the system. This may not represent a hazard to primary safety, but it does involve risks that have a potentially great economic damage easily comparable to a confrontation between Houston and its hurricane. The Royal Dutch Meteorological Institute expects that climate change could cause periods of extreme precipitation, even in the summer. We saw the most recent example of this about three years ago in Central Europe where more than 75 mm fell every twenty-four hours for weeks on end. We would not have been able to handle such quantities of precipitation either. People in large areas of the country would have been up to their necks in water. In such cases, extra pumping capacity will not be enough help.
The surface area that this water volume would require is extensive, such as needed in the western Netherlands for the missing links in the water system, the water reserves for times of drought, the reserves of brackish water and the peak supply. Our study, done in the context of the Architecture

Biennial, came up with a result of approx. 30,000 hectares, which is about 5% of the total surface area of the Randstad. If we make the link to the issue of suburbanisation, it is a mixed message. For a small elite, the new water structures, such as polder drainage pools where the water may fluctuate significantly, may serve as nice scenery for living in areas with very low population densities. These studies are bad news for urban and rural planners who imagine that there might still room for major urban expansion in reclaimed polder land. It would be good policy to reserve room in the polders for water, while it is still possible. Fragmentation caused by infrastructure, changes in agriculture and, of course, urban development will quickly decrease water retention possibilities. This indicates even more ambitious terms of reference for increasing urban population density.

In summary: these three considerations in urban and rural planning for the delta region point towards increasing urban population density, less room for the VINEX-style neighbourhoods to expand and limited, well-planned options for rural residence at even lower densities. In the preceding text, I also gave good reasons for keeping certain areas completely free of new developments. It would be unimaginable for the room we need to solve the water problem to be unavailable because we have just released it for building new homes. In that last category, the rural residences, it would be advisable to employ a "no, unless" regime, as already recommended by the VROM council for housing, spatial planning and the environment. This would make it possible to extract guarantees of quality and lay the foundations for forms of an earmarked balance between red and green developments. Accordingly, building outside the city must be just as complex as building inside cities, towns and villages. This is necessary to prevent investors from turning their backs *en masse* to the important transformation tasks in the cities out of sheer convenience.

All this is very well and good, but if we were to follow the American example despite all these indications to the contrary, it would be interesting to see if we can at least avoid a number of systematic errors. In the second half of my lecture, I therefore want to take a closer look at the new urban ecology that *Smartacres* proposes. The guidelines that Mr. Lerup developed to reduce or eliminate the negative side effects of the suburban project closely resemble a cross between the building blocks developed in our country under the heading of 'sustainable building' and the studies done on "light urban development". It is about the introduction of grass roofs, not paving everything, and thus ensuring that the prairie topography retains options for collecting water and draining it off through the new collective green spaces in the city, on through to the introduction of new techniques on a building level, such as the System-Integrated Variables house.
The recommendations still feel a bit experimental because planners and designers are outsiders when it comes to the suburban project. It would appear that the "new suburbanism" is still in search of its own Celebration.

Would this American version of sustainable construction, although it represents a giant leap forward, be sufficient to create a new urban ecology, as Mr. Lerup hopes, an urban ecology that changes this form of urban development into a sustainable occupation strategy? I don't think so. It is not only the aspects of the metabolism and the "grey" environmental themes (such as air and soil pollution) of the suburban city that demand our attention; to achieve true sustainability, it is necessary to think through the ecological relationships. We are limited in this by a glass ceiling of incomplete ecological knowledge; ecology is not yet a science of prediction.

In caricaturising the temporal, spatial and organisational scales of ecological research, the American ecologist Stuart Pimm produces this diagram.

The minimum time resolution of paleo-ecology (dealing with extinct ecologies) is far greater than the longest-term studies in the rest of ecology. Community ecology typically involves only a few species, and although bio-geography (addressing the problem of the distribution of species around the globe) deals with large areas, it rarely deals with how ranges change over time.

And yet it is possible to say something useful about a new relationship between the city and nature. It first demands that we take an unprejudiced look at the phenomenon of nature and of the city. Nature is not pathetic and the city is not by definition hostile to nature. It is not possible to turn nature on and off. There are all sorts of good reasons, well-understood human self-interest for example, to create closer ties between culture and nature – even if only to ensure by means of adequate spatial planning and conservation that we will not fade away from the Cenezoic (the Era of Mammals) into the Eremozoic (the Era of Solitude), a concept used by the evolutionary biologist Edward Wilson to characterise the situation following mass extinctions. The compact city and the sprawling city have different natural expressions and different opportunities for mutual penetration. Viewed only in spatial terms, without any historical considerations, the compact city would have the potential to exist right in the midst of unspoiled nature in maximum, almost theatrical contrast. In reality, the European compact city naturally has a history of one or two millennia of reclaiming nature, an agricultural past and an accumulation phase, so the typical setting is a cultural landscape. The sprawling city has the potential to mesh more closely with its natural substrate. In America, particularly on the West Coast, but also in a number of megacities in the Third World, the contrast to the natural environment is, surprisingly, greater than the contrast of the European city, because these new settlements skipped over the “agricultural phase.”

This produces an additional responsibility, but also a number of additional opportunities. Responsibilities, because this literally concerns direct usurpation of natural reserves. And opportunities because the immediate surroundings offers more than enough biota to fuel a more natural setting for the city as a constantly running generator. Of course the city will never be able to approximate a natural reserve in terms of species and biomass production. However, the coyotes cadging food in Los Angeles and the prairie remnants in Houston show that some sort of meld may yet be possible. The only missing ingredient is functional surface area, upon which natural processes are given free rein. This can be done by simply letting the city skip over an outlying area in the occupation process, or by utilizing the more than ample green space present in the suburban city itself to allow more freedom to natural processes. The first option requires strict planning, while the second gives another take on an alternative use of the sea for private gardens.

The second variant, offering functional surface area for natural processes within the warp and woof of the city, requires completely different strategies. The key to change, in my opinion, lies in gardening reforms. The level of mechanisation, the use of fertilisers and pesticides in the gardens exceeds even the most intensive agricultural areas by a factor of three or four. It would seem that these are the front lines of an undeclared war that man is waging on insects and micro-organisms. These civil defence expenditures in the USA may not surpass the country's military spending, but at 27 billion per year, it comes close. This is where there are possibilities for spectacular improvements in the relationship between the city and nature. Offering functional surface area is only a matter of changing management methods. The natural processes that can respond to that need are succession and pasturing, recolonisation by all sorts of plants and animals plus, on a modest

scale, some erosion and sedimentation via the more natural methods of water management proposed by Mr. Lerup. This is possible in principle by making the private garden more collective via this type of transformation management. But of course this is too radical a solution. Garden reform as demonstrated in community experiments in Florida offers better prospects. Widespread conversion to native species in the garden and the elimination of toxic fertilisers and pesticides would make a formidable contribution. The water balance and infiltration options also improve. This is where nature technology can prove its worth as advanced culture technology. If this form of gardening catches on throughout suburbia, then this form of urbanisation, at least in terms of its impact on nature, will become less of a spatial expression of the pest organism that is man. Rather, we would be moving more in the direction of the adage "treading the earth lightly."

Mr. Lerup describes suburbanisation as the biggest living organisation on Earth. In doing so, he draws his inspiration from *Armillaria ostoyae*, a fungus that has been known to exceed 2,000 hectares in size. In the pessimistic scenario that Mr. Lerup outlines of the current situation, the extended city will never be able to survive as long as this gigantic organism, even with all the measures that have been proposed. Research on the specimen in Oregon he refers to indicates an age of between 2,400 and 7,200 years old, the age of Rome respectively Jericho. Therefore, I would rather replace this metaphor with the lichen, the organism that comes closest to the ideal image of the new ecology by means of a perfect meld. The lichen is a living example of one of nature's greatest miracles from a few hundred million years ago. A mycobiont and a photobiont, creatures from completely different kingdoms in biology, entered into an alliance with a long-lasting consequence, a lifeform that resembles neither of its constituents and which for centuries was understood to be an altogether separate organism. Both profit from it.

The fungus uses algae to obtain the products of photosynthesis, while the algae uses fungus for protection from excessive sun or dehydration, thus reaching places where no other algae has ever set foot. You could say that a lichen is a fungus that discovered the concept of gardening. Together, these two organisms are capable of colonising the most inhospitable corners of the world. There are types of lichens that have more or less the same structure as the suburban city, but there are fortunately also those that show wonderful examples of three-dimensional constructions and soaring structures at high densities. There is still hope for the green city!