森林都市主义：比利时索尼安森林的城市－生态策略及实施途径

FOREST URBANISMS: URBAN AND ECOLOGICAL STRATEGIES AND TOOLS FOR THE SONIAN FOREST IN BELGIUM

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布鲁诺·德·缪德尔
比利时鲁汶大学工程科学学院建筑系都市主义与建筑研究小组都市主义专业教授

凯利·香农*
比利时鲁汶大学工程科学学院建筑系都市主义与建筑研究小组都市主义专业副教授

阮明匡
比利时鲁汶大学工程科学学院建筑系都市主义与建筑研究小组博士候选人

Bruno De MEULDER
Professor of Urbanism, OSA Research Group, Department of Architecture, Faculty of Engineering Science, KU Leuven

Kelly SHANNON*
Associate Professor of Urbanism, OSA Research Group, Department of Architecture, Faculty of Engineering Science, KU Leuven

Minh Quang NGUYEN
PhD Candidate, OSA Research Group, Department of Architecture, Faculty of Engineering Science, KU Leuven

*Corresponding Author
Address: c/o KU Leuven, Faculty of Engineering Science, Department of Architecture, Kasteelpark Arenberg 1, 3001, Heverlee, Belgium.
Email: kelly.shannon@kuleuven.be

摘要

本文通过回顾大布鲁塞尔及周边地区的索尼安森林与人居环境交融演变的发展历程，阐释了“森林都市主义”这一概念。森林景观被认为是生态（提供大量生态系统服务）和城市环境的基本结构。森林都市主义是城市建设的一种形式，其依靠森林作为跨越（与交通、人居环境和生态相关的）尺度和维度的结构性要素。城市建设与大面积森林的相互作用体现为地域尺度上具有不同性质的各式森林形态。本文揭示了布鲁塞尔地区的森林和城市建设之间的相互影响，其中，城市环境的尺度、密度、品质和发展压力不尽相同，从坐落于森林中的人类定居点到拥有鲜明肌理的森林–城市的形式和方式也有所差异。索尼安森林及其周围环境随着时间发生的持续变化、所面临的当代挑战，以及未来可能的发展方向都非常引人瞩目。本文探究了森林砍伐与造林、人居环境与城市环境重建之间平行却又相互交织的过程和复杂关系。最后，作者认为，当下迫切需要通过重新梳理开发与保护的关系，来重建城市与森林之间生产与消耗的平衡。

关键词
森林；都市主义；比利时；设计研究；索尼安森林

ABSTRACT

This article unfolds the notion of “forest urbanism” through a discussion on the intertwined evolution of the Sonian Forest and settlement development in the greater Brussels environs through history. The forest landscape is considered a fundamental structure, both for ecology (delivering numerous ecosystem services) and the urban environment. Forest urbanism is an urbanism that relies on the forest as a structuring device across scales and dimensions (in relation to mobility, settlement, and ecology). The interplay of urbanism with the large forest domain operates at the territorial scale and various forest domains of very different natures. It unravels forest and urbanism interplays within the Brussels region with quite different urban contexts (scale, density, quality, development pressure, etc.) and with quite different forms and modalities (from settlements embedded within the forest to the forest-city as adjacent domains). The Sonian Forest and its surroundings are exceptionally compelling with regards to both their continuous transformation over time, contemporary challenges, and possible future trajectories. The article traces the parallel, intertwined processes and complex relations of deforestation / afforestation and settlement / restructuring of urban environments. As will become evident, the relationship that always iterated between a productive and consumptive one, urgently requires a recalibration where exploitation / consumption is balanced by protection / production.

KEY WORDS
Forest; Urbanism; Belgium; Design Research; Sonian Forest

编辑、翻译 田乐
EDITED AND TRANSLATED BY Tina TIAN

1 森林都市主义的发展历程：从中世纪到“美好时代”①及以后

索尼安森林既是一处具有纪念意义的生态资产，也地处一个不断扩大的都市区的核心地带，被层层城市肌理所包围。它是上个冰河时期后覆盖整个欧洲西部地区的巨大炭森林的残存部分[1]。然而，该森林不断遭受砍伐的历史可以追溯到加洛林王朝（公元732~888年）时期。大约在公元1000年时，随着布鲁塞尔城邦在塞恩河谷中建成，森林中出现了第一个人类定居点，索尼安森林成为了一个“取之不尽用之不

① “美好时代”在西方历史中通常指从普法战争结束到第一次世界大战爆发（1871-1914）这段时间。

① The Belle Époque (French for "Beautiful Era") in Western history is conventionally dated from the end of the Franco-Prussian War in 1871 to the outbreak of World War I in 1914.

竭”的资源宝库（包括建筑木材、燃料和食物）。时至今日，森林与城市的角色已然颠倒，残存的索尼安森林面积（4 383hm^2）已远远小于布鲁塞尔都市圈的面积（16 100hm^2）。当前的森林集中在塞恩河河间地（主要位于布鲁塞尔和哈雷这两座城市）及迪杰勒河（一条向东延伸的河流，主要位于鲁汶和瓦维尔这两座城市）支流之间的高原（海拔高度65~130m）之上[1]。粗看之下，城市和森林似乎形成了鲜明对比：低与高，湿与干，斑驳与葱郁，平地与丘陵，人工与自然，有限与无垠。同时，无论是过去还是现在，二者又都受限于彼此。尽管城市已成为公共领土，但森林仍保留了封建统治时期作为封建领地的属性。如果说城市是人造的、需被治理的，那么森林就是被贵族统治的封建领地，这似乎已变得天经地义。城市和森林看起来像是两个相互颠倒的平行世界。

事实上，城市的发展与森林密不可分。自1989年比利时联邦政府成立以来，该国的森林就被划分为三个区域：佛兰德地区（56%）、布鲁塞尔首都地区（38%），以及瓦隆地区（6%）[1]。木材贩卖导致森林所有权频频变更，并常常彻底改变森林形态，包括大规模砍伐（作为战争赔偿的一种形式）、农业发展（作为盈利性更高的一种生产性景观），以及由土地投机行为引发的大规模郊区化。经历了所有权更替、管理实践，以及被开发、滥用和改造等一系列事件，大部分的森林由资源开采地（狩猎、伐木、木制品原料获取等）转变为了开发区（中世纪的修道院建设在很大程度上为在砍伐过的森林区域发展农业铺平了道路）、人工造林区，仅仅为满足城市化需求而提供资源，直到最终仅有的残存林地变为自然保护区（保留下来的森林已成为布鲁塞尔地区的一个主要公园）。这也使索尼安森林具有了自然保护区②与遗产③的双重价值。

1 Episodes of Forest Urbanism: From the Early Middle Ages to the Belle Époque① and Later

The Sonian Forest (Zonienwoud / Forêt de Soignes) is simultaneously a monumental ecological asset and at the heart of the ever-expanding metropolitan area that literally envelopes it. It is a remnant of the huge coal forest that covered the whole of Western Europe after the last Ice Age[1]. The coal forest was however systematically felled since the Carolingian Era (732-888). First settlements in the forest (around the year 1000), coincided with the foundation of Brussels in the Senne Valley, for which the Sonian Forest appeared an inexhaustible resource (construction wood, fuel, and food). Today, roles are reversed and the remaining Sonian Forest (4,383 hectares) is substantially smaller than the Brussels agglomeration (16,100 hectares). The forest occupies the plateau (65 to 130 meters above sea level) between the interfluvial areas of the Senne (anchoring the cities of Brussels and Halle) and Dijle (to the east spanning, anchoring Leuven and Wavre) tributaries[1]. On first sight, city and forest appear to be one another's inverse: low versus high, wet versus dry, mineral versus green, flat versus hilly, artificial versus natural, limited versus endless. As well, both worlds were (and remain) subject to different regimes. Whereas the city became the territory of the citizen, the forest remains a seignorial domain in the best feudal tradition. Where the city is considered to be human-made and governed, the forests were seignorial domains and as such governed by nobility, as if a God-defined natural order. City and forest appear as parallel worlds that invert one another.

In fact, development of city and forest have been closely intertwined. Since the federalization of the Belgian State in 1989, the forest has been divided between the three regions of the country: 56 percent in the Flemish Region, 38 percent in the Brussels-capital region, and 6 percent in the Walloon region[1]. Successions usually went hand-in-hand with selling and often radically transforming the forest, including intensive logging as part of settling war bills, agricultural development which proved more lucrative as a productive landscape, and massive suburbanization triggered by land speculation. As this whole chain of successive ownership, management practices, uses, abuses, and transformations unfolded, large parts of the forest turned from sites of resource extraction (hunting, wood logging, wood products harvesting, etc.) to colonization (medieval abbeys largely paved the way to agricultural exploitation of cleared forest pockets) to reforestation and simply consumption for urbanization until finally the remaining relict became a nature conservation site. In reality, the preserved forest functions as a major park of the Brussels region. It is no wonder that nature conservation② and heritage③ go hand-in-hand.

很久以前，森林就拥有了除却原始荒地之外的文化属性。自中世纪早期开始，索尼安森林中便出现了修道院、城堡、农场等设施。从12世纪起，至少有7座修道院被嵌入森林之中，人们开始定居于此，并将“文化”带入森林和林间空地。森林本身很快就成为了被管理的对象。伐木与种植、滥伐与造林、定期维护与按时收获、使用与权利，所有的这些都体现了权衡、定义和实施的过程。森林管理和城市建设几乎是同时出现的，在文化视角下，森林和城市这两个错综复杂的、共同演进的世界拥有各自的发展节奏、周期和波动。在荷兰语（当地语言）中，林业和城市建设分别为“bos-bouw”和“stedebouw”，其字面意思是“建造”森林和“建造”城市——“建造”越多，就承载越多的复杂多重性。

有学者认为修道院促进了人类定居点（修道院和小村庄以及后续出现的村落）、森林（天然森林、经管理的森林、砍伐后的林地、人工林地和人工复垦的荒地）与因农业发展而具备文化属性的林间空地之间的动态相互作用（图1）。这种相互作用恰恰使森林都市主义陷入了一种脆弱的平衡：森林和人居环境（包括农田）作为两个互为基底——或至少相互作用——的领域交织在一起，形成了一种有意识的、合理的空间发展。这种森林都市主义的另一种形态体现在众多建在广袤森林中的城堡区域，以及在城堡本身之外发展起来的庄园及附属建筑、小村庄的雏形和自然形态的村落，共同形成了一种错落分布的“文化斑块”。同时，伴随着森林与人类定居点（开垦区）的相互交织，这种早期的森林都市主义形式也与河谷地区城市（及其市场）的发展有关。从中世纪早期开始，曾经浩瀚如海的“炭森林”在一次又一次的砍伐下变得支离破碎，而残存的森林仍与邻近城市保持着密切的关系：哈勒博斯森林和索尼安森林分别对应哈雷和布鲁塞尔这两

Quite early, the forest exchanged its status from a savage wasteland into a cultured domain. From the Early Middle Ages onwards, the Sonian Forest harbored abbeys and castles, farms and the like. No less than seven abbey domains were embedded within the forest from the 12th century onwards, carving out settlements and bringing “culture” into forest pockets and clearings. The forest itself soon became an object of management. Cycles of logging and planting, de- and reforestation, maintenance and harvesting calendars, access and rights, were all weighed, defined, and enforced. Forest management and urbanism seem to have almost emerged simultaneously, since both the forest and the city staged their parallel complex itineraries as cultured domains, each with their own rhythms, cycles, and waves of development. In Dutch (the local language), forestry and urbanism translate as “bos-bouw” and “stedebouw,” literally the “building” of forest and the “building” of city. The more they are constructed, the more they both host complex multiplicities.

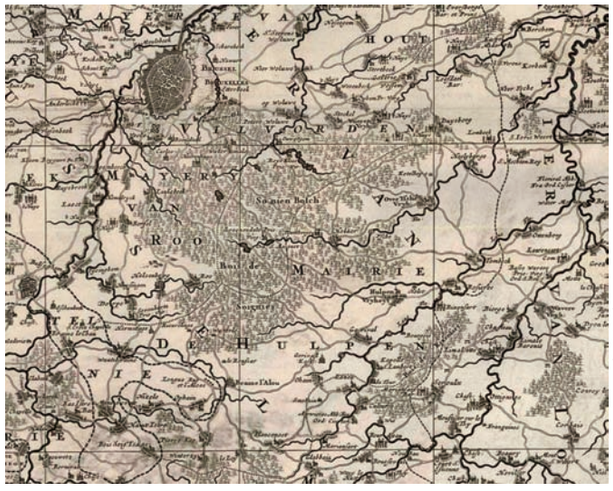
One could argue that the abbeys created a dynamic interplay between settlement (abbey and hamlets and villages that emerged in their wake), forest (natural forest, managed forest pockets, cleared forest patches, plantation forests, and domesticated wasteland), and that the cleared forest brought in culture by way of agriculture (Fig. 1). The interplay was archetypical as a fragile form of forest urbanism: a consciously reasoned spatial development where forest and settlement (including agricultural fields) were intertwined as complementary or at least interacting domains. A variant of this form of forest urbanism also originated from the numerous castle domains that inserted themselves within the once endless forest, and developed, besides the castle itself, homesteads and outbuildings, initiated hamlets, and founded villages, while bringing in “culture”

② “自然2000”是欧盟范围内的一个自然保护区网络，其由分别依据《栖息地保护条例》及《鸟类保护条例》划定的重点保护区及特殊保护区组成。索尼安森林中有2 066hm^{2}的区域属于“自然2000”网络。更多相关信息，请访问http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BE1000001。

③ 2017年，联合国教科文组织将索尼安森林中400hm^{2}的区域划定为喀尔巴阡山脉和欧洲其他地区原始榉树林的一处遗址（遗址编号1133ter-023）。更多相关信息，请访问https://whc.unesco.org/en/list/1133。

② Natura 2000, a network of nature protection areas in the territory of the European Union made up of Special Areas of Conservation and Special Protection Areas designated respectively under The Habitats Directive and The Birds Directive. There are 2,066 hectares included in the designation. For more information, see http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BE1000001.

③ In 2017, UNESCO World Heritage status for Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe was granted to 400 hectares of the Sonian Forest (UNESCO ID 1133ter-023). For more information, see https://whc.unesco.org/en/list/1133.



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© De Ferraris, J. (1777) in De grote atlas van Ferraris: De eerste atlas van België (1:25.000) (2011). Tielt: Lannoo.
2

座坐落在塞恩河上的城市，米尔达尔沃乌德森林则对应迪杰勒河上的鲁汶城（图2）。

尽管城市和森林之间存在物品、动物和人的多样化的关系、相互作用及流动，但事实证明，城市无法摆脱对森林的依赖：森林终究是一种可以带来快速收入的资源。为了满足哈雷、鲁汶、瓦维尔、（特别是）布鲁塞尔等周边城市不断增长的消耗性需求而进行的资源开采和砍伐，已超过了森林自我修复能力和人工造林的速度。在动荡不安的18世纪，民众开采和贵族（出于资金短缺而进行的）砍伐导致森林面积锐减。森林砍伐的数量如此之大，以至于奥地利政权（1714–1795）被迫进行大规模的造林计划，以增加森林面积。“造林”计划的规划者乔奇姆·瑞尼尔认为，应当运用启蒙运动时期发展起来的现代林业原则（但在生态意义上并非明智之举），尽可能多地种植山毛榉（*Fagus sylvatica*）这一种树种并形成大规模森林。正是该计划的实施将索尼安森林变成了一座巨大的“森林殿堂”：如今，大部分榉树树龄在200年以上，且仍是索尼安森林景观中的主角（尽管在过去的10年间，森林管理加强了生态多样化建设，以形成更自然的混生林）。[2]无论如何，瑞尼尔“造林”计划中遗留下来的数十万株榉树无疑是布鲁塞尔地区最宏大、最具纪念意义的人造成果。索尼安森林现已成为层次分明的、有生命的文化遗产。

19世纪30年代，布鲁塞尔周边地区突然出现的大量“空置”土地引发了郊区化进程。起初，随着各种或大或小的城堡领地的排他性拓张（为了分封新国家政权下的新兴贵族及精英），这一过程推进得很谨慎。后来，随着机动车数量呈指数级的增长，森林及其周边地区被别墅和后来的平房开发严重蚕食。自第二次世界大战以来，该地区最大的住宅（及其服务）开发项目正发生在森林周围及无人监管的森林

1. 18世纪：比城市面积更大的森林。这张17世纪的地图显示，当时的索尼安森林面积远远大于布鲁塞尔的面积。作为森林中的人类定居点，一些修道院、城堡和小村庄彼此联系在一起。它们主要与河流支流河谷以及通往布鲁塞尔东南部的运输道路相连。
2. 1777年：景观结构详图。著名的菲拉里斯地图是比利时第一幅系统性的大规模地图，由奥地利荷兰的制图师约瑟夫·德·菲拉里斯绘制。这幅地形图非常详细地描绘了工业革命开始前河谷之间的森林高原地貌。整个高原上有一系列显著且分布广泛的支流，这些支流由冰河时代末期的冰川演变而来。

1. 17th century: More forest than urbanism. The 17th century map reveals that, at the time, the Sonian Forest was significantly larger than Brussels. A number of abbeys, castles, and small villages, all related to each other, settled within the forest. They are primarily linked to the valleys of river tributaries and carriage paths linking the southeast territory to Brussels.
2. 1777: Detailed topography of landscape structures. The well-known Ferraris maps, by cartographer Joseph de Ferraris of the Austrian Netherlands, were the first systematic and large-scale mappings of Belgium. The highly detailed topographic maps highlight the forest plateau between the river valleys just before the start of the industrial revolution. The whole plateau is marked with a remarkable and extensive constellation of deeply carved out tributaries formed by glaciers at the end of the ice age.

patch by patch. This early form of forest urbanism, intertwining forest and settlement (development), was, at the same time, related to the development of the cities (and their markets) in the river valleys. The once unlimited “coal forest” that was systematically felled from the Early Middle Ages onwards, became a fragmented sequence of relict forests that maintained close relationships with adjacent cities: Hallerbos and Sonian Forests respectively with Halle and Brussels (both on the Senne River) and Meerdaalwoud with Leuven on the Dijle River (Fig. 2).

Despite the fundamental multiplicity of relationships, interactions, and flows of goods, animals and people between the city and the forest, the dependency of the city on the forest also proved to be an Achilles heel. Ultimately, the forest remained an easy and fast source of income. Extraction and logging for the ever-growing and consumptive demands of cities (Halle, Leuven, Wavre, and particularly Brussels) exceeded both natural self-renewal and reforestation. In the turbulent 18th century, the forest was substantially reduced as it was plundered by the population and logged by the nobility (which was short of funds). Deforestation occurred at such a large scale that the Austrian regime (1714–1795) was forced to undertake a massive reforestation program to supplement the pieces of remnant forest. Joachim Zinner, who elaborated the “restoration” scheme, conceived it an as massive as monocultural beech (*Fagus sylvatica*) production forest, applying modern forestry principles (yet ecologically inappropriate) which were developed during the Enlightenment. It is this episode that turned the forest into an immense cathedral. Slender and high beeches, often more than 200 years old, still dominate the Sonian Forest landscape today (although during the last decade, forest management induced a process of ecological diversification to obtain a more naturally mixed forest).[2] Anyhow, the hundreds of thousands of slender columns of the Zinner plan established, without doubt, the largest and most monumental construction of the Brussels region. The Sonian Forest has a layered and living patrimony.

In the 1830s, the sudden abundance of “vacant” land in the vicinity of Brussels initiated a suburbanization process. At first the process was quite timid, with the development of small and large (but always exclusive) castle domains for the nouveau-rich nobility and elites of the new national regime. With time and following close in the heels of the exponentially increasing acceleration of vehicular mobility, the forest and its surroundings were massively encroached by villas and later bungalows. Since the World War II, the largest part of the residential (and in its wake services) development in the region has taken place around the forest, and — whenever unguarded moments occurred — in the forest (fringes). In ecological terms, the systematic occupation of the fringes has

之中（边缘地带）。从生态学角度来看，森林和开阔地之间的过渡区具有丰富的生物多样性，因此对森林边缘地带的不断蚕食将造成灾难性的后果。森林周围的整个郊区带成为了一个巨大的荒地—城市交界面[3]。

时至今日，城市仍在向野外森林扩张，将那些城市需要但又不想容纳的基础设施和设备建在了从前的“荒芜之地”中。这种邻避现象在索尼安森林案例中体现得尤为明显，体育场、电信和电力传输站等常见的设施都建在森林之中。20世纪60年代，城市的环城公路也建设在森林内，包括一个作为区域性交通枢纽（公路）的交叉路口（图3）。东环路（R0）连接起了比利时南部的主要公路（通往芒斯/卢森堡/巴黎方向）。森林正逐渐成为大都市发展的中心（但无实质功能）。它既是该地区的转向盘，也是枢纽，但却不再提供任何服务——或者更准确地说，主要的城市活动已从这里销声匿迹；与此同时，索尼安森林也变成了当代大都会的一个空心的中央公园。森林已成为一个生态结构和广阔的休闲区域；既是当地的垃圾场，也是瑰宝。

利奥波德二世（1835–1909）是历史上唯一将森林作为准大都会的娱乐中枢进行大力开发的君主。他不仅在特鲁伦地区重新建造了“避世之林”（1875–1880），建立了令人惊叹的特鲁伦植物园，也扩大了当地马尼斯森林的面积，将主要的都市休闲基础设施建在森林之中。索尼安森林（包括残存的森林、新种植区域和纪念性公园）中很快增添了纪念性赛马场、高尔夫球场、“网球小屋”和皇家池塘等康乐设施，供精英们打高尔夫、赛马、湖畔漫步、与亲友野餐，或者在周末举办茶会。由有轨电车、铁路、漫步道和观景道构成的路网连通了城

© U.S. Army Map Service (1943), series 2364 (sheet 8)

3

been catastrophic since the transition areas between forest and open land are the areas of richest biodiversity. The whole suburban belt around the forest is one mega wildland urban interface (WUI)[3].

Until today, the city catapults itself into the (wild) forest, into the previously considered “wasteland” with infrastructure and facilities that the city needs but does not want to accommodate. The Sonian Forest is on the receiving end of NIMBY. Sport complexes, telecom, and electricity transfer stations and the like inhabit the forest. You name it, it is there. In the 1960s, the city ring road was dumped in the forest and it literally hosts the central (highway) crossroads of the region (Fig. 3). The east ring road (R0) crosses the major highways to the south of the country (direction Mons / Luxembourg / Paris). More and more, the forest becomes the (functionally empty) center of the metropole’s development. It is both the turntable of the region and its crossroads. However, nothing happens inside, or more correctly, no primary urban activities take place inside the center, crossroad, or turntable. The Sonian Forest has been simultaneously turned into the empty heart and the central park of the contemporary metropole. It is an ecological structure and an expansive recreational area. It is simultaneously the region’s dumping ground and its jewel.

King Leopold II (1835-1909) understood, as no other before him or since, the potential of the forest as the recreational armature of the metropole-in-the-making. He not only extended the domain by re-planting the Kapucijnenforest (in Tervuren, 1875-1880), founding the astonishing arboretum of Tervuren, adding the Marnix Forest (also in Tervuren), but also embedded major metropolitan leisure infrastructure within the forest. The Sonian Forest (as a patchwork of remnant forests, newly planted domains and monumental parks) suddenly accommodated monumental hippodromes, a golf course, “tennis chalets,” and the Koningsvijvers (the Royal ponds), amongst other amenities. The forest became the natural environment of elite leisure — to play a round of golf, bet on horses, walk around the lake, picnic with friends and family, or have a Sunday tea and cake. A network of tramways, railways, bridal paths and scenic roads delivered access to forest and the services it hosted. The forest became the armature of the pleasant city — a forest city, a city built in and around the forest.

Last but not least, during the Leopold II era, majestic links between the forest and city were created: sequences of spaces where nature penetrates in the city and simultaneously transforms from natural to urban forms, from forest to park to boulevard and avenue to square. At the end of his life, Leopold II projected a whole new (and new type of) city within the forest. Tervuren would be one of the poles. It transformed the interlocked bipolar city-forest complex into a truly revolutionary multi-polar constellation of forests (the patchwork of forests and parks that the Sonian is

3. 1943年：现代化、城市化，以及生态的大规模丧失。20世纪的工业化，尤其是沿河道进行的城市化受到了基础设施发展的推动作用。森林景观经历了大规模破碎化的过程，但其仍与基础设施网络形成了鲜明对比。

3. 1943: Modernization, urbanization, and massive loss of ecology. The 20th century brought industrialization, particularly along waterways while urbanization was driven by infrastructure development. The forest landscape was subjected to a process of extensive fragmentation, but remains characterized as a gap in the infrastructural mesh.

市与森林及其中的各项服务设施。森林成了这座怡人城市——一座森林城市，一座建在森林中及森林周围的城市——的中心。

在利奥波德二世时期，森林和城市之间建立起了前所未有的联系：一系列自然空间向城市中渗透，并由自然形态转变为城市形态，从森林到公园，再到林荫道和大街，再到广场。在其统治的末期，利奥波德二世在森林中规划了一个全新的（新型的）城市，将相互嵌套的城市—森林两极复合体系颠覆性地转变为一个集森林（与索尼安森林—公园斑块式肌理类似）、多中心城市（以布鲁塞尔和特鲁伦为首）和各种便利设施（高尔夫球场、赛马场、俱乐部等）于一体的多极体。1897年的布鲁塞尔世界博览会在朱贝尔公园和特鲁伦（森林两侧的边缘）举行，成为未来城市—森林建设的开端。利奥波德二世去世多年后，他的构想仍对众多旨在将特鲁伦打造为一座世界城市及曼达纽姆遗产城市④的计划有所启迪。人们不断提出特鲁伦森林城市的新构想方案，以迎合他们所处时代的城市发展需求。

利奥波德二世离世后，人们对森林的主动开发和大规模干预虽有所放缓，但对重新拥抱森林的新型城市化的兴趣却日渐浓厚。利奥波德二世通过果敢的举措（即明确的行动和有计划的实施，而非空谈理论）为森林都市主义开拓了一种新的形式。与其实践相比，利奥波德二世未形成明确的森林都市主义理论。然而，二战后的森林都市主义范式（以浑然天成的林中住宅形式为代表）——无论是理论还是实践——仍旧是模糊而漫无目的的。20世纪50年代，在森林中建造的别墅已经具有浓重的栖居文化色彩，但由于开发缺乏统一规划和对森林的一味侵占，其代表的森林都市主义的实施路径仍是模糊的，未形成一个整体上的全新环境。如今的规范化开发行为犹如一个个吸榨森林资源的寄生虫，使森林复杂的生态系统、有趣的空间环境及其景观结构都处于崩溃的边缘（图4）。

所有这些都使得今天的问题异常棘手。（原有）森林中无区别化的住宅建设、分散的城市化和漫无目的的建设行为导致了空间的碎片化（图5），进而严重地影响了当地的交通（因为所有事物都处于散布状态、缺乏凝聚性）（图6），造就了千篇一律、犹如散沙般的郊区化形态（图7），同时（正如生物学家发出的警告）导致了生态崩溃（图8）。森林和城市的多样性被层次逐渐消失的简单性所取代。这一势态亟待扭转。

2 当代挑战

目前，索尼安森林既是将其完全包围的布鲁塞尔大都会区的中心公园，也是该区域（残余的）生态结构的基础，亦是包含大都会区交通枢纽的主要空间结构。它可能发挥了中央公园的功用，但人们从未意识到这一点，更不用说为森林完善相关建设了。如上所述，许多道路都从林间穿过，包括17km的车行公路、152km的非机动车道路、

④ 曼达纽姆是一个世界级知识机构，由保尔·奥勒特于20世纪初构建。奥勒特将曼达纽姆设想为一座“世界之城”的核心，一个新的世界级的知识城市，那里将储存亿万份人类已有知识的检索卡片和文献。

④ Mundaneum is a world institution of knowledge invented by Paul Otlet in the early twentieth century. Otlet regarded the project as the centerpiece of a "world city," a project for a new international knowledge city which eventually became an archive with millions of index cards and documents.

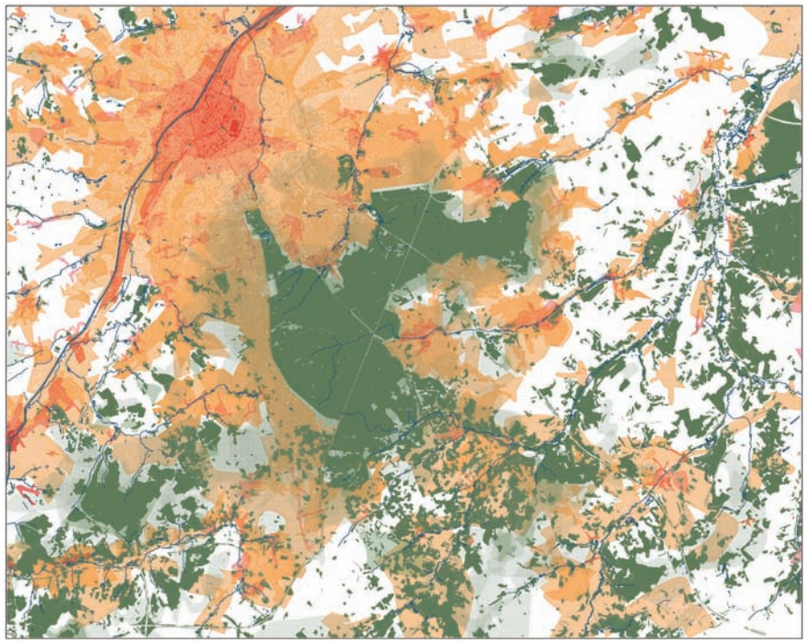
known for), various centers (Brussels and Tervuren to begin with) and amenities of all kinds (golf courses, racetracks, clubs, etc.). The Brussels World Exhibition of 1897 — that took place in the Jubelpark and in Tervuren (in the fringes of two opposite sides of the forest) — functioned as a rehearsal for the building of the city-forest of the future. Long after his death, the vision of Leopold II resonated in numerous schemes for a World City and Mundaneum in Tervuren④. They all revive the idea of a new form of forest city in Tervuren, while resonating the urbanistic paradigms of their times.

Although the capacity for forceful action and structuring interventions might have faded with the death of Leopold II, the taste for a new form of urbanity that re-engages with the forest was awakened. Leopold II articulated a form of forest urbanism through his energetic (and always speculative) operations; in other words, more by clear action and directed realization, than by explicit discourse or theory. Leopold II's theory of forest urbanism was as implicit as its practice was explicit. However, the post-war paradigm of forest urbanisms, both as a discourse and practice, remains diffuse and unarticulated. Nevertheless, post-war forest urbanisms were propelled by an incredibly strong image of residing in the forest — as if it was natural. The 1950s villas built in the forest have become very strongly imbedded within dwelling culture, but remain implicit regarding an approach to forest urbanism since their occupation lack cohesion and simply consume the forest, without producing an overall qualitative new environment. The now normalized practice parasites so much on the forest that it is on the precipice of collapse as a complex ecological system, as an interesting spatial setting, and as a landscape structure (Fig. 4).

All this makes the situation today highly problematic. The generic inhabitation of (previous) forest sites, diffuse urbanization and lack of deliberate articulation result in spatial fragmentation (Fig. 5) that, in turn, generates impossible mobility challenges (as everything is dispersed and lacks density) (Fig. 6), produces a highly monotonous and diluted form of sub-urbanism (Fig. 7) and causes, as biologists warn, ecological collapse (Fig. 8). The multiplicity of both forest and city is exchanged for thinned-out simplicity. A reversal of this process is urgently required.

2 Contemporary Challenges

Presently, the forest functions simultaneously as the central park of the Brussels metropolitan region that completely surrounds it, as base of the (remaining) ecological structure of the region, and as the main spatial structure of the metropole that contains its main crossroads. It might function as central park, it



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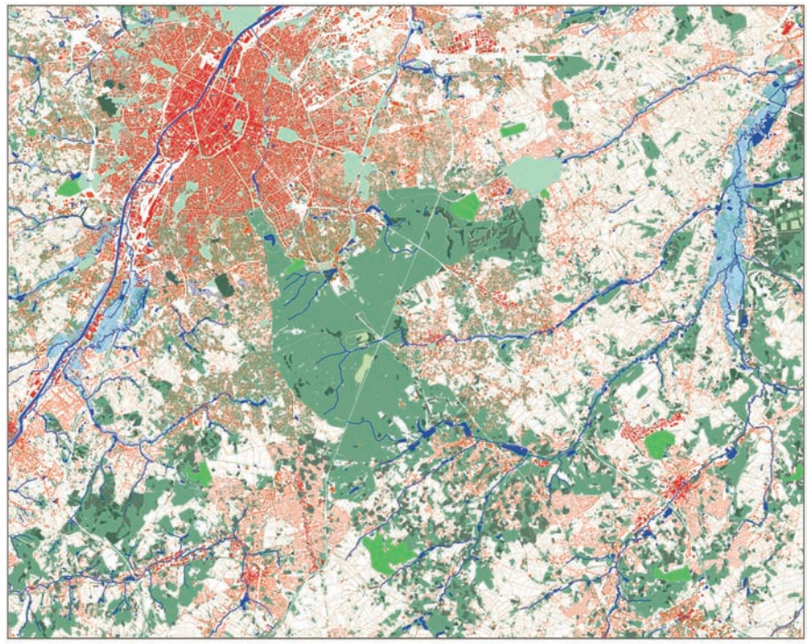

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84km的人行道、30km的自行车道，以及50km的马行道[1]。

如今，索尼安森林以其壮观的山毛榉景观而闻名（树干细长的山毛榉林下是稀稀拉拉的灌木丛）。山毛榉之所以成为了森林中的优势物种，是由于它为耐阴植物，且本身叶片宽大，遮蔽了阳光，抑制了其他物种幼树的生长。目前，其覆盖了近65%的森林面积[4]。除山毛榉外，森林中还有其他6种主要树种，数量由多到少依次为：橡树（*Quercus* spp.）、苏格兰松（*Pinus sylvestris*）、欧洲落叶松（*Larix decidua*）、欧洲黑松（*Pinus nigra*）、花旗松（*Pseudostuga menziesii*）及欧洲云杉

has however, never consciously been given that status, let alone being equipped to perform that role efficiently. As mentioned above, many paths and roads cross the forest. There are 17 kilometers of roads open to motor vehicles, 152 kilometers of roads closed to motor vehicles, 84 kilometers of footpaths, 30 kilometers of bicycle paths, and 50 kilometers of bridle paths[1].

Today, the Sonian Forest is renowned for its cathedral aspect of beech areas, consisting of old beeches with slender trunks and an almost non-existent underbrush. Beech tends to dominate in forests because it grows well in the shade and itself produces a lot of shade with its broad leaves, suppressing the growth of other young trees. It presently covers nearly 65 percent of the

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4. 森林与城市的演变
5. 2018年：现状。
6. 交通的挑战。特鲁伦城中大规模的高速公路基础设施现已对索尼安森林的生态完整性造成了实质性破坏。
7. 人居环境的挑战。从图中可以看出，像欧文杰斯这样毗邻森林的地区具有明显的优势，但也不难想象，无节制的投机建设使森林变得极为脆弱。
8. 生态的挑战。特鲁伦城（依照当地地形）呈现出具有典型佛兰德特色的带状发展形态，威胁着河谷系统和各种景观斑块的生态价值；大量不透水地面的使用也对自然水系造成了影响。

4. Evolution of forest and urbanism
5. 2018: Contemporary reality.
6. Challenge of mobility. As seen in Tervuren, there is a massive highway infrastructure which nowadays literally cuts the ecological integrity of the Sonian Forest.
7. Challenge of settlement. The obvious advantages of proximity to the forest are evident in allotments like this one in the municipality of Overijse. It is not difficult to imagine the extreme vulnerability of the forest proper due to unbridled speculation.
8. Challenge of ecology. Classic Flemish ribbon development, here in Tervuren, follows the logics of topography and threatens the ecological value of valley systems and various landscape mosaics. The large amount of impermeable surfaces disturb the natural water systems.

（*Picea abies*）[4]。为了适应当代的管理趋势，森林工作者希望丰富森林中树种的多样性。

随着布鲁塞尔大都会区的不断扩张，在森林和城市这两大系统注定唇亡齿寒的背景下，我们必须重视索尼安森林的重要性。很明显，森林和城市都面临着巨大的压力，迫切需要一套共同的愿景、战略行动，以及各种行动和措施来保障二者的相互可持续发展。城市和森林都已变得支离破碎、缺乏凝聚力、形态分散、不堪一击。现在亟待对二者的关系加以梳理，并对利用与保护、城市发展与生态修复、新规划与管理等冲突加以调和。基于此视角，通过对索尼安森林进行调查，设计实践提出了若干计划和方案，在考虑适用性的基础上满足发展需求，在从区域到微观的各个尺度上将生态与都市主义、森林发展与城市设计结合起来。

3 向国家公园转变：设计研究研讨会

2018年9月，一个为期两周的密集的国际设计研讨会在格罗能达尔城堡举行（共有来自15个国家的35名代表参加），包括弗兰德斯、瓦隆尼亚、布鲁塞尔等地的自然与森林机构在内的许多重要利益相关者在会上进行了密切磋商。此次研讨会旨在促进人们重新思考该地区重要的自然/文化关系，以及各利益攸关方如何通过寻找新的合作方式，共同重新描绘森林和城市的未来。设计研究使人们认识到森林都市主义的特殊性和紧迫性，即许多森林问题（首先是生态问题）、城市问题，以及它们之间的相互作用——所有问题都刻不容缓。设计研究也要服务于森林都市主义的愿景构想，通过交通、人居环境和生态等层面的考量，提出不同以往的新蓝图。

设计研究发现问题的过程与佛兰芒—布拉班特计划（又名“地平线+”计划）一同推进。该项目旨在“创建自然联系，宛如森林中的条条绿色山麓向周边城市延伸。这种方式可使不同的自然区域之间以及与森林的核心部分更好地相连，这对于无数动植物的重要性不言自明”[5]。“地平线+”计划的长远目标之一是将索尼安森林发展为国家

forest acreage[4]. In addition to beech, there are six other major tree species, in order of quantity: oak (*Quercus* spp.), coniferous Scots pine (*Pinus sylvestris*), larch (*Larix decidua*), Corsican pine (*Pinus nigra*), and Douglas fir (*Pseudostuga menziesii*) and spruce (*Picea abies*)[4]. In keeping with contemporary management trends, there is a desire by foresters to increase the diversity of tree species in the forest.

As the Brussels metropolitan region merges into a larger urban territorial entity, it becomes imperative to consider the Sonian Forest as essential patch of a forest system that inevitably interacts intensively with the urban system. It is clear that both forest and city are under intensive stress and in dire need of a shared vision, strategic operations, and a variety of actions and measures to guarantee their mutual sustainable development. Both the urban as well as the forest are fragmented, diluted, diffuse, and weak. Both need radical requalification. Above all, their relationship urgently requires clarification and contradictory conditions have to be reconciled: accessibility with conservation, urban development with ecological restoration, new programming with stewardship, etc. The design exercise that follows investigated the Sonian Forest from that perspective and developed projects and scenarios that couple ambition with applicability, ranging from regional to micro scales, and combining ecology with urbanism and forestry with urban design.

3 Design Research Workshop towards a National Park

In September 2018, an intensive international two-week design workshop was organized in close interaction with a number of important stakeholders, including the Flemish, Wallonian, and Brussels Agencies for Nature and Forest. The 35 participants from 15 countries worked in the Groenendaal Castle. The workshop was a catalyst for rethinking the region's fundamental nature / culture relationship and how various stakeholders can reimagine future relationships of forests and urbanism while finding new ways to cooperate. The design research created awareness of the particular and pressing issues of forest urbanism, namely a multitude of forestry issues (ecological in the first place), urban problems and questions concerning their interplay — all that require urgent action. The design research also gave way to visions for the territory, which focused on eye-opening propositions through the lenses of mobility, settlement, and ecology.

The problem formulation of the design research was co-developed with the Flemish Brabant project, Horizon+, which seeks “to create natural connections that, as green foothills from the forest, carry through the surrounding municipalities. In this way different nature areas can be better connected, both with

公园——比利时尚未广泛建设国家公园，目前仅于2006年开放了一处国家公园（霍根肯彭国家公园，面积57.5hm^2）。在构想中，索尼安森林国家公园将西至布鲁塞尔地区的哈勒博斯，东至米尔达尔沃，并一直延伸至东南部的瓦维尔地区。该构想建立在20世纪早期美国林学家吉福德·平肖特和本顿·麦卡伊的理论基础上：将公共领域的保护与多重利用相结合，并明确地将森林和流域联系起来。他们率先提出，不仅国家机构是集体景观的管理者，居民和使用者本身也是管理者[6]。通过对公园中现有的人类定居点进行重组以缩减占地面积，并将城市和市民都视为公园的照料者。很明显，这个从塞恩河延伸至迪杰勒河谷、从布鲁塞尔和鲁汶延伸至哈雷和瓦维尔的国家公园方案不仅大幅度扩大了索尼安森林的面积，也拓展了国家公园的概念——它将成为数十万居民的家。在这个意义上，多重利用中也囊括了居住功能。尽管构想的国家公园中可能有人栖居，但人们想到它的时候，仍首先认为其是一个以自然环境为主的公园。公园中发生的一切活动及所容纳的一切建设都无法取代其公园的特质。

4 森林与水都市主义

实现这一愿景的第一个策略是重塑该地区的生态环境。当今高度分散的森林和水系已成为现代化和城市增长危机下的牺牲品。人居环境、基础设施和农业——这三种并存的肌理的形态都极为分散——严重破坏了景观的连通性，大大减少了生物多样性（图9）。重建强健生态系统的重要一环是重构交通系统，而这也对生态修复发出了挑战。方案确定了三种交通密度——密集的城市路网、依据饱和交通量修建的城市外围路网，以及连接佛兰德斯和瓦隆尼亚其他地区的更大尺度的路网。后两种路网在许多情况下会切断森林，从而最终仅仅成为简单的十字路口。方案提出了4项具体措施，以迎接即将到来的交通变革。

首先，公路与和地方性发展并不匹配，其中卢森堡—布鲁塞尔国家公路（N4）将被改建成为地方公路。第二，在可能的情况下，公路基础设施将大幅减少，并对生态廊道进行必要的连接修复。公路深入到森林中的结构经由重新规划，成为了可以满足城市（而非区域间）通行需求的林荫大道。像赫尔曼—德布鲁克斯之类的穿入城市的高架桥将被拆除。大规模的“变道”改造将以利于交通转换为原则，同时也为生态系统融入城市结构预留出了更多的空间。未贯通的东部环路结构（R0）将被部分终止使用。改造后的公路系统将不会对景观空间造成影响（在地势起伏剧烈的景观地区采用高架桥或隧道从中穿过，而非将公路直接架设在景观之上），改造后的R0公路也将不再是生态

each other and with the core of the forest. These compounds are of unmistakable importance for numerous plants and animals”[5]. A long-term ambition of Horizon+ is to develop the Sonian Forest as a national park — a relatively recent designation and not yet widespread in Belgium, with merely one that opened in 2006 (Hoge Kempen National Park, 57.5 hectares). The idea of a Sonain Forest national park in the Brussels region would as well encompass Hallerbos (to the west) and Meerdaalwoud (to the east) and stretch until Wavre in the southeast. The notion of a national park for the region builds upon the reasoning of early 20th century American foresters Gifford Pinchot and Benton MacKaye, which combines conservation of the public domain with multiple use and explicitly links forests and watersheds. They spearheaded the concept that not only the State apparatus is custodian of the collective landscape, but also inhabitants and users are themselves stewards[6]. The existing settlements are restructured to lessen their footprints and municipalities and citizens are considered caretakers of the park. It is clear that by stretching the envisioned National Park from the Senne to the Dijle Valleys and from Brussels and Leuven until Halle and Wavre, the design not only enlarges the area of the “Sonian” drastically, but simultaneously broadens the notion of the National Park, since it would be inhabited by hundreds of thousands of inhabitants. Multiple use in this sense also includes a new notion of dwelling. As much as the envisioned National Park might be an inhabited park, it remains in the first place a park: a natural environment recognized as its primary structure. Whatever happens in it is embedded within it, and does not replace it.

4 Forest and Water Urbanisms

The first strategy towards realizing the vision was therefore to reconstitute the territory’s ecologies. The present-day, highly fragmented forest and water systems have fallen victim to the perils of modernization and urban growth. Human settlement, infrastructure, and agriculture — all three extremely diffuse, spread out and simultaneously present — have significantly compromised the connectivity of the landscape and substantially reduced biodiversity (Fig. 9). An important component in recreating robust ecologies was the profound reconfiguration of the mobility system that creates numerous barriers for ecology. Three densities of mobility were identified — the dense urban mesh, saturated urban periphery networks and larger scale connections with other parts of Flanders and Wallonia. In many instances, the latter two cut the forest, whereby it ultimately becomes regulated as a mere crossroads. Four concrete interventions are proposed to usher in the coming transportation revolution.

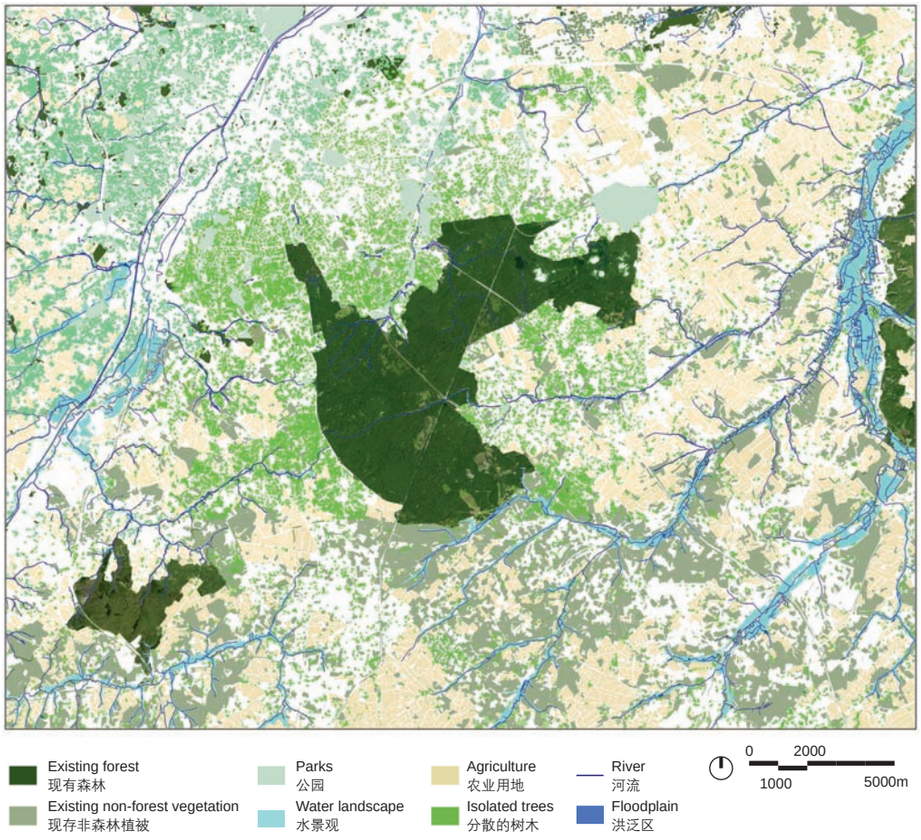
Firstly, highway and local systems are decoupled, including the

9. 现有生态环境。该地区的生态环境被体量过大且过度使用的交通基础设施所切断，被人类定居点及农业活动所滥用，其生态系统因娱乐开发而不堪重负……种种这些使得当地的生态环境严重碎片化。

9. Existing ecology. The territory's ecology is highly fragmented. It is disconnected by oversized and overused transport infrastructure, abused by residential settlements and agriculture, and overstressed by double-triple use of ecological systems for recreation.

裂口。第三，在现行政策下，加强公共交通网络——特别是区域快速路网、延长的有轨电车系统，以及拼车/共享汽车。最后，通过对终止使用的车辆基础设施进行改造并引入自治性电子自行车快行道，提升自行车基础设施。基础设施的重构使得生态系统中的关键性连接得以重建，并明确了潜在连接。森林不再是被跨越的对象，也不再仅是交通枢纽。当你沿着森林行走或最终进入森林时，你将发现自己穿梭于林海之中。生态重建后的索尼安森林将重新与城市肌理形成鲜明对比，而不是城市中的花园。最终，基于水、土壤和高原环境之间的相互影响，方案拟恢复由塞恩河和迪杰勒河众多支流构成的复杂区域性河谷结构，以连接森林中的各个飞地（图10），此举将创建一个远比传统意义上的遗迹更为宏大的森林形象，其规模之巨（广泛连接了生态系统）是为了启动高度城市化地区迫切需要的生态恢复，并创造一个包裹城市的基础结构。其将成为城市重构的框架及指导原则，扩大后的森林将缓解当前森林的过度使用现状。

在“森林与水都市主义”这一构想（图11）中，森林、水和城市都将得到稳健发展。基于交通考量的生态系统重建也符合重构人居环境的需求。当地除了一些可称之为森林都市主义的地区外，还有许多



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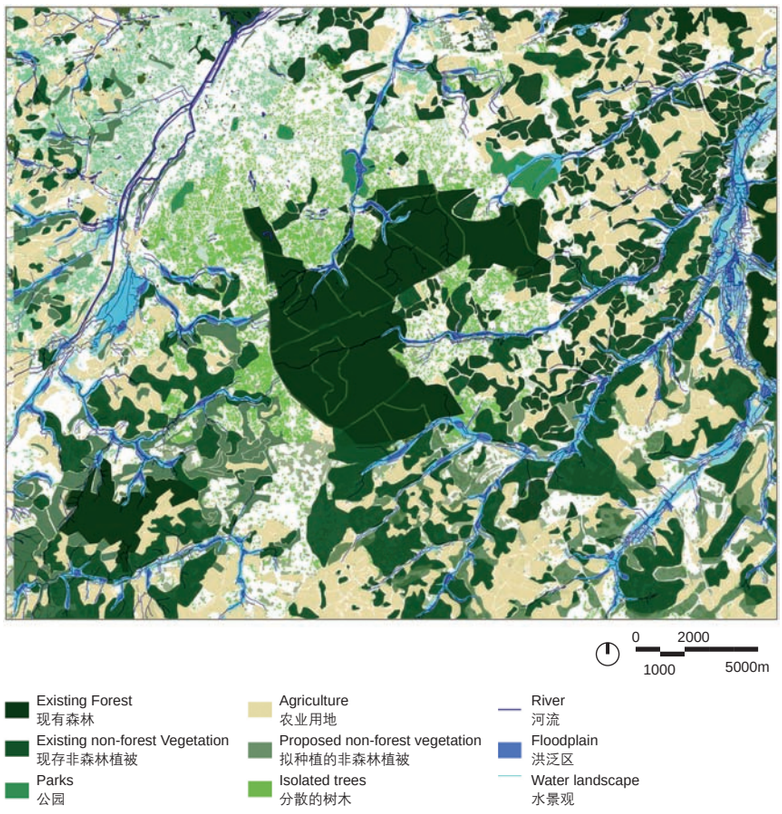
national road Luxemburg-Brussel (N4) which is restored and reduced to a local level. Secondly, highway infrastructure is, where possible, strongly reduced and eco-ducts restore necessary connections. The penetration of highways deep into the fabric is reconfigured into parkways with urban (instead of interregional) capacities. Viaducts such as Herman-Debroux (a penetration into the city of the A4 highway) is dismantled. Drastically “changing lanes” allows for the guidance of the mobility transition while at the same time allocating more space for ecological systems to weave into the urban structure. The incomplete east highway ring structure (R0) is partially decommissioned. In the proposed vision, it is simultaneously physically decoupled from the landscape (running on viaducts and in tunnels through the strongly undulating landscape, but never “on” the landscape). In this way the reduced R0 is no longer an ecological rupture. Thirdly, the public transportation network — particularly with a regional express network, extended system of tramways, and carpooling / car sharing schemes — is enhanced (in line with present policies). Finally, bicycle infrastructure is intensified through recuperating decommissioned vehicle infrastructure and introducing autonomous e-bike highways. The reconfiguration of infrastructure allows for critical connections of ecological systems to be re-established and latent connections to be accentuated. The forest is not something to cross. It is not a crossroad. One goes around a forest or eventually enters it and get lost in. It is a place to wander. The new ecology importantly repositions the Sonian Forest as a counterfigure of the city, and not its garden. Ultimately, through an understanding of the intertwinement of water, soil, and plateau conditions, the complex regional valley structure — structured by the multitude of tributaries of the Zenne and Dijle Rivers — was proposed to be restored and serve as the connectors of forest enclaves (Fig. 10). A greatly more extended figure than the conventional relict forest figure of the past is generated. The generous scale of it (the vast extent and width of connecting ecological systems) is meant to initiate ecological recovery which is necessitated by the strongly urbanized region and, at the same time, forms a base structure for the urban that is embedded within it. Its frames and steers the restructuring of the urban. The radical expansion provides relief to the overused existing relict forest.

In the Forest and Water Urbanisms proposition (Fig. 11), the robustness of forest, water, and urbanism are simultaneously strengthened. The reconstruction of ecologies, in relation to new mobility, goes hand-in-hand with the rethinking of settlement. The territory has a number of environments that can already be recognized as garden cities — including the remarkable heritage of Le Logis en Floréal and Kapelleveld (both designed

可以称得上“花园城市”的环境（包括由路易斯·凡·德·斯韦尔曼设计于1919年的勒洛什–弗洛艾尔和卡佩勒维德这两个著名的“花园城市”），这些区域往往拥有浓荫大树，环境良好，森林与城市交织杂糅。同时，还拥有许多其他的人居环境类型（包括带状开发住宅，分散且无组织扩张的单户住宅建设，环境较差的、缺乏配套服务和公共交通及其他共享交通网络的自用地住宅及宿舍），这些居住类型没有对景观资产加以利用（通常反而会破坏原有景观品质）。虽然这些品质较差的住宅也具有珍贵的遗产价值（承载着自第二次世界大战结束以来数十万居民的生活印记），但随着社会进步及住宅多样化的发展，这些住宅品质明显低于当前的技术标准要求（特别是在隔热、采暖及水电方面），因此需要尽快对其进行更新。在可能的情况下，需要对千篇一律的非集约型单户住宅在形态和类型上进行品质提升。从空间消费向空间生产转变是此举秉承的基本理念。方案拟将许多地方从

by Louis Van der Swaelmen in 1919) — while others could be called forest urbanism — which are characterized by extensive canopy, environmental quality, and a qualitative interplay between forest and urbanism. At the same time, there are also a host of other settlement types (including ribbon development, scattered sprawl of one-family houses, and low-quality allotment and dormitory settlements without sufficient services and access to public and other shared transport networks) which do not capitalize on the landscape assets (and often, on the contrary, destroy the pre-existing landscape qualities). While the sub-standard housing represents an enormous patrimony, the investment of hundreds of thousands of inhabitants since the end of World War II, it is also clear that the patrimony requires an urgent re-investment cycle since current technical standards (particularly thermal insulation, heating, electricity, and water) have substantially changed, as has social evolution and significant diversification. The dominant single-family houses are ill-adapted to current housing demands. Therefore, the rather stereotypical and space consuming single-family house types are, where possible, transformed into more qualitative morphologies and typologies. The notion to move from the consumption of space to production of space is an essential concept. A number of



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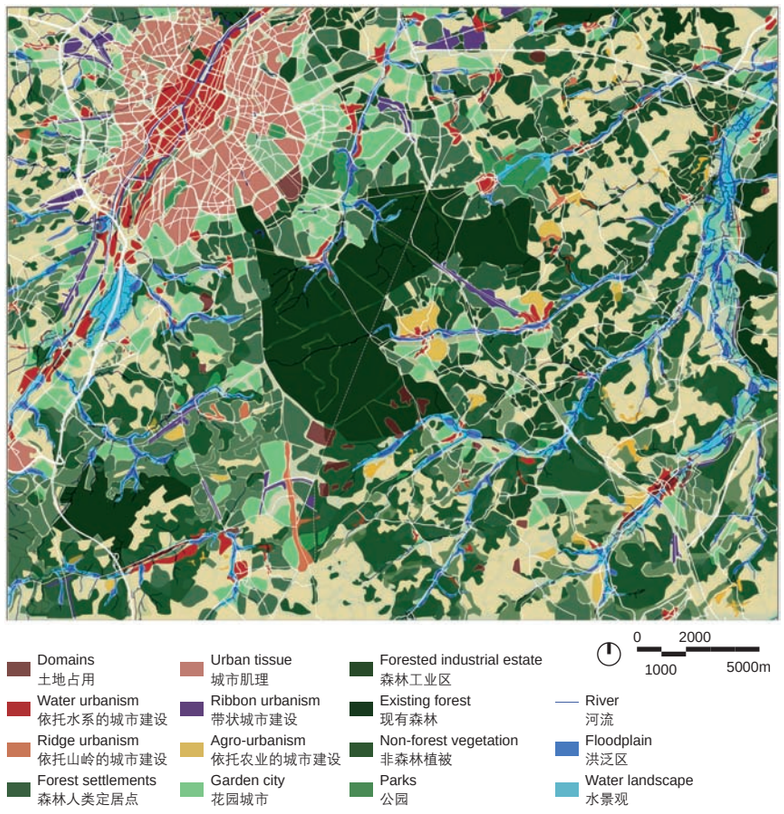

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单调的居住景观转变为森林都市主义——作为21世纪的新型花园城市和农业城市——而其他区域则完全去城市化并开展自然复育。

5 改造原则

为了平稳有序地实施“森林与水都市主义”构想，方案制定了一些设计策略和准则，以指导具体项目的实施。开发权集中（为了土地和资产合并）及开发权转让的政策工具被认为是一种强有力的补偿和监管制度——不仅是经济层面上的，更是“公共”或公共物品层面上的。开发权转让的妥当实施（将房地产的开发权与所有权分离）可以对密集或非密集城市建设决策起到引导作用（图12）。阿拉姆·J·雪瑞尔和阿丽莎·阿金斯在对美国开发权转让、增长管理和景观保护的研究中指出，“业主因被限制土地使用而获得补偿，而权力转让使在其他地方进行更高密度的开发从而获得更大的潜在盈利成为了可能；而在现行基线分区体制下，这些都无法实现。理想情况下，通过保护性役权或限制性契约对实施开发权转让的地块进行永久性保护”[7]。通过这种激励机制，低品质和低密度人居环境中的生态境况将得到改善，也将形成新的城市形态（及密度）。这将创建一种共赢局面：既实现了高品质（且可能更加广泛的）城市建设，也营造了新的自然。

根据基于地域尺度的总体构想，地方尺度（即城市设计尺度）的基础设施重大变革对生态修复非常关键。向后汽油时代的转变必须加强公共交通、电动汽车的共享和拼车，以及电动自行车、踏板车和其他个人出行方式（尤其是解决“第一英里”和“最后一英里”的需求）的结合。圣均尼斯罗得地区进行了重新激活火车站的测试；欧文杰斯地区的街道也进行了重新设计，以适应各种新的交通需求，同时将超大面积的沥青铺装区域改造为一个有趣的、更加生态的公共空间。通过人工造林和沥青区域改造等可能措施，随之发生的模式转变都将服务于生态空间建设（图13）。

10. 生态重建。设计方案拟重建森林和水系统的关键性连接廊道，作为必要的生态基础设施。重新连接后的系统将形成新型国家公园的核心，从塞恩河谷延伸至迪杰勒河谷，并将东南部的大片区域整合到国家公园之中。这些连接廊道将形成一个相互联系的整体，以提升生物多样性及应对气候变化的能力，更具韧性地发展城市建设并迎接即将到来的交通变革。
11. 森林与水都市主义。索尼安森林被设想为一个国家公园，用以提升森林生态环境及其与水系的融合。未来，公园将西至布鲁塞尔地区的哈勒博斯，东至米尔达尔沃，并一直延伸至东南部的瓦维尔地区。通过对公园中现有的人类定居点进行重组以缩减占地面积，并让城市政府和市民共同照料公园。

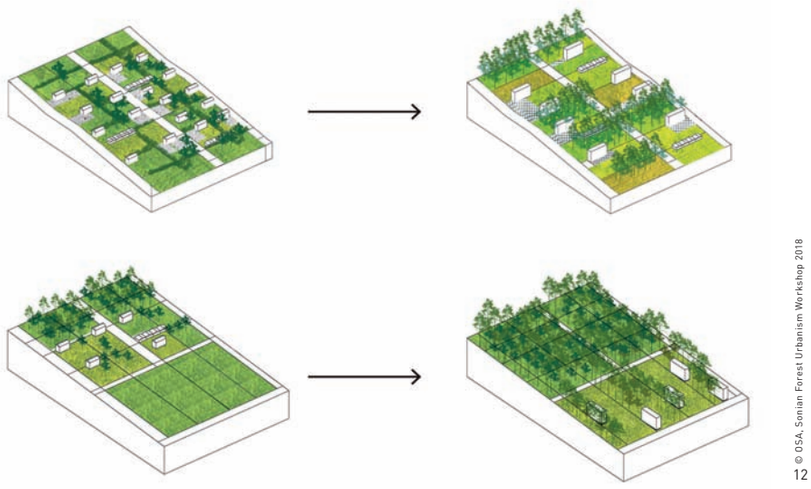
10. Reconstituted ecologies. In the proposal, critical connections of both forest and water systems are re-established as necessary ecological infrastructure. The connected system, that forms the armature for a new type of national park, stretches from the Senne to the Dijle Valley and integrates a large area to the southeast into the national park. The connections are reconceived as an interconnected whole to foster biodiversity and resilience to climate change and to more robustly structure urbanization and the soon-to-come mobility revolution.
11. Forest and water urbanisms. The Sonian Forest is envisioned as a national park that strengthens the ecology of the forest and its intertwining with water structures. Over time the park would as well encompass Hallerbos (to the west) and Meerdaalwoud (to the east) and stretch until Wavre in the southeast. Existing settlements are restructured to lessen their footprints and municipalities and citizens are considered stewards of the park.

environments are proposed to transition from banal residential landscapes into forest urbanism — as new, 21st century garden-cities and agro-urbanism — while others are completely deurbanized, allowing nature to reclaim sites.

5 Transformation Principles

In order to incrementally, but nevertheless steadily, transition to the Forest and Water Urbanisms vision, a number of design strategies and principles were developed which could be realized on the immediate turn and at the scale of concrete projects. The policy tool of pooling (of both plots and assets) and transferring of development rights was recognized as a powerful compensatory and regulatory regime, not only from an economic perspective, but also, and more importantly, from a “commons” or public goods perspective. The clever implementation of the transfer of development rights (TDRs) — which decouples development rights from ownership of a property itself — can steer where to (re)build / not (re)build and densify / de-urbanize (Fig. 12). As explained by Avrum J. Shriar and Alissa Akins in their study of the transfer of development rights, growth management, and landscape conservation in the US, “the owner is thus compensated for restricting land use on his property, and the transferred rights make it possible to develop elsewhere at a higher density, and thus with greater profit potential, than would otherwise be possible under the existing, baseline zoning. Ideally, the property from which the development rights have been severed is protected in perpetuity through a conservation easement or restrictive covenant”[7]. The transformation of low-quality and low-density settlement types with such an incentive system could drive the creation of both renewed ecologies and new urban morphologies (and densities). It would allow for an and / and condition, with high quality (and potentially more) urbanization while simultaneously creating new nature.

As in the overall vision at the territorial scale, radical transformation of infrastructure at the local scale (the scale of urban design) is considered essential in order to restore ecologies. The shift towards the post-petrol era must necessarily focus on the combination of public transportation, car-sharing, and car-pooling of electric vehicles, in addition to e-bicycles, scooters, and other forms of individual mobility (particularly to address the so-called first and last mile). At Sint-Genesius-Rode a test to re-activate the train station was tested and in Overijse the street profile was redesigned to embrace diverse new mobilities, while turning the oversized plain of asphalt into an interesting and more ecological public space. The coming modal shifts literally give way to space for ecology where reforestation and reclamation of asphalt are possible (Fig. 13).



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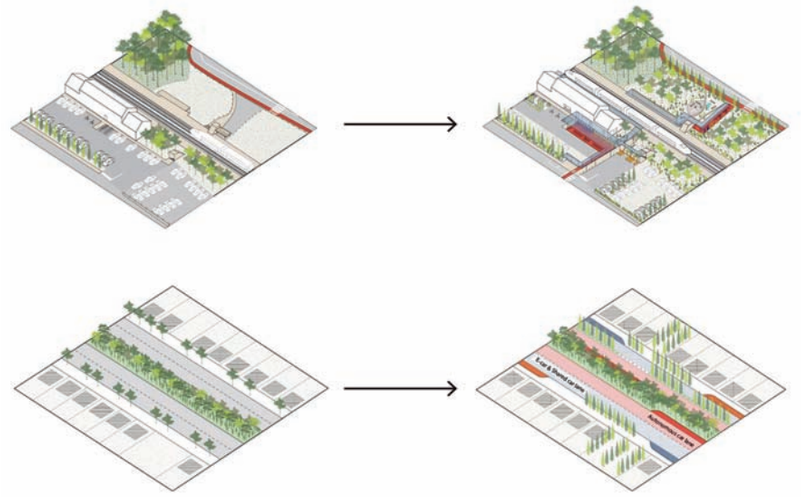

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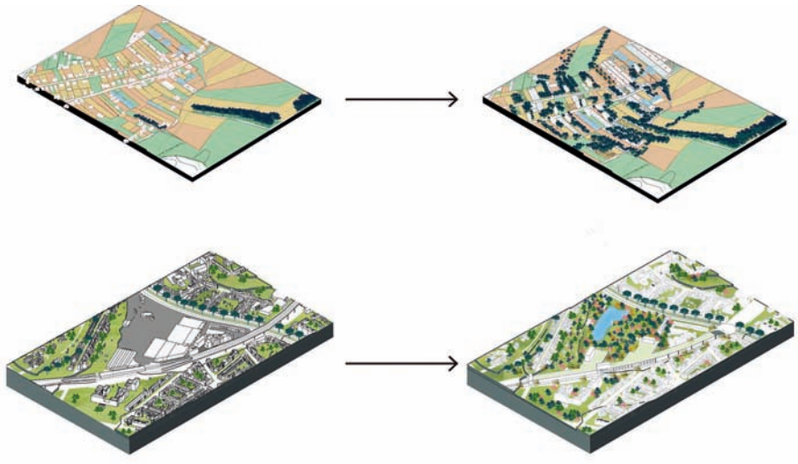

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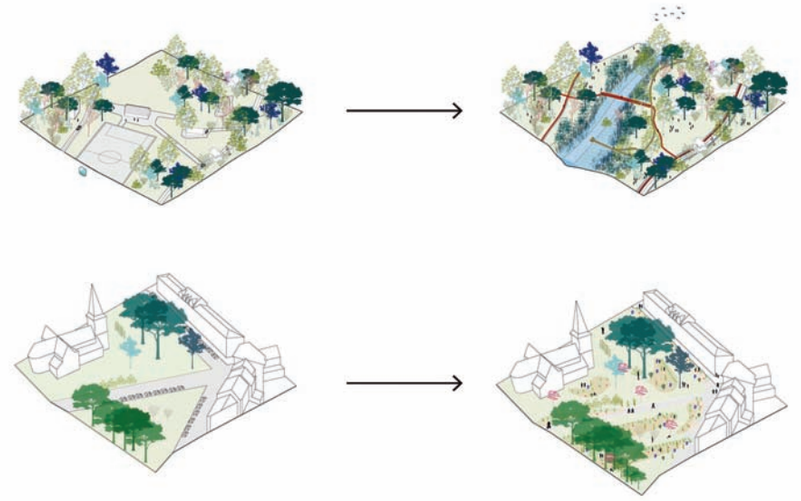

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在人居环境形态的转换中，开发权的集中和转让令自然、森林和水得以共存。在胡伊埃拉尔特地区，单户住宅、农场和温室景观将转变为满足21世纪需求的农业/森林城市建设。在新的集体生活模式和更高的人口密度下，也将建立新的生产性景观和森林地块。与此同时，在奥德赫姆地区计划上演一种新形式的水都市主义：通过“疏通”大型单体开发中的低地区域，将水体引入城市。同时，人工造林也为改善人居环境提供了重要契机（图14）。

最后，生态改善策略不仅增加了交错群落区、提升了生物多样性，也通过一系列措施使得该地区更具生产力、更能适应气候变化、拥有更具魅力的形象。在拉霍普地区的设计实践中，不适当的土地利用地块被用于水体修复；沃特摩尔—波斯沃尔德的鲁德瑟卓思地区也

In the transformation of settlement morphologies, the pooling and transferring of development rights affords the creation of new ways of living with nature, the forest, and water. In Hoeilaart, the single-family housing, farms, and landscape of greenhouses are re-developed into a 21st century agro- / forest-urbanism. New models of collective living and higher densities are developed hand-in-hand with new productive landscapes and forest pockets. Meanwhile, in Auderghem, a renewed form of water urbanism was conceived by “unclogging” a lowland from big-box development and allowing the restoration of water bodies. Again, reforestation is a major opportunity allowed by redesign of settlement systems (Fig. 14).

Finally, strategies to renew ecology reinforce not only more ecotones and biodiversity, but also the hybridization works to simultaneously make the territory more productive, adapted to climate change, and visually pleasing. An exercise in La Hulpe locates inappropriate land-

12. 开发权转让。开发权转让是实现生态改善与创建新城市形态（和密度）的重要工具。提高建筑高度以减少占地面积是这一转变的关键。
13. 交通设计原则。在不久的将来，交通革命将推动人们向新型交通方式过渡，也将大规模缩减（甚或停用）超大机动车路网。
14. 人居环境设计原则。小规模的自用地住宅可转变为新的集体生活模式，而受到电子商务冲击的大型单体零售空间可以改造为公共空间。
15. 生态设计原则。受到干扰的生态环境将得到恢复，人工造林过程中可以运用多样化的本土植物物种。不适当的土地用途将被重新定位，并尽可能用透水铺装代替不透水铺装。

12. Transfer of development rights. An essential tool for the creation of both renewed ecologies and new urban morphologies (and densities) is the transfer of development rights. Decreasing footprints while raising building heights is key to this transition.
13. Mobility design principles. The mobility revolution of the near future is the impetus to transition to new forms of transportation and the radical downsizing (even decommissioning) of the oversized vehicle network.
14. Settlement design principles. Small-scale allotment housing can be transformed to new forms of collective living and big-box retail (losing credibility with e-commerce) can be reclaimed as part of an expanded public realm.
15. Ecological design principles. Disturbed ecologies are to be restored and reforestation can be done with diverse, yet native species. Inappropriate land-uses can be relocated and as many mineral surfaces as possible can be replaced with permeable ones.

开展了都市农业实验（图15）。其他策略包括将郊区草坪改造成自给自足的农田和果园，以涵养水源、集约农林业用地。

6 策略试点场地

此外，为了检验基于地域尺度的总体构想的改造原则，三个聚焦于更小尺度的项目也得以实施（图16）。在布鲁塞尔和索尼安森林之间的过渡空间，自然被重新引入城市，不仅恢复了以前的生态系统，也重构了城市建设。而沃鲁威河谷原本的洪水危机转化为了创造更多水域空间的契机。为了提升慢行交通、生态环境和公共领域而扩大的东西向连接廊道不仅创建了高密度的城市肌理，也将城市中的现有公路改造为了林荫大道。通过增加城市中的树木种植，可以加强现有的森林都市主义，并改善微气候、环境的健康状况和舒适性（图17）。

拉霍普和盖里玛尔达地区在埃杰斯与兰恩河谷（皆为迪杰斯河的支流）中修建人类定居点的传统由来已久。该地区的森林高原之上还包括众多大型土地占用形式（苏威、IBM、SWIFT、Argenteuil等公司坐落于历史城堡区）。除此之外，当地还拥有一望无际的农业景观。改造方案保留了封闭式土地占用的特色，同时将其由排他性向包容性转变，并强调了本土性耕作的重要意义。开放的农业景观中点缀着林地、树篱和斑块。埃杰斯与兰恩河谷作为主要连接纽带的作用得到加强，既创建了别样的风景和怡人的慢行交通路线，也为未来的水和森林都市主义勾勒了框架（图18）。

在霍伊拉特和杰西艾克地区，一系列交替的带状景观重新定义了当地的开发结构。霍伊拉特现有的温室割裂结构将转变为森林斑块、农田、温室、开阔地、马厩和更为密集建设的新型住宅类型。在杰西艾克，公路从当地基础设施系统中分离出来，一个大型生态廊道将受干扰的生态区域重新连接。宿舍类住宅被逐步拆除，为索尼安森林的延伸提供了空间。在改造居住区景观及扩大森林和生态修复区域的同时，该项目也加强了索尼安森林和埃杰斯河谷之间的牢固（且多样）联系（图19）。

7 森林都市主义

森林是自我再生的生态系统，因此也是一种可再生的、源源不断的资源。几个世纪以来，森林一直被规划和管理，也不断经历着开采和维护；这种森林管理通常比同一时期的城镇规划更为庞杂和宽泛[8]。针对本文中讨论的案例——正如前文所阐述的观点——林业和城市发展是并行的；在特定时期的特定情况下（包括修道院、城堡、利奥波德二世等），二者实际上是密不可分的，形成了一种森林都市主义。虽然森林和城市建设分属不同领域，但森林都市主义反映出了森林和城市之间另一重富有魅力的、协同且互为补充的相互作用。从比利时

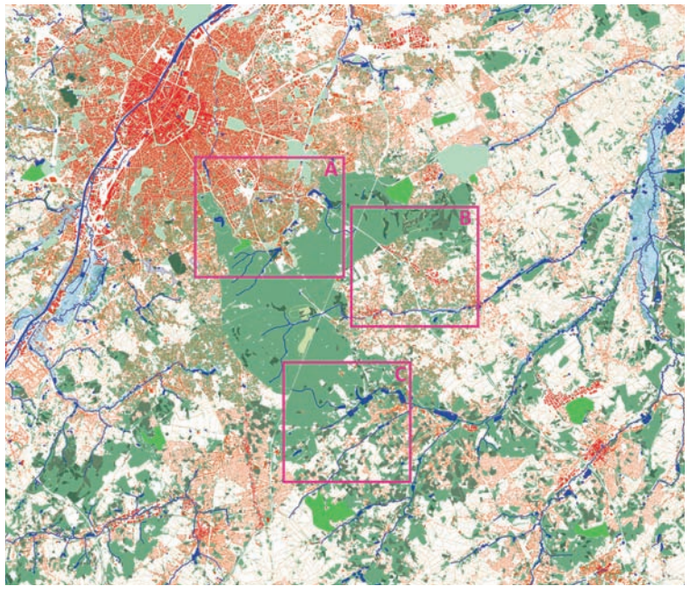
use in order to bring back water and a scheme for Rue des Cedres in Watermaal-Bosvoorde experiments with urban agriculture (Fig. 15). Other strategies were developed for transforming suburban lawns into self-sustaining fields and orchards, for replenishing reservoirs and for intensive agro-forestry.

6 Strategic Pilot Sites

A number of strategic zoom-in areas were also developed that straddle the scale of the overall vision and the sites where transformation principles were tested in three sites (Fig. 16). In the transition space between Brussels and the Sonian Forest, nature was reconfigured to invade the city; previous ecological systems were restored and urbanism was restructured. Projected flood risk was the underlying premise for creating more space for water in the Woluwe Valley. East-west connections for soft mobility, ecology, and an expanded public realm punctually restructure the dense urban tissue, while the existing highway entering the city is transformed into a parkway. More trees are planted in the city, strengthening the existing forest urbanism, improving micro-climates, healthiness, and pleasantness of the environment (Fig. 17).

The historic settlements of La Hulpe and Gaillemarde are located in the IJse and Laan Valleys, tributaries of the Dijle Valley. The area also hosts a succession of large domains (Solvay, IBM, SWIFT, Argenteuil — companies that have occupied historic domains of castles) situated on the plateau of the forest. Between these two worlds are expanses of marvelous agricultural landscapes. The proposed transformation accentuates the qualities of enclosed domains, while simultaneously turning them from exclusionary to inclusionary, while underscoring indigenous cultivation strategies. The open agricultural landscape is punctuated with woodlands, hedges, and patches. The IJse and Laan Valleys are strengthened as main connectors providing alternative scenic and pleasant soft mobility routes and framing future water and forest urbanisms (Fig. 18).

In the area of Hoeilaart and Jesus-Eik, a series of alternating landscape stripes reframe development. The existing greenhouses parcellation structure in Hoeilaart is mutated into alternating stripes with forest patches, agricultural fields, greenhouses, open spaces, stables and new, more aggregated housing typologies. In Jesus-Eik, the highway is separated from the local infrastruture and a large eco-bridge re-connects disturbed ecologies. Dormitory allotments are phased out and make place for the extension of the Sonian Forest. While transforming the residential landscape and extending the forest and ecologically restored areas, the project reestablishes strong (and varied) links between the Sonian Forest and the Ijse Valley (Fig. 19).



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Forest 森林
Canopy 林冠
New forest 新建森林
Urban green area 城市绿地
Orchard 果园
Wild vegetation 野生植被
Agriculture landscape 农业景观
New agriculture 新建农业区
Urban transformation 城市改造区
Existing urban tissue 现有城市肌理
Water surface 水域
Flooding risk 洪泛风险区
New water surface 新增水域
Public transport 公共交通
Bike path 自行车道

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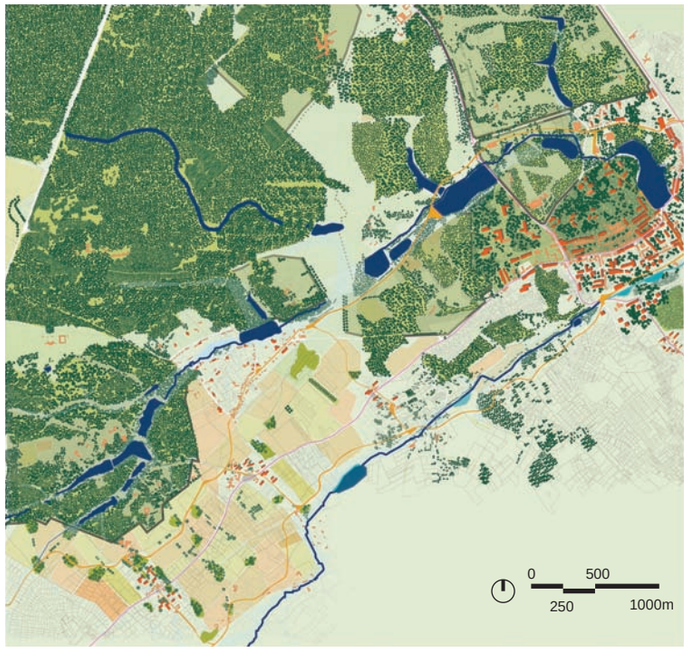

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16. 森林与水都市主义预景。三个案例基于不同的背景，展示了森林都市主义的设计潜力。A：布鲁塞尔东南部地区，森林向城市渗透；B：拉霍普和盖里玛尔达地区代表了森林和高度城市化的乡村之间典型的边界现状；C：重构霍伊拉特和杰西艾克地区的农业和城市肌理，以扩大索尼安森林，并将之重新与埃杰斯河谷（迪杰斯河的支流）相连。
17. 自然重新进入城市：布鲁塞尔东南部地区。
18. 不断发展的土地利用形式与“踏步石”：拉霍普和盖里玛尔达地区。
19. 交错的森林带状发展：霍伊拉特和杰西艾克地区。

16. Forest and water urbanism scenarios. Three zooms, in very different contexts reveal design potentials of forest urbanism. A: In southeast Brussels, the forest penetrates the city. B: The site in La Hulpe and Gaillemarde is representative for the current border condition between forest and (heavily urbanized) countryside. C: The restructuring of agricultural and urban tissues in Hoeilaart and Jesus-Eik allow to expand the Sonian and reconnect it with the valley of the Ijse (tributary of the Dijle)
17. Nature reinvades the city: southeast Brussels.
18. Growing domains and step stones: La Hulpe and Gaillemarde.
19. Alternating forest stripes: Hoeilaart and Jesus-Eik.

索尼安森林的案例中可以明显看出，从一开始，森林即与城市互为映衬、相互依赖。当涉及到（城市）发展时，它们也呈现出两种相反的模式：一个是自我再生，一个是持续性的自我毁灭；一个拥有（自我）可再生资源，一个依赖生产商品的持续性消费。从某种意义上说，森林恰是永恒的生态意象与原型。

森林都市主义是布鲁塞尔地区历史长河中不可磨灭的组成部分，其未来发展亦同样重要。这就要求战后模糊、脆弱的森林都市主义具有更加明确而有力的形式：能够清晰地重新连接和重新定位该地区中相互交织的森林和城市区域。这需从加强和扩大生态系统做起。以这种方式重建的人居环境的“自然”框架也可以应对当代的生态危机——提供必要的碳封存、改善小气候、增加生物多样性和降低污染——同时创造出更美丽的城市和景观。**LAF**

致谢

本文中涉及的研究基于于2018年9月开展的大量设计研究工作坊。本次工作坊的指导教师包括：来自比利时鲁汶大学工程科学学院建筑系OSA的布鲁诺·德·缪德尔和凯利·香农、来自“地平线+”计划的乔·德科斯泰，以及来自鲁汶大学大都市实验室的罗丝琳·德·莱斯特兰奇；参与者包括：M·阿尔茨（比利时）、R·阿尔哈雷（黎巴嫩）、M·拜格（克罗地亚）、J·伯格斯（比利时）、F·博尔托拉托（意大利）、N·克罗齐（意大利）、G·克罗蒂（意大利）、M·J·达·里斯卡（意大利）、M·蒂克利（比利时）、E·迪兹（西班牙）、M·C·杜克（土耳其）、G·埃尔法尼（伊朗）、A·凡廷（意大利）、T·胡恩（越南）、K·基肯斯（比利时）、P·洛伊（美国）、X·H·V·卢（越南）、M·马提努斯（印度尼西亚）、D·N·T·明（越南）、A·莫雷蒂（意大利）、阮明匡（越南）、R·奥利维拉（葡萄牙）、蒲红霞（中国）、B·拉迪亚（印度尼西亚）、R·桑托斯（葡萄牙）、D·西姆格拉斯（德国）、T·I·斯塔库（罗马尼亚）、H·斯泰恩（比利时）、孙玉莹（中国）、M·塔斯蒂亚（希腊）、G·维尔加索拉（意大利）、M·P·乌（越南），肖欣雨（中国）、M·扎哈洛娃（俄罗斯），以及A·萨拉戈萨（西班牙）。

7 Forest Urbanisms

Forests are self-regenerating ecosystems and for that reason as well, a renewable and eternal resource. For centuries, forests have been planned, managed, systematically exploited and maintained; often this management was more extensive and sophisticated than the town planning of the same time[8]. In the case dealt with here, one could argue, as attempted earlier in the text, that forestry and urbanism developed in parallel and in some instances, during certain episodes, they actually developed hand-in-hand, hence, as forest urbanism (by the abbeys, the castles, Leopold II, etc.). While forestry and urbanism respectively manage their own domains, forest urbanism represents an additional interesting, synergetic, and complementary interplay between the forest and the urban. As is evident in the case of the Belgian Sonian Forest, forests were from its earliest days a counter-figure of the city. Both figures complement each other. They are also counter-models when it comes to (urban) development: self-regeneration versus continuous self-destruction, (self-)renewable resource versus continuous consumption of production goods. In a certain way, forests stand for witness as timeless ecological archetypes.

Forest Urbanisms were an indelible part of the Brussels region's historical development and need to become as important for its future. This requires the rather implicit and weak forms of forest urbanisms of the postwar period to be blended with more explicit and forceful forms of forest urbanisms — ones which are capable of clearly re-articulating and requalifing the intertwined forest and urban domains of the region. This starts with the strengthening and expanding ecologies. The “natural” frame for settlements that is reconstructed this way can as well address the contemporary ecological crisis — providing necessary carbon sequestration, improved microclimates, increased biodiversity and pollution mitigation — while generating more beautiful cities and landscapes. **LAF**

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