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LISTEN



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Adapting lessons from ‘dark ecology’ shows us whole new ways of designing buildings and cities

THE ADAPTATION ISSUE

We start seeing buildings as something not necessarily finished at the end of construction; we understand that they can keep evolving and adapting

Contemporary design is plural, collective and mutant. In times of global climate change we are told no ecosystem is unaffected by human actions. But which kind of change are we referring to? Aren't change, transformation and adaptation all inherent qualities of the planet we inhabit?

Our current stage of technological evolution, notably in the form of synthetic biology or artificial intelligence, is opening scenarios where traditional dichotomies such as natural and artificial, material and digital, human and non-human become obsolete.

If, for example, we look at large growing cities from a satellite, we realise that it is becoming increasingly difficult to define what is natural and what is artificial. From this perspective, global cities — despite being large artificial systems often depicted as the antithesis of nature — develop patterns of growth (or shrinkage) that recall natural formations of a radically different kind. Cities appear as complex synthetic organisms. This perspective contradicts the model of urbanity that we inherited from modernity, where zones are clearly defined and morphologically demarcated.

Today we still rely on a ‘sanitised’ vision of the world’s ecosystems where bacteria and micro-organisms are commonly considered dangerous; we therefore talk about re-greening cities and re-naturalising forests as if such process could lead to the re-equilibrium of a temporary perturbed biosphere. But destruction, decay, digestion and dissolutions are some of the most fundamental processes of most global systems, and a critical part of their circularity; these processes often constitute the dark side of ecology, the one that we have all but erased from our consciousness.

Micro-organisms have exceptional properties that we keep discovering in labs and that make them capable of turning what we consider pollution or waste into nutrient and raw material; they are the missing link to redefine contemporary urban metabolism.

Biotechnology and AI design are enabling a new vision of urbanity in which fungi, bacteria, spiders, swarm machines, and other forms of intelligences become, alongside humans, bio-citizens, contributing to a new urban morphogenesis.

This notion is key to one of my practice’s principal lines of enquiry, spanning a decade, and culminating recently in the **Photo.Synth.Etica** project, in **Dublin**. The photosynthetic **Urban Curtain** creates habitats for microalgae organisms as part of building envelopes. Within this framework, microalgae are not only able to photosynthesise, but also to absorb emissions from the building itself. A new active layer becomes part of both urban and natural metabolic cycles. In other words, the so-called green and dark sides of ecology are reconnected.

There are multiple interactions in buildings that can be activated by microalgae. The micro-organisms grow faster in our biomechanical environment than in the wild. Building emissions, such as carbon dioxide, stimulate biomass growth; the biomass in turn can be used by the occupants as source of energy or food. It is a new kind of symbiosis. This means we start seeing buildings as something not necessarily finished at the end of construction; we understand that they can keep evolving and adapting. Change becomes part of their lifecycle.

We can now imagine and design new urban typologies and new hybrid habitats. It is a crucial transition; the urban environment stops being just a container of programmes or functions, like in the modern machine for living, and becomes itself a dynamic process of production, a living machine.

My team and I recently promoted this vision within **bioTallinn — Tallinn Architecture Biennale 2017** of which I was head curator. There, **ecoLogicStudio** developed a project which investigates the

urban future of Tallinn, the capital of **Estonia**.

The project site is a unique peninsula on the outskirts of Tallinn, a former Soviet military base that was abandoned after Estonia became an independent country. Nature — especially birds — resettled on it, alongside the main wastewater treatment plant of Tallinn. The birdwatchers and ecologists soon claimed that the plant was contaminating their reserve. It was a case of green versus dark ecology.

But birds and bacteria do not see it that way. Birds actually like the warm and nutritious water in the bio-digestion tanks and seem to play with its large machines. Our project takes the birds’ perspective, or rather a non-anthropocentric perspective, and develops it into a speculative vision that became the theme of the main curator exhibition, **Anthropocene Island**, conceived as a real laboratory of future city making.

The exhibition proposed a new city model that grows from the waste of present-day Tallinn. It integrates micro-organisms into the built environment and explores bio-digestion as a founding principle for a new city. We proposed new distributed habitats able to receive Tallinn’s wastewater, process it, generate health and nutrients, host new species, increase photosynthesis, grow biomass, extract biofuel and feed it back to the city of Tallinn. In this vision, urban design becomes a morphogenetic process defined by the material and virtual interaction of its multiple human as well as non-human dwellers.

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