


BIRKHAUSER

An aerial photograph of a cityscape, likely New York City, showing a dense cluster of skyscrapers in the background. In the foreground, a large, modern building with a prominent green roof structure is visible. The roof is composed of several large, angular sections, some of which are covered in grass. A red sculpture is situated on one of the green sections. In the lower foreground, a train with several orange and black locomotives is moving along a set of tracks that run parallel to a body of water. The overall scene is bathed in the warm light of late afternoon or early morning, with long shadows cast across the buildings and the water.

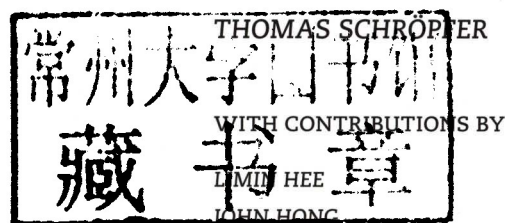
ECOLOGICAL URBAN ARCHITECTURE

QUALITATIVE APPROACHES
TO SUSTAINABILITY

THOMAS SCHRÖPFER

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MITCHELL JOACHIM

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EDUARDO RICO

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I INTRODUCTION

ECOLOGICAL URBAN ARCHITECTURE

BY THOMAS SCHRÖPFER

The 21st Century is producing dramatic new modes of living and understanding. The first decade of this century marked the threshold in which half the world's population now lives in cities. Furthermore, the urban areas of the world are expected to “absorb all of the projected population growth in the next decades while at the same time drawing in rural populations.”¹ Hence our ability to understand density and productive urban modes of living becomes ever more important. In concepts and in discourses, trans-territorial networks of connected nodes and urban tissues have replaced the finite limits of city, countryside, and state.² There is a characteristic duality in that the majority of the world's population, in one sense, moves away from nature to an urban context, while at the same time we are increasingly aware of our complete interconnectivity within a greater ecological context.



Architecture plays a critical role in this new organization. The Italian architectural historian Manfredo Tafuri remarked that the very conceptions of nature in Western and Eastern societies express themselves through the parallel manifestations of the Tempietto and the Japanese Garden.³ It is through architecture that our relationship with nature is mediated. Nature and humanity are interconnected in a synthetic existence and architecture mediates these states. But architecture must be critically re-understood in its relationship to a more comprehensive system. There is a paradigmatic shift in our understanding of architecture and humanity's place *within* the environment rather than apart from it. A building can no longer be thought of as a discrete object. Its design must be conceived in terms of its urban context within a greater ecosystem, situated at the key intersection between macro-scale world systems and the micro-implementation of architectural scale. Any architectural detail is both far-reaching and acutely specific – in an understanding that is at once global and local.

The necessity of large-scale system thinking within architecture was traced back by Rem Koolhaas to the post-war work of Buckminster Fuller: "Perhaps Buckminster Fuller's contribution to the field was the apotheosis of this combination of nature and network. He did the most with the least, producing on the one hand diagrams of ponderous simplicity. On the other hand, he worked on radical inventories of the world, both of cultural and natural elements, documenting the neck-and-neck race between them in a very forward-looking way ... Now, if you put everything that's happening in the late 1960s and early 1970s in a cloud or cluster, it seems that there is a very confusing mixture of good and bad. But if you put the events into different zones or categories, a pattern emerges. There are of course many crises, but an explosion of green consciousness as a response to those crises."⁴

This explosion of thinking that Koolhaas discusses is the reaction to the crises of the time – the social restructuring of post-war, post-colonial society, the crises of energy, resources, and population epitomized by the Club of Rome's publication of *The Limits of Growth* in 1972, and the world oil crisis in the following year. This was also a crisis of modernity, of the singularity and autonomy of modern architecture as proliferated after the war. This modernism was that of the technological revolution which allowed for the ubiquity of cheap energy, lighting, and air conditioning, creating what Michelle Addington termed "the manufactured homeostasis," a homogeneous interior environment for the maximum amount of people that is neutral, goes unnoticed.⁵ Some members of the architectural establishment attempted to ignore these crises, epitomized by Reyner Banham's quote of a supposed position of some faculty of the Architectural Association at the time, "never mind all that environmental rubbish, get on with your architecture."⁶ These crises, however,



Foster + Partners, Swiss Re Tower,
London, UK, 2004.

sparked the creative energy of a number of architects. Fuller, along with Banham and other contemporaries, engaged this technological age with a utopian scale of vision, a technological utopianism that saw a radical use of technology's capacity to rethink the existing "on the scale of the world."⁷

The world scale of these issues reiterated itself again as the nations of the world convened in the United Nations Rio Earth Summit in 1992, followed by the eventual establishment of the Kyoto Protocol in 1996. These events alerted the general public to the "consequences of man's pillage of natural resources, the worrying rise in global warming and the rapid and spectacular destruction of ecosystems."⁸ Architecture holds a central place in these crises not only through its mediating existential and philosophical role but through the deeply pragmatic questions of its material existence, of the scale of resources and energy use that goes into the construction and operation of the built environment. In her essay "No Building is an Island," Michelle Addington stated that "the most recent data released by the U.S. Department of Energy attributes 40 % of energy used in the U.S. to the building sector, including the energy of electricity generation, of which more than 70 % is consumed by buildings. Furthermore, the use of energy by the building sector is increasing at a rate faster than that of the other sectors."⁹

The solution to this problem is not driven purely by the reduction of numbers and statistics. The act of architecture, by its very nature, uses matter and energy, transforming them into the architectural manifestation and continued operation; and consequently the question is about the total impact of a work – how it engages itself as part of a greater (eco)system.

LOW-TECH VERNACULAR ARCHITECTURE

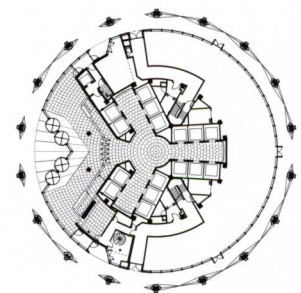
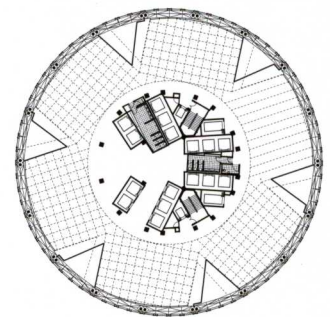
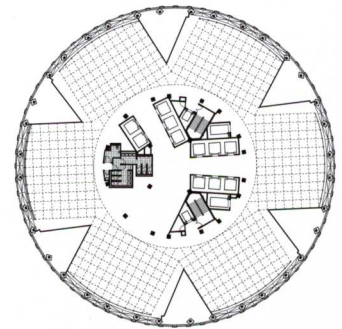
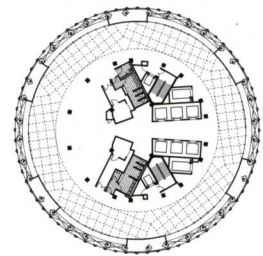
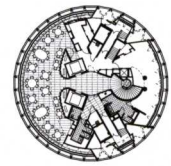
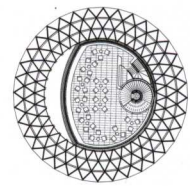
Some of the early work to engage an environmental consciousness attempted to embed itself, literally, within the natural environment. This mode of ecological thinking in architecture is characterized by a low-tech or vernacular approach, which looks to time-tested solutions reacting to existing environmental conditions and tradition. Such projects opt for passive solutions, often tied to inherent material properties and the conditions of the land. Technology, if used, as for instance with solar panels, is explicitly employed to achieve energy independence – to be 'off the grid.' An engagement with passive strategies as well as local materials and techniques is, undoubtedly, a fundamental necessity of well-developed architectural production. Yet such an approach is also problematic for the crises we face. These solutions may be simple and intuitive but often are implemented

in a rural context and on a singular scale. The desire to exist off the grid, while notably positioning buildings as producers rather than solely consumers of energy, isolates the projects. Through their very disengagement with the greater urban system, their environmental agenda is obfuscated. Again, buildings tend to become autonomous objects, explicitly aware of their environmental agenda, but unable to feed back into the greater ecosystem. Generated at the scale of the individual, these solutions cannot be reproduced at a scale or density appropriate to solve the needs of any more than a select few. Doing so would create an unfathomable sprawl, further disintegrating the condition of the natural environment. This places them in a context removed from the places that our future depends on – cities, and limits their ability to fully engage the problems of modernity, density, and urbanity at a larger scale.¹⁰

(ENVIRONMENTAL) MACHINE FOR LIVING

Engaging issues of sustainability requires a fundamental understanding of inherent passive and contextual environmental strategies, but to do so at a large and dense scale has also led to active strategies of sustainability. These active methods articulate themselves with an almost mechanic resolution, producing a finely tuned and engineered architectural work. The practices of Norman Foster and Renzo Piano exemplify this technological mode of architectural production. Foster, who began his career in collaboration with Buckminster Fuller, carries forward optimism in the power of modernism, if not the technological utopianism of Fuller. His projects have engaged the issues of sustainability with the building type of modernity, the skyscraper. The Commerzbank Headquarters in Frankfurt reflects a watershed in this mode of thought. Commerzbank re-engages the skyscraper with the greater environment, utilizing natural daylighting and controlling the internal environment through an operable facade. The building is no longer the container of an autonomous air-conditioned homeostasis. It becomes an environmental machine for working. The Swiss Re Tower in London and the Hearst Tower in New York, among much of Foster's work, have continued to explore the environmental response of the skyscraper.

The performative building has seen the most attention in the facade. Many of Foster's projects introduce adaptive, multi-layered facades. The articulated facade can be seen in Renzo Piano's New York Times Building, consisting of a fully glazed curtain wall protected by a screen of ceramic rods on the exterior and a mechanized screen on the interior. The development of the intelligent facade can trace a lineage to Jean Nouvel's



Foster + Partners, Swiss Re Tower, London, UK, 2004, floor plans.