

DIGITAL LANDSCAPE ARCHITECTURE NOW

Nadia Amoroso
Foreword by George Hargreaves

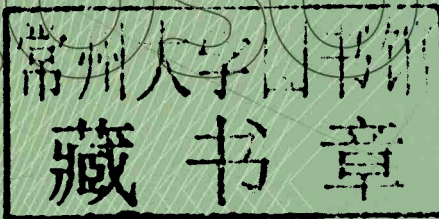
Thames & Hudson



DIGITAL LANDSCAPE ARCHITECTURE NOW

NADIA
AMOROSO

with 692 illustrations, 620 in colour





On the cover: Botanic Bridge Gwangju, South Korea
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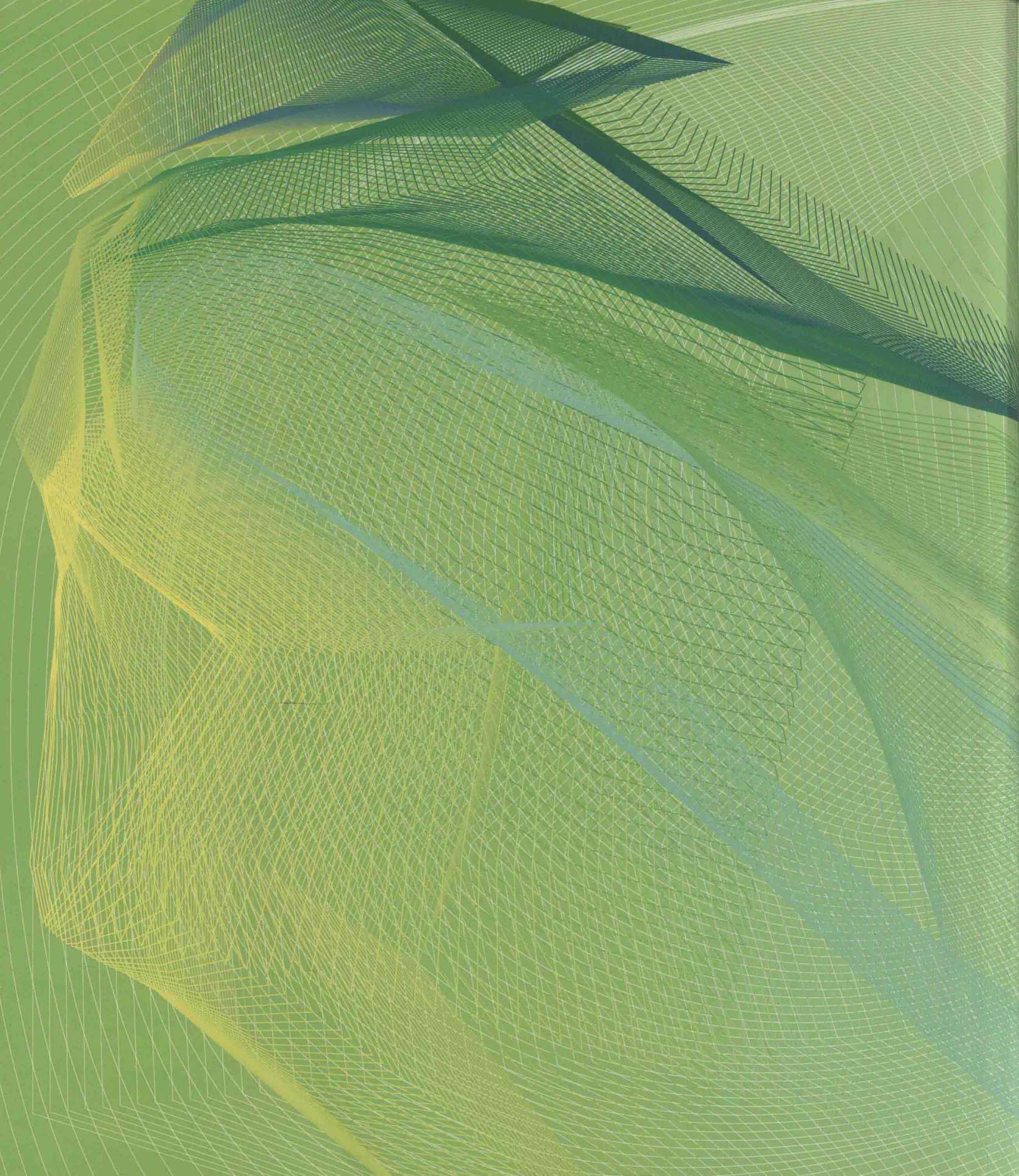
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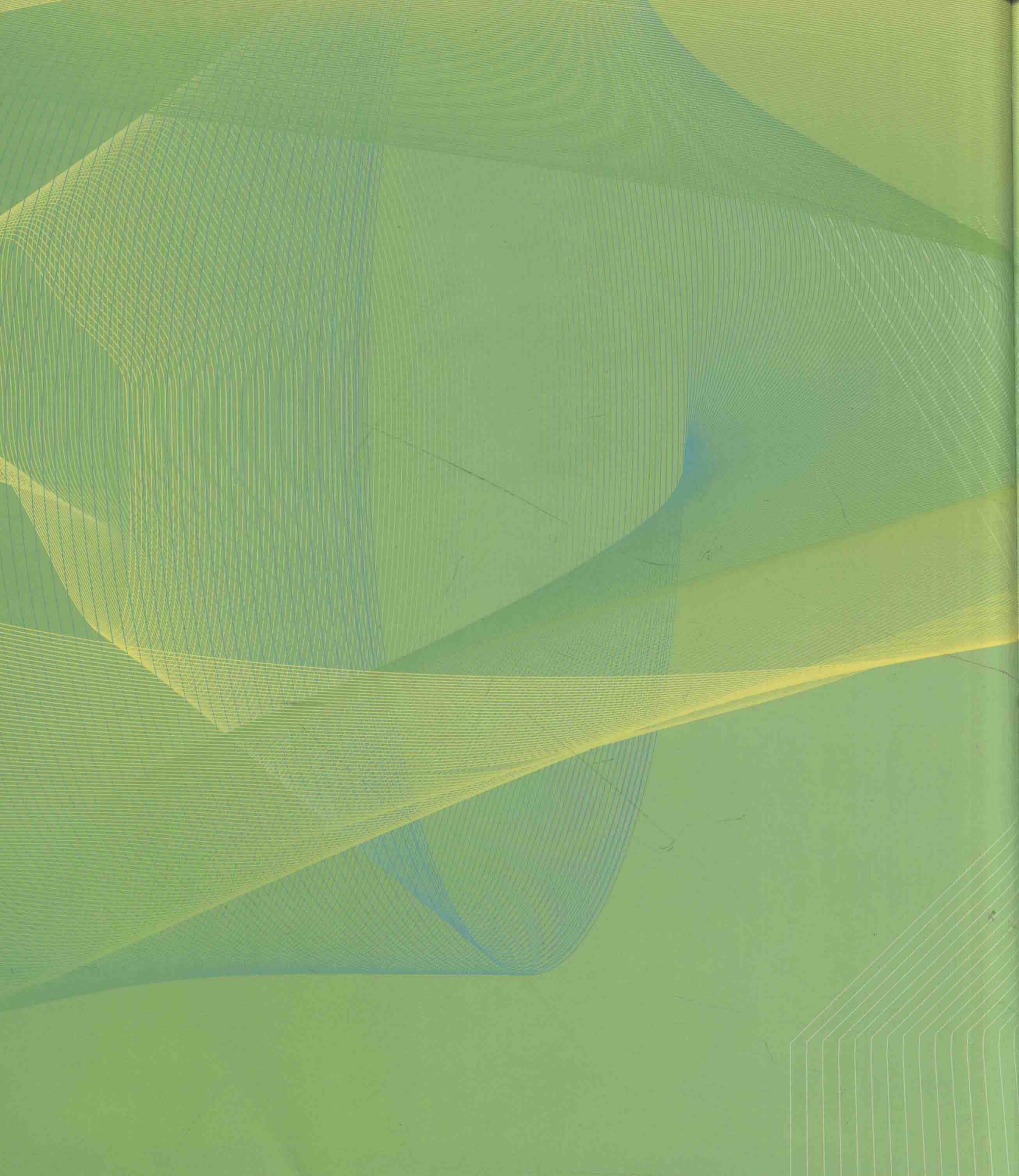
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FOREWORD

GEORGE HARGREAVES

The landscape architecture profession has seen a good deal of change in both content and representation tools. We now delve deeper into ecology and sustainability, and more recently into the economics of public landscapes, but it is representation through digital means that has seen the most variety and evolution over the last two decades. Many older practitioners (gasp, I am now one of those) can recall the analogue days – the hours setting up perspectives, trying to master drawings techniques, and the planning and crafting of models. In hindsight, one can see a clear relationship of form and technique.

It was certainly easier to portray a picturesque landscape or a modern straight-line landscape with these simple techniques, but as we tried to pursue, shall we say, more complex formations, we ran into our lack of representational talent or the limitations of analogue. In our case, we began to work with clay as a way to design and model ideas and forms at the same time, and with some degree of complexity. During this period (early to mid-1990s), our construction packages began to use computer-aided design (CAD) as the principal means for drafting. Here, we discovered the ability to study project detailing in three dimensions, rather than in simple plan and section. Both of these instances sprang from the desire to study and evolve design strategies and

detailing, rather than mount a purely representational effort.

As we fast-forward to today and the contents of this book, digital representation has exploded and is in the hands of virtually every practitioner, except for the few 'fuzzies' still published by trade periodicals. It seems there are three main areas of work in digital representation. The first is a fairly conventional representation effort to depict in true proportion what the project will look like, but the ability to render real surfaces and plant materials through various techniques, including Photoshop, move these depictions far beyond the watercolour/prisma colour textures, replete with balloons. The second involves the use of collage and some perspectival set-up, used in concert to depict an idea of what the project is about or its feel, as opposed to a measured depiction. The third uses digital means as a way to study the design of the project, and not merely to represent it. This last use is perhaps best shown by the many architects whose projects do not have any corners, otherwise fondly known as 'blob' architecture.

This book is an exploration and survey of many facets of landscape architectural design and representation using digital means; it is an excellent collection of forward-thinking and innovative design and research explorations that use a digital palette to render progressive moves

in the field of landscape architecture and design. The use of advanced 3D modelling computer applications has helped us to develop complex formal expressions with more accurate measures of space and earthwork volumes. We tend to work three dimensionally in the early stages of the design process; the wide range of digital tools – including 3D Studio MAX, Rhinoceros, Google SketchUp, 3D Land Desktop (the precursor to 3D Civil), Photoshop, to name a few – has allowed us to quickly dispense more complex designed forms with an understanding of scale, proportion and enclosure or openness. These tools assist us in areas of technology and information, advanced illustration and animation to produce innovative landscapes.

The changes in landscape architecture's digital realm over the last two decades have been tremendous. The adoption by most of the profession is complete, but it is still simply a tool: for designing, studying various aspects of a project, representing the project, and finally creating the legal documents for construction. Though digital tools will never ultimately do the designing for us, the digital realm allows us to expand our thinking and making of a project.

INTRODUCTION

NADIA AMOROSO

Digital Landscape Architecture Now presents a series of profiles of world-renowned landscape architects, researchers, artists and architects who are challenging traditional landscape design through digital means. The professionals in these pages are notable for their concern for radical design, use of fluid forms, and deep commitment to discovering environmentally and socially responsive methods for addressing site-design problems.

This is a generation of professionals who approach common design issues through the use of new technologies and other digital methods. Their combined practice marks the twenty-first century as a groundbreaking era, informed by 'hybridity' and 'interdisciplinary' practices. This book explores how traditional landscape architectural practices are being pulled forward by innovation in digital tools, from software and mapping systems to interactive displays; what we see is a spirit of active interchange of ideas across disciplines, building on the early work of the environmentally concerned and technologically savvy landscape designers and architects who emerged in the 1960s.

Through testing and sculpting a wide array of surface modalities, landscape architects actively engage in proposing design solutions, crafting new formal expressions of the land in ways that


propose unique visions of possible and future use of space. This can be from individual building projects to participation in the formal reimagining of portions of urban or 'empty' space, or even the complete (re)rendering of city and countryside. As such, landscape design today is a field that is (re)integrating prior historical architectural concern with urban or rural planning. During the twentieth century, architecture often combined, incorporated or juxtaposed such aspects as horticulture, botany and industrial design to reveal possibilities, both philosophical and aesthetic, of the confluences between natural organic forms and technological solutions.

The Brazilian landscape architect Roberto Burle Marx (1909–94) is one example of a professional who utilized new practices, creating a new aesthetic perspective that revealed how landscape architecture and architecture proper, as disciplines, can be effectively integrated. More recent incorporation of digital rendering with advanced software development, applied to landscape architecture, has expanded the possibilities and potential of combining and imaging interconnections between natural shapes, technological and industrial innovation, sustainability issues, and futurist projection. It is an exciting, expanding, interdisciplinary field.

History

Available methods to express, understand and project the possibilities of our natural and built environments into the future have changed over the years, and methods have grown exponentially in the very recent past. This can be attributed to the numerous opportunities inherent in both science and technology, found in the expanding capabilities of our digital world. Digital landscaping enables a great leap forward in the ability of landscape architects to present visual representations of the ways in which nature and built environments have changed and will continue to change, based upon design decisions and planning possibilities.

Until recently, however, the majority of architectural ideas developed with digital technologies have been conservative, and orientated to past historical practices. This is evident in the continuing employment or presentation of traditional architectural designs, stemming from or emergent out of classical models and romantic nostalgia, or what is referred to as 'poetic silence' by Arne Saelen, in his introduction to Alex Sanchez Vidiella's *The Sourcebook of Contemporary Landscape Design* (2008). This, of course, is not a description to be discounted; in fact, as Sanchez Vidiella and Saelen maintain, beginning in the 1990s in Spain concern for the future of the planet, from its natural resources to where



people live and their quality of life, its built environments and materials, entered the mainstream of concern of landscape architectural discourse.

In architecture, most changes have taken place with reference to drawing, modelling, fabrication, presentation graphics, and the new media in general. But the introduction of computers and even more advanced media technologies have enabled a greater connection between the fine arts, landscape architecture and architecture proper. Numerous formatting techniques have been used to scan and print, with digital technology increasingly relevant to practices of image production (drawing) and use of video for site-location mapping and fabrication. Additionally, the Internet as a resource has enabled landscape architects to interact worldwide, and share creative content regarding an infinite variety of subjects.

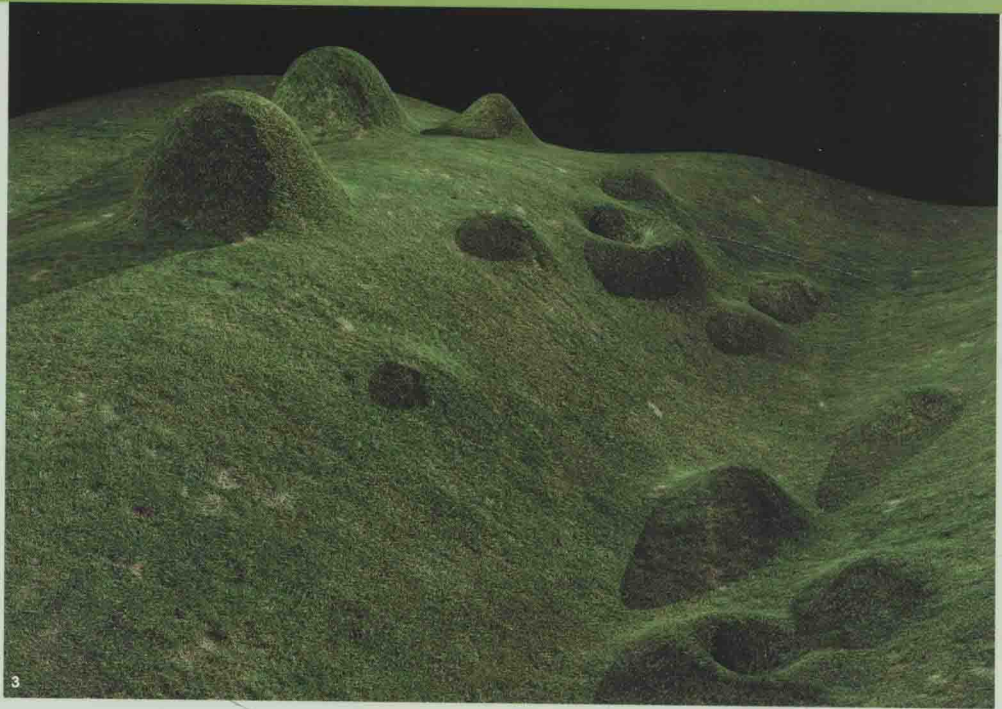
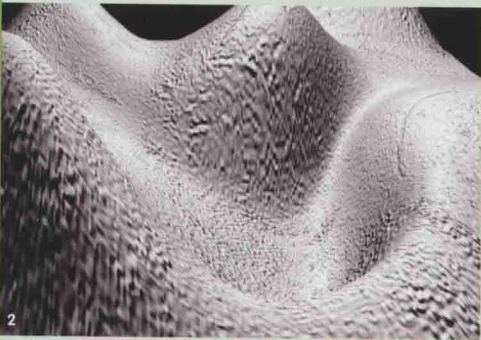
Where did these innovations occur, and what encouraged them or fuelled resistance towards the types of experimental projects discussed in this volume? While there may have been initial resistance within landscape architecture to use the new technologies to advance the possibilities and relevance of the field, increasing understanding of the potential of digital technologies to landscape architecture has actually increased the interest in and relevance of it as a specific field. In other words,

traditionalism in landscape architecture stems from the nineteenth century and earlier, from Romanticism and a nostalgia for nature, order and the picturesque. In contrast, contemporary landscape architecture embraces the possibilities of thinking about nature through science and technology; embracing environmental concerns with a growing realization that the twentieth century largely transformed much of the available land use and settlement patterns from rural to urban, as noted by Elizabeth Barlow Rogers in her book, *Landscape Design: A Cultural and Architectural History* (2001).

As Diana Balmori notes in *A Landscape Manifesto* (2010), landscape architecture is poised to become a prominent field in its mix of aesthetic concerns and technological approaches to understanding how we have used nature in the past. Key late twentieth-century designs promote an environmental agenda. These fundamental ideas emerged from the intersection of design firms and earth-artists in California in the 1960s, and later can be found in the work of designers based in the Netherlands. Balmori, drawing from Roberto Burle Marx and others, continues by describing the realization that 'we cannot re-establish ecosystems that have been thoroughly destroyed by human activity, but it is possible to understand scientifically how

they worked, and then to implement that knowledge in the creation of new ecologies' – a movement she calls 'ecogenesis'. This leads to the past decade where globalization, site-specific locality, and concern for community and culture have been incorporated as practical, aesthetic and philosophical concerns, engaging local and vernacular solutions via technology towards methods to address sustainability issues, as noted by Sanchez Vidiella.

One of the earliest practitioners to see the relevance of new technologies to landscape design was Thomas Church (1902–78), an environmental architect based in San Francisco. His studio nurtured the talent of, among others, Lawrence Halprin (1916–2009), an innovative landscape designer who participated in the Donnell Garden project in San Francisco, while part of the Church studio. In his practice, Rogers notes, Halprin promoted the idea of landscape architecture as process-orientated, rather than static. Halprin maintained that landscape architecture had the potential to be a highly creative profession, akin to artists' work, that landscape design could reflect 'celebrating human creativity and community life within the context of nature ... using environmental motifs metaphorically in his designs'. Halprin was influenced by landscape architect



Ian McHarg's views on environmental planning, as was evident in his design for Sea Ranch, California, an eco-coastal housing development that integrated natural topography and landscape with urbanism. McHarg and Halprin were, says Rogers, inspired by the idea of 'seeing city and country as a continuum'.

The work of these innovators in the 1960s, a time of heightened interest in environmentalism that engaged with technological solutions, led to increasing attention to technologically informed, environmentally relevant original design, which often contained spiritual or psychological dimensions – recognized as being of particular concern, noted Rogers, as we began to live in ever-more urbanized environments. And as Diana Balmori observed, with the gap between 'nature' and the city diminishing, forward-thinking landscape architects found ways to enfold the city in nature, rather than replace nature with the city. International awareness of the need for solutions to problems, from avalanches in Iceland to creating ways for people to experience the remaining undisturbed countryside in Norway, Sanchez Vidiella wrote, also revealed the need for minimal intervention to natural environments as a new design paradigm. Digital-mapping techniques, virtual-reality programs, arrays of climate projection, and other new media melded with landscape

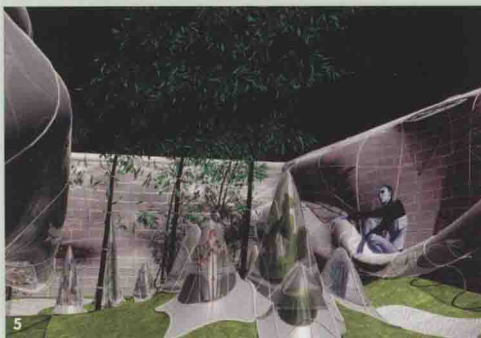
architecture to enable the important directions that were emerging. New technology stimulates innovators, and innovators are sensitive to science and to the practices of artists, to the ways that artists today are themselves using new media and technology in their work, envisioning advanced conceptions of land-shaping via virtual, interactive and living, spatial artwork.

Formal Expression, Surface Manipulation and Fabrication

Landscape architecture today can, at its most progressive, be regarded as a mix of practical, functional and visionary impulses. The work of its practitioners may involve, as described by Virginia McLeod in *Detail in Contemporary Landscape Architecture* (2008), everything from conceptualizing and designing parks, cultural centres, civic buildings, waterfronts and private home gardens, to reclaiming industrial wastelands. Developments in computer software have enabled the vast increase in the imaginative possibilities to be found in design and the built environments of the late twentieth and early twenty-first centuries. While in the past visionary architect-engineers may have proposed impossible utopian models, today CAD and other new media tools can provide architects with the capabilities of proposing and rendering drawings that

are abstract in their modalities, but also realizable. This permits more innovative building design, but also engenders improved design development in landscape forms, the visual communication between designers and clients, and opens ways to conceptualize the intersection of technology, form, art and nature, thus allowing landscape architecture to push the boundaries even further with art form. (Ian H. Thompson further discusses the idea of landscape architecture as an art form in *Ecology, Community and Delight: Sources of Values in Landscape Architecture*, 1999.)

Modelling and fabrication through digital means make it possible to pass information in an immaterial realm, as well as to create new forms of architectural designs, aided by the infinite possibilities provided through computer software programs. Architects today also expand their concepts by drawing on ideas and products produced in and disseminated through various mass media. This enables a kind of field work or research-matching design innovation to the client's or the public's desires and demands. Hybridity, or interdisciplinary practices, is therefore a positive future-orientated component of professional exchange, one made possible by the speed of international idea-sharing. Collaborations between visual artists and scientists, or landscape architects and climate specialists, also reveal the



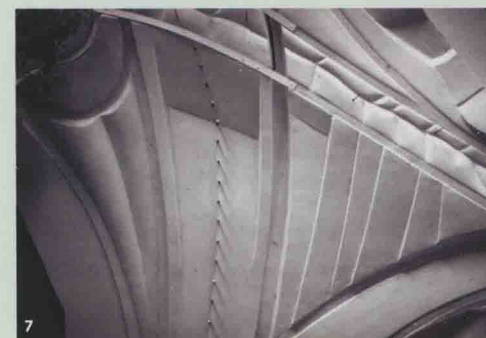
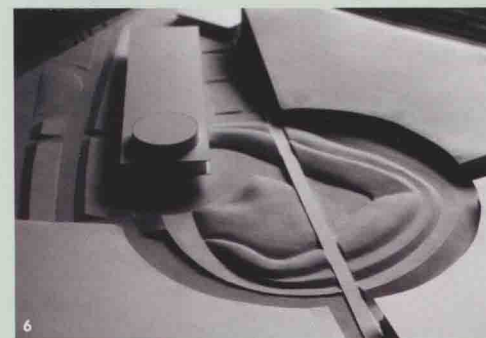
potential and the realization of interdisciplinary practice, made possible through digital technology and new media systems.

Highlighting key digital design experimentations and other technological agents used to conceive creative and radical landscape spaces, *Digital Landscape Architecture Now* documents achievements and explorations in landscape design. It also evaluates the contemporary firms and researchers who are at the forefront of these aesthetic movements, experimenting with alternative form-making and surface manipulation to achieve complex sculptural landscapes. 'Landscape architects are much concerned with beauty,' notes Thompson, as well as with using new media together with traditional values of form, aesthetics, social practices and ecological conscientiousness. Digital application has been the driver behind crafting more dynamic spaces in recent years, especially now with parametric and performative-landscapes, and fabrication of formal expression.

At the University of Toronto, graduate students have explored formal expressions and manipulation of volumetric form using digital processes. Responding to a given action – ripple, flow, bump, carve or pinch – they abstracted their selected action into experimental forms using 3D Studio MAX and Rhinoceros. Once the forms were

generated, the students could then apply various groundcovers, which used textures to transform the digital forms into virtual landscapes (figs 1–3). The computer-generated landscapes were fabricated into physical models using 3D-plotting or CNC devices. These projects investigated a three-fold digital formal landscape expression, encompassing the digital model, image-modification materials testing, and physical output. Throughout the process, the students experimented with a range of modelling parameters to creatively engage with the technical and artistic challenges at each stage.

London-based Metagardens (pp. 156–65) is an innovative landscape design firm that is exploring the new possibilities. Through fabrication techniques such as taking rapid-prototyping landscapes from the computer to 1:1-scale creation, they are able to transform creative computer designs into 'real' physical landscapes. Metagardens has also developed a next-generation virtual reality landscape, or immersive environment, as demonstrated in their Electronic Dreams landscapes (fig. 4), as well as augmenting and creating reactive environments, such as their Evoterrarium landscape (fig. 5). Such far-reaching projects expand the possibilities of the field by developing dream-like, easily adaptable landscapes for purposes that range from the artistic to the practical.



- 1–3. University of Toronto, student projects in form-making and texturing.
4. Metagardens, Electronic Dreams.
5. Metagardens, Evoterrarium.
6. Kathryn Gustafson, L'Oréal factory.
7. Kathryn Gustafson, Penne-Mirabeau Freeway Exchange.



Materials, from soil to the most technologically advanced metals, can now be experimented with and employed, joining centuries-old ideas and vernacular processes to computer-modelled usage to create new forms, innovative constructions or new materials, notes Cordula Loidl-Reisch in her introduction to *Constructing Landscape: Materials, Techniques, Structural Components* (2008). Landscape architect Kathryn Gustafson (pp. 94–99) utilizes traditional media, such as clay, to express a poetic visual statement through techniques and methods of production. This is demonstrated in the sculptural clay models for the L'Oréal factory (fig. 6) and Penne-Mirabeau Freeway Exchange (fig. 7), both in France.

Such a commitment to artistry is shared by many landscape architects. The firm Hargreaves Associates (pp. 108–15) has spent more than two decades using clay as a communicative medium to create signature sculptural landscapes and achieve landforms that creatively engage communities, while fulfilling practical requirements (figs 8, 9). In comparison to the landscape architecture of previous generations, today's building designs, gardens, waterways and park projects utilize digital software tools and organic and industrial materials to express complex design solutions, radical forms, realistic renderings and digital production.

Parametric Landscape and Augmented Environments

One of the most influential early practitioners of new digital approaches to architectural design was Ian McHarg. Through his knowledge, he influenced modern geographic information systems, or GIS, which is used today in analysing materials for architecture. With reference to the environment, much concentration was based on topography, hydrology and vegetation. Along with employing GIS and terrain-modelling tools to create and troubleshoot site-related issues and planning design, many contemporary landscape architecture firms also test dynamic landscape designs by using performative measures and digital tools to change the landscape in response to fluctuating site conditions, users, events, and other environmental factors.

The Erie Plaza project (fig. 10), in Milwaukee, Wisconsin, by StossLU (pp. 236–41) employed a variety of digital tools, including software programs Rhinoceros, Flamingo, AutoCAD, Illustrator and Photoshop, to create a flexible landscape design. Digital tools allowed the team to test the ephemeral conditions of the waterfront site prior to construction by creating a flexible 'field' along the river walk, which generated creative forms and spaces through a series of mixed components originally generated in Rhinoceros. A variety of versions were

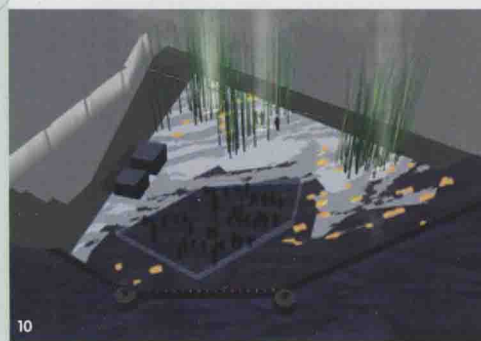
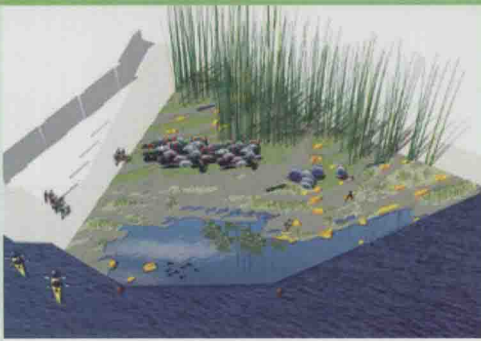


tested in Rhino at this preliminary stage in order to troubleshoot all possible volumetric and topographic assumptions.

Software programs such as Grasshopper and Rhino have allowed landscape designers to push creative boundaries, implementing parametric measures in order to apply certain conditions, parameters and logic to the ever-changing design of the site. Parametric methods are highlighted in many other projects showcased in this publication, including StossLU's Bass River Park (p. 238), in West Dennis, Massachusetts, and Velo Catalyst (p. 85), a bicycle shelter by Chilean design firm GT2P (pp. 80–87); such processes generate complex landscapes quickly. Sometimes these parametric-created landscapes rely on a scripting or algorithm definition, plugged into the generative software, to create undetermined and pleasantly surprising landscape outcomes. This process becomes experimental, allowing added variables and conditions to change the resulting design.

Geomapping, Virtual Reality Landscapes

By profiling research-based projects that experiment with digital landscape design and tools, this publication demonstrates the myriad ways in which professionals in the field are utilizing new technologies. Notable projects include those undertaken



10



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by the University of Toronto's Centre for Landscape Research, including *Capital Views* (p. 297), which, under the direction of John Danahy and Robert Wright, has developed digital tools designed to explore existing landscape conditions and test proposed designs from a multidimensional perspective. For over twenty-five years, the CLR has experimented with real-time and immersive environments by allowing users to more accurately represent and experience a variety of landscapes.

In the early 1980s, the team pioneered a series of revolutionary tools, including *PolyTRIM*, a software program that provides a toolkit for the interactive representation and modelling of landscape, synthesizing multiple technologies and digital media types into one complete virtual work environment. *PolyTRIM*'s toolkit includes real-time rendering, ray-tracing export,

paint, CAD, GIS, photogrammetry, parametric modelling, visual assessment, and exhibition interface and network collaboration tools.

The immersive lab at the CLR enables students to fully experience designed landscapes once limited to their imaginations (fig. 11). The lab itself is a room around which large screens are placed to create a panoramic effect. Users can travel through this 4D simulated scene, change the direction of their progress as they 'stroll' or 'drive', look from side to side, and change their viewsheds. Users can interface with the landscape to adjust the time of day, season and climatic conditions. Vegetation can be adapted to correspond with environmental changes; the visualization of a mature tree in full springtime bloom, for example, transforms into one that is now winter-stark and bare of leaves. The CLR lab effectively engages users with the landscape by actively

8. Hargreaves Associates, Lisbon Expo 98.

9. Hargreaves Associates, William J. Clinton Presidential Center, Little Rock, Arkansas.

10. StossLU, Erie Plaza, Milwaukee, Wisconsin.

11. Centre for Landscape Research, University of Toronto, immersive lab.