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JO VAN DEN BERGHE, FRANCESCA ZANOTTO

TERRARIUM. EARTH DESIGN:
ECOLOGY, ARCHITECTURE
AND LANDSCAPE

A CURA DI
SILVIA MUNDULA,
KEVIN SANTUS,
SARA ANNA SAPONE

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TERRARIUM. EARTH DESIGN: ECOLOGY,
ARCHITECTURE AND LANDSCAPE
edited by
Silvia Mundula, Kevin Santus, Sara Anna Sapone

Terrarium collects research and reflections on the relationship between space, soil, vegetation and the biotic community, linked through the metaphor of the terrarium. The book is curated by a research group from the Ph.D. program "Architectural Urban Interior Design", coordinated by Alessandro Rocca (Department of Architecture and Urban Studies at Politecnico di Milano), involved in the PRIN Sylva by the IUAV research unit.

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TERRARIUM AS A DESIGN METAPHOR

SILVIA MUNDULA
KEVIN SANTUS
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A climate within a climate, a little world within a world. (Ward 1854, p. 11)

The word *Terrarium* has many different meanings and interpretations. Its roots lie in the Latin word *Terra* (earth or ground), and earth constitutes its base layer. Its primary function is to create a self-sufficient ecosystem which sustains plants and other living beings. Indeed, a *terrarium* is designed to create and maintain a specific ecological state, which is self-contained and self-perpetuating. The history of *Terraria* begins with the story of the *Wardian case*, created in the 19th century by Dr Nathaniel Bagshaw Ward to nurture plants used for medical purposes, which were struggling to survive during the Industrial Revolution. The *Wardian case* was then used to transport vegetation, in particular the exotic plants which were discovered during geographical exploration. It worked as a

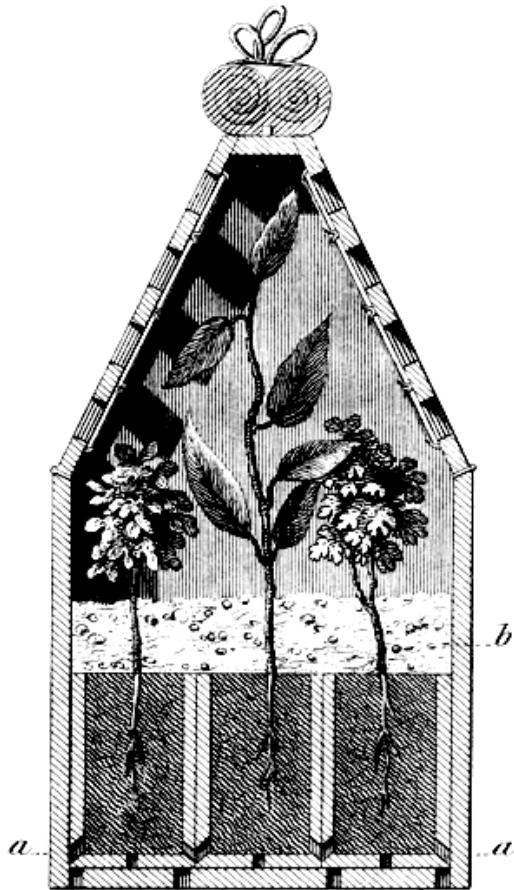
vehicle for environmental scrutiny in Victorian culture, the Wardian case married seductive visions of fertile growth with frank discussions of the human activities that put all vegetation at risk (Wells 2018, p. 168).

The concept of the *terrarium* as a structure which encloses an ecosystem, poses architectural challenges. In this regard, *terraria*, which are tools to sustain, transport and display rare species from faraway lands or different climates, can be interpreted as artifacts for observation and as spaces to nurture living forms which require particular growing conditions, as well as places for leisure.

As described in *On Wardian Cases for Plants and Their Applications*, the *terrarium* aims to

obtain, in short, in the isolation afforded by the glass covering, a climate within a climate, a little world within a world, in which, while their wants

Box to protect plants during sea voyages. Drawing of the inside.
Image published in the paper by John Lindley, "Instructions for Packing Living Plants in Foreign Countries, Especially within the Tropics; and Directions for Their Treatment during the Voyage to Europe," Transactions of the Horticultural Society of London 5 (1824). Work under no copyright protection according to the Biodiversity Heritage Library.



are satisfied, the plants enjoy an immunity from external disturbing influences (Ward 1854, p. 11). *Terraria* are protected space, as well as a miniature version of a specific environment or an architectural structure. They are both desirable ecosystems and structures in which nature is artificially grown and displayed. Therefore, the *terrarium* represents both the container and its content, as well as the relationship between these two elements. This allows us to link the *terrarium* to the idea of *future nature* (Gissen 2019), where the latter is interpreted as both a process and a space for interaction. The concept of *terrarium* as an object is replaced by the concept of *terrarium* as a metaphor of man's impact on natural ecologies. These hybrid ecologies display new ways to coexist for humans and other living beings and new forms of nature. By reflecting on the meaning of the *terrarium*, the contributions to this book show that man's understanding of nature is continually in flux, in both theory and practice. Indeed, this concept of *terrarium* leads to discussion—often both contradictory and oppositional—about the critical relationship between architecture and nature.

Architecture has often drawn inspiration from nature, as described by architectural critics such as Adrian Forty (2000), and has also used nature as a model to reinforce the authority of design choices (Whiston Spirn 1997). Nature's physical and atmospheric presence has also provided inspiration for the design and amplification of sensory experiences (Rahm 2023). However, in the final decades of the twentieth century, science has often been used to emphasise the supremacy of nature, paradoxically questioning its own role. Ian McHarg's *Design with Nature* (1969) undoubtedly changed the relationship between design and the natural environment, by introducing the subject of ecology.

Ecology not only took its place in the design world but also became a driving element for many designers, replacing, in a way, the role of nature (Whiston Spirn 1997). Furthermore, the increasing relevance of urban nature for ecology highlighted the potential interplay between spontaneous vegetation and spatial design (Kowarik 1991). This led to a different interpretation of the boundaries between the built and the unbuilt and to an interest in the inner dynamics of this in-between space. Architecture culture was also influenced by the identification of the environmental crisis – which was first mentioned in the seminal report *The Limit to Growth* (1972) – as well as by the recent recognition of climate breakdown. It showed how man has modified the precarious relationship between territory, climate and technology, by reshaping the geological strata of Earth and by playing with topographies, as discussed in *Robotic Landscape* (Giot 2022) and in *The Earth is an Architecture* (Trévelo, Viger-Kohler 2021). Also, the recent exhibition at the MoMA in New York, *Emerging Ecologies. Architecture and the Rise of Environmentalism*, explores the relationship between architecture and the environment with a focus on the rise of an ecological consciousness (Carson, 2023). Therefore, the *terrarium* can also be interpreted as an element of mediation between the space for life, the atmosphere, and Earth (Ingold 2021). It is evident that man's understanding of nature has become multifaceted and open to question, and so the *terrarium* itself appears to be a system which unveils not only desirable and endangered environments but also “the decay and the uncanny” (Morton 2007). The uncertainty underlying the cultural debate, which is a common thread running through every chapter in this book, results in the various critical interpretations of the *Terrarium*.

As part of the Prin Sylva series, *Terrarium* gathers diverse contributions which investigate the relationship between architecture and nature from multiple perspectives; through texts, drawings and photos. Some authors describe the *terrarium* in visual essays, documenting both designed and abandoned landscapes through photos and drawings. Other authors use the metaphor of the *terrarium* as a means to explore theories and projects, which range from the scale of the landscape to the scale of the building.

Terrarium has five sections which look at the metaphor of the *terrarium* from different perspectives: *Islands*, *Machines*, *Biomes*, *Wildness* and *Metamorphoses*.

Islands focuses on the notion of *terrarium* as an enclosed ecosystem, exploring portions of landscape and architectural constructions as isolated microcosms. The island is a metaphor for an enclosed space which is separated from the outside. The chapters in this section concentrate on the contrast between what stays inside and what is left out, both in domestic spaces and in the urban realm.

Machines looks at the *terrarium* as a system in which single elements reveal the whole. Nature is shaped by architecture and architecture is shaped by natural dynamics. The chapters in this section interpret the *terrarium* by looking at the tectonic as well as the topological resonance of land or vegetation.

Biomes highlights the relationship between entities within a certain environment, whether that is a small plot or the whole planet and overcomes the binary thinking that separates human beings from other forms of life. These biomes reveal the coexistence of different living and non-living beings, exploring their interaction and evolution. They are investigated not only from a human point of view but also from various

Islands, Machines, Biomes, Wildness, Metamorphoses,
Photos by Sara Anna Sapone, Various locations
(Berlin, Amsterdam, The Hague, Almere, Venice), 2022-2023.

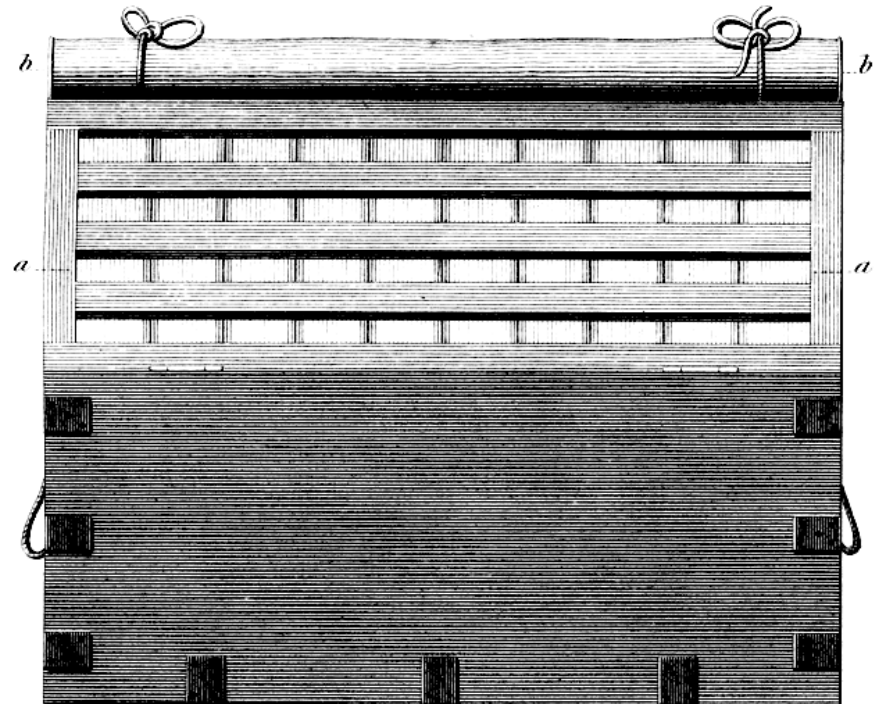


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other perspectives which focus on the relevance of the biotic community.

Wildness looks at how unpredictable natural dynamics can be, in spaces which seem to be enclosed by defined boundaries, either physical or conceptual. These natural dynamics create places which are unexpected *terraria*. Vegetation develops outside the rules, creating precious reserves for biodiversity and attractive spaces between the built and the unbuilt.

Metamorphoses defines the *terrarium* as a space where profound changes occur. In this sense, the contributions to the book are reflections on climate change, territorial alterations and reclamation processes, describing architecture as a space in continual transformation, growth and decay. Therefore, each contribution with its own concept of *terrarium* is a critical reflection on the relationships between ecology, architecture and landscape.

Box to protect plants during sea voyages. Drawing from the outside.
Image published in the paper by John Lindley, "Instructions for Packing Living Plants in Foreign Countries, Especially within the Tropics; and Directions for Their Treatment during the Voyage to Europe," Transactions of the Horticultural Society of London 5 (1824). Work under no copyright protection according to the Biodiversity Heritage Library.



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ABOVE THE ROOF. DESIGNING SECOND CHANCES
FRANCESCA ZANOTTO

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Hassan (Beybe) Ahmed is a Maldivian environmentalist and coral scientist. In 2007, he founded the NGO "Save the Beach Maldives". Since then, he is fighting for an ecologically sustainable development of the country, involving local communities and schools. In 2014 he started his first coral restoration project. He led projects on different islands and organised the very first coral relocation in the Maldives (2016). He believes that only through information and knowledge the community will be able to protect and preserve its natural heritage. His aim is to grow back entire reefs and restore their ecological role lost due to climate change and coastal development.

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Kevin Amendt is an independent researcher engaged in the study of underground quarries, their role in today's landscape and their preservation. Member of the "Studiegroep Onderaardse Kalksteengroeven", "vzw Hulpdienst Groeven" and founder of "Onderzoeksbureau MGL", he advises public and other organisations in the border region Liège (BE) - Limburg (NL/BE).

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Born in Rome in 1997, curious explorer and patient creative, third of four children. After classical high school, she enriched her university course with two years abroad, practicing drawing at FAUP in Porto and ecology at ENSP in Versailles-Marseille, and on-site internships with Wagon-Landscaping and the Botanical Garden of Rome. In 2023, she graduated with honors in Architecture - Urban Design at Roma Tre, guided by A. Metta, presenting with C. Condemi Maglia Boscata, a landscape architecture thesis on the material and immaterial, microscopic and cosmic geographies of the Magliana Stream.

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Annalisa Azzola is a marine ecologist and research fellow at University of Genoa. She finished her PhD in Marine Science and Technologies in 2023. Her research topics include characterization, monitoring, and assessment of the ecological status and change over time of coastal ecosystems. Part of her research also focuses on assessing local and global anthropogenic impacts. Her studies are based on scientific diving techniques, including visual field surveys and photographic sampling.

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Architect and researcher, Giulia Cazzaniga holds a PhD in Landscape and Environment from Sapienza Università di Roma. Her research focuses on the impact of representation on the perception of landscape and its influence on the design of future transformations. Recently, she has applied this reflection to the River Po basin. She is part of the research team financed by Enel Green Power focusing on the decommissioning of solar power plants and she is currently a research fellow at the Politecnico di Milano where she teaches Landscape Architecture design.

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FELICE CIMATTI

Felice Cimatti teaches "Semiotica e teoria dei linguaggi" at the 'Università della Calabria.

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Pietro Consolandi is a researcher and artist based in Venice, where he co-founded the Barena Bianca collective in 2018. He is a research fellow at THE NEW INSTITUTE Centre for Environmental Humanities (NICHE), Ca' Foscari University, inquiring about the possibility to implement the Rights of Nature in the Venetian Lagoon from a cultural point of view. He also collaborates with art and ecology foundation TBA21-Academy since 2020, where he develops various collaborative didactic initiatives as OCEAN / UNI Research Lead.

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Saskia de Wit is landscape architect and assistant professor at the Section of Landscape Architecture, Delft University of Technology. She designs gardens and landscapes at her office Saskia de Wit tuin en landschap. Her research focuses on the garden as a core concept of the field of landscape architecture: the concept of the garden is used as a lens for further research into site-specificity, the sensory perception of place, urban landscapes, leftover spaces and urban forestry.

DAMIANO DI MELE

Damiano Di Mele, architect, PhD candidate at the Sapienza University of Rome in international co-tutorship with the Universidad Politécnica de Madrid (UPM). Graduated cum laude from the Iuav University of Venice after a period of training in Spain. His current research is focused on the analysis of themes related to the history and criticism of contemporary Spanish architecture in the relationship between figurativeness and structure. He participates in research activities in the GIPC group (Grupo de Investigación en Paisaje Cultural) at the Proyectos Arquitectónicos department of the Escuela Técnica Superior de Arquitectura de Madrid (ETSAM), where he has been a visiting doctoral researcher since 2022.

SARA FAVARGIOTTI

Sara Favargiotti is Associate Professor at the University of Trento, DICAM. Her research investigates the multiple identities of landscapes through applied research at different scales, focusing on fragile territories, emerging infrastructure, adaptive dynamics and regenerative design. Local coordinator of project B4R. Branding for Resilience (PRIN, 2020-2024), member of the Directive Board of IASLA (since 2018), she is co-founder and scientific advisor of the innovative startup RUMA S.r.l. SB.

MARCO FERRARI

Marco Ferrari is a researcher at the University of Trento, DICAM and adjunct Professor of Architectural Design Theory at the University of Ferrara. He is project leader of PaesaggiForti project and partner and co-founder of the artistic duo AIDEL. He is particularly interested in contemporary architectural and landscape theory and in revealing the relationship between bodies, ecologies and space, questioning concepts of domesticity and intimacy in both living environments and landscape.

ANDREA FOPPIANI

Andrea Foppiani is a PhD candidate in Architectural, Urban, and Interior Design from the DASTU department at Politecnico di Milano, where he graduated with honors in Sustainable Architecture and Landscape Design. His research focuses on post-logistics landscapes in the Po Valley, working through more-than-human ecologies to explore future hybrid scenarios. He is an academic tutor in design studios and is part of the Landscape Off[f] Limits International Workshop's organization team.

HERMANO LUZ RODRIGUES

Hermano Luz is a designer from Brazil and a PhD researcher in Creative Technologies at the University of Galway. He received a Master's in Design Studies degree from the Harvard Graduate School of Design, where he was a curator of the GSD Kirkland Gallery. He has exhibited and published internationally as an artist and contributed to several technological art projects. In his practice, he mixes iconic cultural heritage with contemporary digital media to inspire participatory creative practices.

INA MACAIONE

Ina Macaione, associate professor at DiCEM_Unibas, coordinates the Phenomenology of Architecture Design course. She is scientific coordinator of the NatureCityLAB. Her research is on the issues of urban regeneration, starting with the transformations of architecture, city and landscape in the process of ecological transition and Climate Change.

VALERIO MASSARO

Valerio Massaro is an architect and academic and a PhD candidate at the AA School of Architecture. He holds a degree in architecture from the University of Florence and an MPhil from the AA School (Projective Cities). He taught Design and History and Theory in several institutions, including London South Bank University, the Royal College of Art and the University of Greenwich.

DAVIDE MONTANARI

Davide Montanari graduated with honors in Sustainable Architecture and Landscape Design from Politecnico di Milano where he is currently doing a PhD in Architectural, Urban, and Interior Design. His research focuses on the practices of appropriation of water within the Po River Basin to unveil protocols of exploitation and investigate future visions through the image of cyborg landscapes. He works as tutor in design studios and is member of the Landscape Offfj Limits International Workshop's organization team.

LAURA MUCCIOLLO

Laura Mucciolo, architect, is Ph.D. st. in Architecture. Theories and Design, Sapienza University of Rome. In 2022, she exhibits the ephemeral design With Mies van der Rohe into a New World (Neue Nationalgalerie) during the Hypercomfort SS by S. Bru (BRUTHER). In the year, she was guest curator with Michelangelo Pivetta and Giacomo Razzolini of the touring exhibition Isolario Venezia Sylva (curated by Sara Marini) at Dept. of Architecture in Florence. She publishes Terzo Paradiso (Libria, 2023).

SILVIA MUNDULA

Silvia Mundula is a PhD candidate at the Politecnico di Milano and a garden designer. After completing her Master's degree in Architecture in Milan, she gained a Master's degree in History and Critical Thinking at the Architectural Association in London, where she developed her interest in the theory of gardens. Her research investigates the cultural principles and the design outcomes of contemporary wild oriented planting design in Europe.

VALENTINA NOCE

Valentina Noce is an architect and researcher based in Milan (Italy). She is the founder of architectural office Sabotage Practice. She is completing a PhD in Architecture Interior and Urban Design at Politecnico di Milano, where she's also collaborating in teaching activities. Bridging the realms of architectural practice and academic research, her work delves into the intersections between space and technology.

RITA OCCHIUTO

Rita Occhiuto is Professor Director of the "Lab. Ville-Territoire-Paysage" within the Research Unit in Architecture at the Faculty of Architecture, University of Liège (BE). She is member of the "PhD School in Architecture and urban planning" and of the Lepur "Research Center in Sciences of City, Territory and Rural Environment" (University of Liège), and Founder Member of "UNISCAPE - European Network of Universities for the implementation of the European Landscape Convention".

ANDREA OLDANI

Andrea Oldani is an assistant professor of Landscape Architecture at the Department of Architecture and Urban Studies at Politecnico di Milano, where he is faculty member of the School of Architecture, Planning and Construction Engineering. He earned a Ph.D. in Architectural and Urban Design from the Department of Architecture and Planning. His researches on the landscape of contemporary infrastructure, are documented by a consistent number of scientific publications. Oldani curated seminars, exhibitions and editorial works.

IRENE PANCAZZI

Irene Pancrazi is a marine biologist specialising in tropical environments and their restoration. In 2016 she started to work for the NGO "Save the Beach Maldives", after witnessing a bleaching event in the Maldives and feeling the urge to take action. Since then, she was in charge of the set-up and the research protocol of various coral restoration projects. She collaborates with various Italian universities, tutoring students and supporting scientific research. Today she is one of the project managers at the NGO and shares the same dream as its founder: to grow back the whole reef and see it thrive.

MARIANA PEREIRA GUIMARÃES

Mariana Pereira Guimarães is an architect-engineer from Brazil and PhD Candidate in Politecnico di Milano's Architecture, Urban and Interior Design program. Mariana was a Marie-Curie EID-ITN research fellow within the SOLOCLIM programme (ID 861119) studying innovative outdoor water-cooling solutions such as fountains and water mists that can respond to extreme urban heat. She received a Master's in Urban Planning and Public Health from Harvard University focused on Human Health and Sustainability.

MICHELANGELO PIVETTA

Michelangelo Pivetta, graduated from IUAV University of Venice, PhD and Associate Professor in Architectural Design in the Department of Architecture of University of Florence. The field of application of the theoretical research is the project and its manifestation through the ephemeral balance between technique, construction and form. He writes essays and books addressing in parallel the didactic and professional activities as experimental opportunities for perennial and necessary verification.

MICHELE PORCELLUZZI

Michele Porcelluzzi is an architect and PhD candidate in Architectural, Urban and Interior Design at DASTU, Politecnico di Milano, in collaboration with the National Biodiversity Future Center. His research interest is focused on the concept of collectiveness in architectural and urban design. He is a founding member of the research project Assume There's a Landscape. His research activity has been published in journals including OASE (2022) and Die Architekt (2023) and exhibited at IABR 2022 in Rotterdam.

CHIARA PRADEL

Chiara Pradel, PhD Arch. (Politecnico di Milano, 2022), is a Landscape Architect and Post-doc researcher at TU Delft, Faculty of Architecture and the Built Environment. Her research explores ground movements originated by building activities, mainly focusing on material culture, reuse and circular baukultur. She lives and works between Milan (Italy) and Delft (Netherlands).

SARA PROTASONI

Sara Protasoni, Head of the M.Sc. in Sustainable Architecture and Landscape Design Politecnico di Milano - Piacenza Campus, is Full Professor of Landscape Architecture and member of the Board of the PhD Program in Landscape Architecture at La Sapienza University in Rome. At the Politecnico di Milano she combines teaching with an intense activity of design and theoretical research on landscape. She is the author of several monographs and over a hundred essays published in books and journals in the field.

ALESSANDRO RAFFA

Alessandro Raffa, architect PhD, is assistant professor PON R&I FSE-REACT EU at DiCEM_Unibas; member of NatureCityLAB and UNESCO Chair on Mediterranean Cultural Landscapes research groups. PhD at DASTU Politecnico di Milano, research fellow Sven-Ingvar Andersson at Benetton Foundation (2020) and post-doc researcher at DAD Politecnico di Torino (2021). He is currently Fulbright Visiting Scholar at University of Florida, College of Design, Construction and Planning and Florida Institute for Built Environment Resilience.

GIACOMO RAZZOLINI

Giacomo Razzolini architect, founder and member of architecture firm filoferro architetti. He is teaching tutor at the Department of Architecture of the University of Florence. He was a research fellow at the University of Florence and Pavia for projects dealing with different themes. In 2022, he was guest curator with Michelangelo Pivetta and Laura Mucciolo of the touring exhibition Isolario Venezia Sylva (curated by Sara Marini) at Dept. of Architecture in Florence.

ALESSANDRO ROCCA

Alessandro Rocca is an architect, a professor of architecture and the Head, for the period 2019-24, of the Ph.D. program of Architectural Urban Interior Design (www.auid.polimi.it) at the Department of Urban Studies of Politecnico di Milano. His recent research develops within the program of national interest (PRIN) "SYLVA - Re-think the sylvan: Towards a new alliance between biology and artificiality, nature and society, wildness and humanity" and the Ca2re European Consortium for design-driven research.

KEVIN SANTUS

Kevin Santus is an Architect, Research Fellow and Ph.D. candidate at the Politecnico di Milano (Italy) in Architecture, Urban, and Interior Design. He won an interdisciplinary grant (2020-2024) to study the design transition facing climate fragilities and its impacts on the morpho-typological aspects of the project. Besides he is a Research Consultant at the Brookfield Sustainability Institute in Toronto and contributor in DOMUSweb.

SARA ANNA SAPONE

Sara Anna Sapone is an Architect, Ph.D. candidate and Research Fellow at Politecnico di Milano. Here she was involved in teaching and research activities, such as the program G124 promoted by Renzo Piano on Italian peripheries. Meanwhile, she worked in Milan-based architecture firms, addressing urban renewal and architectural design. Since 2020, she's developing her doctoral research "Precision Wildland" within the AUID program at PoliMi and a research stay at the Landscape architecture section of TU Delft, funded by the Idea League Grant.

GERARDO SEMPREBON

Gerardo Semperebon, PhD architect, is Assistant Professor in architectural and urban design at the Department of Architecture and Urban Studies (DASTU) of the Politecnico di Milano. Holder of two Ph.D. titles, SJTU + PoliMi, in 2019, he has been a visiting scholar at the BUCEA. The core topic of his research covers architectural strategies of revitalization in complex settlement systems, with specific focuses on Chinese and Italian cities and territories.

GIULIA SETTI

Giulia Setti, architect, Ph.D., is an Assistant Professor of Architectural and Urban Design at Politecnico di Milano, Department of Architecture and Urban Studies. In 2022, she published a typological study of the stepwells in Ahmedabad, India. Her research focuses also on reusing industrial architecture. She worked in the Territorial Fragilities project led by DASTU – Department of Excellence 2018-2022. In 2014-2015, she developed research activities at CEPT University, Ahmedabad, India.

CHIARA TOSCANI

Chiara Toscani is an architect, educator and researcher based in London. She is currently a PhD candidate at the AA School in London in History and Critical Thinking in Architecture. She got her first PhD in Architectural and Urban Design at the Politecnico di Milano and was awarded a postdoctoral research fellow in 2010. She taught urban and architectural design at the Politecnico di Milano, tutored at AA Summer School and Ravensbourne University. Author of essays and books. For a decade, she worked as a senior architect at Cino Zucchi Architetti.

JO VAN DEN BERGHE

Jo Van Den Berghe, architect (Sint-Lucas School of Architecture 1984) with a critical reflective practice since 1986. PhD, RMIT University Melbourne 2012. Teaching experimental architectural design, KU Leuven Faculty of Architecture, where he is developing innovative drawings as the indispensable locus between Techné and Poiesis. Program director KU Leuven Faculty of Architecture 2017-2022. Visiting professor at Politecnico di Milano, EPFL Lausanne, Queen's University Belfast.

FRANCESCA ZANOTTO

Architect, PhD, she is Assistant Professor of Architectural Design at the Department of Architecture and Urban Studies of Politecnico di Milano, where she works on ecological implications of architectural design within the National Biodiversity Future Center. In 2021 and 2022 she was Research Fellow within the Integral Design Environment Research Infrastructure (I.r.ide) – Center for Publishing Actions and Research Development (Pard) at Università Iuav di Venezia, taking part in the scientific activity of national research PRIN "Sylva".

In the same serie

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∞ Sara Marini, Vincenzo Moschetti (a cura di), *Sylva. Città, nature, avamposti*, 2021.

∩ Alberto Bertagna, Massimiliano Giberti (a cura di), *Selve in città*, 2022.

Λ Sara Marini, Vincenzo Moschetti (a cura di), *Isolario Venezia Sylva*, 2022.

∩ Jacopo Leveratto, Alessandro Rocca (a cura di), *Erbario. Una guida del selvatico a Milano*, 2022.

⊥ Fulvio Cortese, Giuseppe Piperata (a cura di), *Istituzioni selvagge?*, 2022.

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