HASSAN AHMED, KEVIN AMENDT, MARGHERITA AUTORINO, ANNALISA AZZOLA, BEATRICE AZZOLA, GINO BALDI, MATTIA BALDINI, NADIA BERTOLINO, FEDERICO BROGGINI, THOMAS CABAI, CHIARA CARAVELLO, GIULIA CAZZANIGA. AMINA CHOUAIRI, FELICE CIMATTI, PIETRO CONSOLANDI. CASSANDRA COZZA, SASKIA DE WIT, DAMIANO DI MELE, SARA FAVARGIOTTI, MARCO FERRARI, ANDREA FOPPIANI, HERMANO LUZ RODRIGUES, INA MACAIONE, VALERIO MASSARO, DAVIDE MONTANARI, LAURA MUCCIOLO, SILVIA MUNDULA, VALENTINA NOCE, RITA OCCHIUTO, ANDREA OLDANI, IRENE PANCRAZI, MARIANA PEREIRA GUIMARÃES, MICHELANGELO PIVETTA, MICHELE PORCELLUZZI, CHIARA PRADEL, SARA PROTASONI, ALESSANDRO RAFFA, GIACOMO RAZZOLINI, ALESSANDRO ROCCA, KEVIN SANTUS, SARA ANNA SAPONE, GERARDO SEMPREBON, GIULIA SETTI, CHIARA TOSCANI, JO VAN DEN BERGHE, FRANCESCA ZANOTTO

AND LANDSCAPE

_{co} €24.00

TERRARIUM. EARTH DESIGN: ECOLOGY, ARCHITECTURE

TERRARIUM. EARTH DESIGN: ECOLOGY, ARCHITECTURE AND LANDSCAPE



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.

PUBLISHER Mimesis Edizioni Piazza Don Enrico Mapelli, 75 20099 Sesto San Giovanni Milano – Italy www.mimesisedizioni.it

FIRST EDITION September 2024

ISBN 9791222311593

DOI 10.7413/1234-1234032

PRINTING Printed in September 2024 by Digital Team – Fano (PU)

FONTS Union, Radim Peško, 2006 JJannon, François Rappo, 2019

GRAPHIC LAYOUT bruno. Venezia

MAKING-UP Silvia Mundula, Kevin Santus, Sara Anna Sapone

© 2024 Mimesis Edizioni Images, graphics and texts © The Authors

This volume was realised with Funds Mur-Prin 2017 (D.D. 3728/2017). The book is also available in open access at www.iuav.it/prin-sylva-prodotti.

Each volume in the series is reviewed by referees chosen from members of the Scientific Committee.

For the images contained in this volume the authors remain at the disposal of any rights holders that could not be traced. The rights of translation, electronic storage, reproduction and adaptation, even partial, by any means, are reserved for all countries.

Unless otherwise stated, all translations are by Y the authors. Y MIMESIS

COLLANA SYLVA

Project of the Research Unit of Università luav di Venezia within the PRIN «SYLVA. Rethink the sylvan. Towards a new alliance between biology and artificiality, nature and society, wilderness and humanity». Call 2017, SH2. Research Units: Università degli Studi di Roma Tre (coordination), Università luav di Venezia, Università degli Studi di Genova, Università degli Studi di Padova.

DIRECTED BY Sara Marini Università luav di Venezia

SCIENTIFIC COMMITTEE Piotr Barbarewicz Università degli Studi di Udine Alberto Bertagna Università degli Studi di Genova Malvina Borgherini Università luav di Venezia Marco Brocca Università del Salento Fulvio Cortese Università degli Studi di Trento Esther Giani Università luav di Venezia Massimiliano Giberti Università degli Studi di Genova Stamatina Kousidi Politecnico di Milano Luigi Latini Università luav di Venezia Jacopo Leveratto Politecnico di Milano Valerio Paolo Mosco Università luav di Venezia Giuseppe Piperata Università luav di Venezia Alessandro Rocca Politecnico di Milano Eduardo Roig Universidad Politécnica de Madrid Micol Roversi Monaco Università luav di Venezia Gabriele Torelli Università luav di Venezia Laura Zampieri Università luav di Venezia Leonardo Zanetti Alma Mater Studiorum Università di Bologna

Ι

_ _ _ _

U

A

TERRARIUM. EARTH DESIGN: ECOLOGY, ARCHITECTURE AND LANDSCAPE

^{10–19} TERRARIUM AS A DESIGN METAPHOR

ISLANDS

- ^{22–35} AN OCULUS INTO THE GROUND. MOTHERHOUSE AND PRESENCING HOMESICKNESS BY DRAWING JO VAN DEN BERGHE
- ³⁶⁻⁵³ AFFECTIVE ENCOUNTERS: NATURE CLOSE TO THE SKIN SASKIA DE WIT
- 54–69 CHINESE GARDEN. ALLEGORICAL ECOLOGIES IN AN URBANIZING WORLD GERARDO SEMPREBON
- ⁷⁰⁻⁸³ LANDSCAPE ARCHIVE COLLECTIONS. DESIGN THE CONTEMPORARY TERRARIUM GIULIA SETTI
- ^{84–95} TERRARIA. AN EXPERIMENTAL GRAMMAR OF SOIL CONTAMINATIONS MARGHERITA AUTORINO
- 96—111 DEBRIS TERRARIUM. BERLIN AND ITS VOID ISLANDS SARA ANNA SAPONE

MACHINES

- 114–127 TRENCHES, WELLS, AND BOULLÉE'S PYRAMIDS ALESSANDO ROCCA
- 128–137 CABIN FEVER VALENTINA NOCE
- 138–145 FOUNDATIONS. ROOTS OF AN ECOSYSTEM GINO BALDI
- 146-161THE LEGACY OF THE ITALIAN
NATURALISTIC HYDRAULICS SCHOOL
CHIARA TOSCANI
- ¹⁶²⁻¹⁷¹ ACQUA VIVA E CORRENTE: INSIGHTS FROM RENAISSANCE FONTANIERI MASTERY MARIANA PEREIRA GUIMARÃES, HERMANO LUZ RODRIGUES
- 172–187 THE PALM HOUSE. A PROJECT OF DOMESTICATION SILVIA MUNDULA
- ^{188–203} VEGETATION AS ARCHITECTURAL FORMS. SITE'S IRONY AND DESIGN PERSPECTIVES. KEVIN SANTUS

BIOMES

- ^{206–223} THE PHILOSOPHICAL CITY. THE BECOMING-WORLD OF THE CITTÀ VECCHIA OF COSENZA FELICE CIMATTI
- ^{224–239} FORT ECOLOGIES AND THE PLANETARY TERRARIUM MARCO FERRARI, SARA FAVARGIOTTI
- 240-249 A NEED FOR CHANGE. VIENNA, A PERFORMATIVE BEAUTY CASSANDRA COZZA
- 250—257 STOLEN LAND. DISAPPEARING ISLANDS AND THE MALDIVIAN PARADOX BEATRICE AZZOLA, ANNALISA AZZOLA, IRENE PANCRAZI, HASSAN AHMED
- ^{258–269} ALLEANZE. A TERRARIUM AS AN UNFINISHED MONUMENT MICHELANGELO PIVETTA, GIACOMO RAZZOLINI, MATTIA BALDINI, LAURA MUCCIOLO
- ^{270–285} IN VITRO LANDSCAPES SARA PROTASONI

WILDNESS

- 288–297 EARTHLY EMERGENCES: SPONTANEOUS ENTITIES DAMIANO DI MELE
- ^{298–307} PILING, MENDING, REASSEMBLING: AESTHETIC AND POETIC OF THE SUBALTERN LANDSCAPES NADIA BERTOLINO
- ^{308–315} AN ASPHALT TERRARIUM. THE HIPPODROME OF TOR DI VALLE FEDERICO BROGGINI
- ³¹⁶⁻³²⁹ INFRASTRUCTURE AS A TERRARIUM. BETWEEN DISCOVERY AND RE-DISCOVERY OF THE INVOLUNTARY ANDREA OLDANI
- ^{330–337} INFRASTRUCTURE OF THE UNEXPECTED. CORVETTO FLYOVER AS A TRANSGRESSIVE TERRARIUM ANDREA FOPPIANI, DAVIDE MONTANARI
- ^{338–345} POST-INDUSTRIAL SYNANTHROPIA. SPONTANEOUS VEGETATION AND ARCHITECTURAL DECAY THOMAS CABAI, MICHELE PORCELLUZZI
- ^{346–351} SUPER TOXIC TERRARIUMS. SPERIMENTAL SCENARIOS FOR TOXIC LANDSCAPES CHIARA PRADEL

METAMORPHOSIS

- ^{354–365} LAGUNARIUM. AMONG THE RUINS OF VALLI DA PESCA AMINA CHOUAIRI, PIETRO CONSOLANDI
- 366–381 RIVER IMAGINARIES. THE RENATURATION OF THE PO REGION GIULIA CAZZANIGA
- ^{382–391} FUCINO: FROM WATER TO LAND VALERIO MASSARO
- ^{392–403} RECLAIMED LANDSCAPES. THE PONTINE MARSHES AS A DESIGN PROTOTYPE FOR A NEW ALLIANCE ALESSANDRO RAFFA, INA MACAIONE
- ^{404–413} GREEN-COVERED: THE SINT-PIETERSBERG AS A TERRARIUM OF CULTURES KEVIN AMENDT, CHIARA CARAVELLO, RITA OCCHIUTO
- ⁴¹⁴⁻⁴²⁵ ABOVE THE ROOF. DESIGNING SECOND CHANCES FRANCESCA ZANOTTO
- 426–440 BIBLIOGRAPHIES
- 441-447 BIOGRAPHIES

FORT ECOLOGIES AND THE PLANETARY TERRARIUM

MARCO FERRARI, SARA FAVARGIOTTI

225 FORT ECOLOGIES AND THE PLANETARY TERRARIUM Terrariums are fragments of the world that are able to depict complexity, synthesizing a few of its elements or features: they reproduce specific environmental conditions in a sort of micro-wunderkammer with an enclosed atmosphere, usually characterized by an object-like scale. Components are usually obtained through a solid supporting base – on which different mineral and soil strata are layered upon – and by a glass case, whose walls define the inner environment and surrounding this aerial counterpart. But besides their pure material configuration, the design of the terrarium is essentially based on the interplay between mineral-animal-botanical features and on a continuous exchange between inorganic and organic matter, animated and unanimated (Morton 2013). In fact, etymologically, terrarium comes from the Latin word terra plus -arium, referring to what comes from or belongs to the land. Terrariums introduce, act and keep unfolding a specific ecological behavior based on a closed-cycle set of processes condensed onto their scale, and they could surprisingly offer an ecological perspective for inhabiting the world in architectural and landscape terms. Indeed, if we consider a terrarium in performative terms (not focusing on dimensions but only on its characteristics) we see how some of its behaviors can be retraced in architectural objects and elements encompassing different landscape dimensions, acting on geographic – or even planetary – scale. Thus, the terrarium is not intended as a passive-receptive box but as an operative concept that can help to re-conceptualize architecture's role inside a dynamic and environmental condition, inscribing its functioning within an expanded planetary (Brenner and Schmid 2013) and ecological notion and responsibility (Colomina and Wigley 2017), revealing the need and opportunity for a disciplinary expansion. With this outlook in mind, an old mountain military heritage could represent the example of an extraordinary century-long unconscious experiment of interaction between nature, design and their intertwined components.

In the eastern Italian Alps, the boundary once separating Italy from the Austro-Hungarian empire where WWI took place – with its archaeology of traces and material presences of military landscape – could be regarded as an emerging hyperobject (Morton 2013). Modifying the mountains, opening new roads, building defensive structures, concrete forts, and hundreds of kilometers of trenches, it was able to encompass opposite geological times and factors and fuse together artificial and natural features (Leoni 2015) in a sort of alternative mountain range. In particular, abandoned WWI forts of the Trentino-Alto Adige alpine region have, over time, constituted platforms for encounFig 01 Geographical localization of WWI forts in Trentino by Livia Sassudelli, realized for the exhibition "Paesaggi Forti", 2022. Key: X: main existing forts and remains of military structures; +: disappeared forts and military structures.



Fig 02 Maquet in felt inspired to Forte Valmorbia (TN) from the maquette series *Soft Landscapes* realized for the exhibition "Paesaggi Forti" by Cristina Gallizioli. Photo by Riccardo De Vecchi, 2022.



229 FORT ECOLOGIES AND THE PLANETARY TERRARIUM ters between artificial matter and botanical or animal species, a base for the emergence of a complex ecosystem. The remains of the forts are today the most recognizable architectural elements of this system: about 60 structures are still evident, and offer the possibility to be interpreted as terrariums on an architectural scale (Fig 01). In over one hundred years, they became sites of infestation, encrustation (Ingold 2013) and creolization (Glissant 1997) in which abandonment unfolded as a possibility and as a model for inhabitation. The ruin became a project, a building site where the actual configuration is the result of a radical co-design process in which authorship was continuously spread along its lifespan, shared between human and non-human agents, forces and phenomena. This design of the abandonment gave rise to the emergence of a series of punctual environments, fort ecologies (Ferrari and Favargiotti 2023) that found and made home within the once autonomous artifact. in a condition of *condominium* and reciprocal domestication (Metta 2022). From their original conception and fixed configuration, they were able to adapt over time becoming starting points for the emergence of new geo-ecological formations, turning aggressivity into welcoming openness and integrating alien approaches and influences. Each fort - shipwrecked over the mountains as a sort of dystopian Noah's arch - gave host and refuge to specific natural species, influenced the local environment, and stimulated a hybrid co-habitation (Morton 2013). based on the interplay between conflicting forces and agents. Today, their image is something in between a futuristic ikebana, an architectural terrarium and a failed reliquary of curiosities (Vogt 2015) in which waste cohabits with relics, artificiality merges with geology, botany, and biology, giving rise to a sort of unconscious alchemy. Designed as concrete independent shells and impermeable shelters, the abandoned forts were colonized and invaded by a springing and adaptive ecology, able to discover domesticity and inclusion inside buildings meant to exclude and protect. From cages, they turned into containers, ironically re-applying to military architecture the conceptual inversion proposed by Elizabeth Fisher's carrier bag theory (Fisher 1979). Besides war, drama, death, and history, an alternative narrative emerged, repurposing these artifacts into ecosystems able to host life and integrate, collect, and accommodate instead of secluding, preserving, and limiting (Fig 02).

Filled, surrounded, crossed, buried, superimposed by incoming presences and components, the original artifact turned over the years into a container, a recipient, a holder, or quoting Ursula Le Guin, into: MARCO FERRARI, SARA FAVARGIOTTI "a thing that holds something else [...] a leaf a gourd a shell a net a bag a sling a sack a bottle a pot a box" (Le Guin 2020, pp. 28-29).

As terrariums create a parallel environment and separated ecosystem, these artificially manipulated mountain parts emerging from the earth's crust are now analogously acting as geologic substrata for incoming soil layers supporting the formation of local ecologies (Fig 03). In fact, the originally self-sufficient and closed system of the fort has turned into a porous one, infiltrated with thresholds, permeable boundaries and leaks allowing various degrees of communication and exchange with the surroundings, properly characterizing it as a vivarium. Defined platforms operating at the intersection between an 'inside' (Schneiderman and Campos 2018) and the outside world, the forts today are configured as objects spontaneously introducing an abacus of contact situations and interface between alternative components. In this sense the periphery of this once autonomous anthropic environment now deploys a series of spatial solutions and strategies of inside/outside interaction: like the walls in a terrarium, the edge is the place where contact happens, working as an outer skin (Zaera-Polo and Anderson 2021) where substances and strata coming from the landscape blend with the inner materiality of the fort. Analyzing its characteristics, we are confronted with a catalog of architectural situations of contact, support and relationship between the landscape surrounding the fort and the new-natural one, stimulated by the artificial intervention and the processes following its subsequent abandonment. The fort is not still or autonomous anymore but is a dynamic system acting as a terrarium: architectural features re-adapted over time and nowadays the solid base provided by horizontal surfaces and structural elements constitute the foundation for mineral and soil strata (Czerniak 2006), while the porous concrete or stone walls encapsulate and define the ecological boundary of the inner environment as the glass case would do in a terrarium. Through its processes, landscape infiltrated inside-over-around-beside the original structure, giving rise to different typologies and terrarium designs, each characterized by a different degree of interface and reception. We propose to divide the whole corpus of this collection into two main categories: stratigraphy | ecologies-on-top built on the element of basement and characterized by accumulation, incremental ground stratigraphies and vertical approach; boundary | around-the-ecologies emphasizes the different walls' designs and the expanded surrounding and horizontal configuration.



Each structure of this collection thus deploys different degrees of integration and landscape/architecture, natural/artificial, organic/inorganic interface, a specific spatial or design strategy (expressed by the action) and content/container logic (expressed by its name).

STRATIGRAPHY | ECOLOGIES-ON-TOP

The typologies of this category are the ones that work with a top approach, the structure stays below, and the organic part is generally more exposed than in the following category:

- *platform (supporting):* in this typology of terrarium – one of the most common – soil and vegetation are hosted on top of the fort/container, which in this case characterizes as the supporting base of a sort of dish garden more than as a proper recipient. Its almost flat surface provides a raised ground-floor for an elevated soil, exchange and air circulation are enhanced, and plants are favorably placed in direct contact with sunlight. Examples of this typology can be found in Batteria Candriai, Batteria Doss Fornas, Batteria Brusaferro, Forte Carriola, Forte Cherle, Forte Larino, while Forte Colle delle Benne, Forte Moena, Forte Pozzi Alti and Forte Luserna offer a less radical design: here the terrarium is only partially present and occupies a defined portion of the whole surface.

- *stand (holding)*: compared to the previous one, this typology combines the advantages in terms of light exposure with the presence of an inclined element oriented towards a preferential direction. Here the flat part is actually minoritarian and the inclined surface constitutes the main support for soil and vegetation to grow: the resulting composition is thus strongly affected by its general orientation, extension, width, inclination and angle. Forte Tenna is almost completely designed around this strategy, Forte Mero and Forte Zaccarana are mainly oriented towards south-west, west Forte Sommo Alto, east Forte Verle and Tagliata Superiore di Civezzano, south Forte Garda, Forte Belvedere and Cima Vezzena which, due to its extreme altitude and peculiar soil structure, characterizes more as a dry terrarium.

- *coffin (burying):* this typology does not differ much from the first in terms of possibilities to host the organic part, but here the structure is particularly integrated into the overall configuration and separated from its organic counterpart by thick soil and mineral layers (while they were still in direct contact in the previous typologies). This typology particularly fits those situations in which there is a need to enhance and highlight the Fig 04 Forte Dosso delle Somme in Altopiano di Serrada (TN) From the photographic series Remnants realized for the exhibition "Paesaggi Forti" by Mark Wilson, 2021.



234 MARCO FERRARI, SARA FAVARGIOTTI soil/vegetation component, maximizing the mineral and inorganic presence and leaving the base structure almost in the background and not visible. If Forte Busa Granda and Forte Valmorbia still offer a well-designed botanical composition on top, Tagliata Inferiore di Civezzano and Tagliata del Ponale developed a sort of dry terrarium or Japanese garden approach.

BOUNDARY | AROUND-THE-ECOLOGIES

The typologies of this category focus on the case element and on a spatial development based on surrounding and enclosing more than on stratification, constituting proper or partial indoors: - skeleton (surrounding): in this category, shading plays an important role, the terrarium's walls completely envelop the ground and are elevated up, providing a good habitat for low vegetation. Usually, the proper terrarium is just a portion of the overall structure, which includes other spaces/environments: this is the case at Forte di Martignano, Forte Doss di Sponde, Forte Dosso delle Somme (Fig 04) and Batteria inferiore di Mattarello. Only Forte Ampola and especially Forte Barbadifior still offer pure examples, where the walls are completely dedicated to the terrarium and the fort is constituted by a series of open-air rooms. Often integrated with a *platform* or *support*, it could be seen as the first step of a *bowl* typology. A sub-category of this typology is *moat*, in which the open room (singular in this case) differentiates for its elongated shape and predominant orientation, surrounding one or more walls from the outside. Forte Alto di Mattarello is an example of particularly prolific vegetation, while Forte Dossaccio only partially envelopes the structure from two sides. - bowl (hosting): set halfway between platform and skeleton, this terrarium design could represent a sort of intermediate development phase between the two typologies. The soil's level is noticeably higher than in the latter, almost filling the walls' height to the top, while opposite to *platform* - where the ground could get considerably thin and is simply layered upon the elevated platform constituted by the structural base of the terrarium here the result is obtained through a careful accumulation of organic material reached over time, possibly alternating different soil's granulometries and consistencies. The best application is at Batteria Superiore di Mattarello, where most areas along the outer walls display good examples of this technique.

- *enclosure (merging)*: one of the rarest terrarium designs, it can alternatively be seen as a development of *bowl* and *skeleton* typologies, with which it shares some of the same logic. In this case, the enclosure is incomplete, and the walls fade into the 235 FORT ECOLOGIES AND THE PLANETARY TERRARIUM organic part, making it sometimes difficult to understand where the terrarium's walls end or where the outside environment starts. Great part of the attention is thus taken by the mineral and botanical part, only comparable for predominance with the *coffin* typology, while the terrarium's elements (base and walls) almost withdraw and merge with the surroundings. In both Forte Sant'Alessandro and Forte San Rocco the walls seem to disappear and are almost conquered by the lush vegetation, fading the terrarium into landscape.

Over time, many typologies overlapped, mixing the different designs, and it is nowadays easy to find different terrarium solutions coexisting in the same structure. Amongst other examples, a particularly rich and peculiar case is constituted by Forte Tombio, in which contour, partial platform and skeleton logic are equally evident at the same time. We can now look at this heritage of military artifacts as a collection of cases from an imaginary museum of terrariums on a planetary scale, lost architectural ikebanas and emerging ruin ecologies set halfway between nature and design. Spread over the Alps as geographic objects (Turan 2020), they share an anthropic origin and the capacity to integrate nature artificially (Corrado 2012) through all these different strategies. Here, the usual scale of the terrarium is magnified to include environments whose spatiality is able to resonate with the size of mountains and valleys, directly shaping the landscape's portions that confront earth, soil, and geological factors (TVK 2022). As a system of man-made ecosystems, each of these elements unfolds a specific bestiary, lapidary and herbarium generated by the dystopic combination of features with contrasting origins and intermingling temporalities, giving rise to a unique and hybrid blend (Fig 05). The variety of these animal, mineral and botanical presences is affected by typology, altitude, soil's composition, relation to built materiality (stone, concrete, etc.) and spatiality (interaction between artificial and natural part, indoor or outdoor predominance). Set between architecture and landscape, these places created a specific and self-perpetuating ecological state, thus characterized by a performative design behavior. Proper terrariums are usually self-sufficient and constitute a sealed environment with a closed atmosphere and dynamics, but this kind of partially-open geographical terraria present a more complex logic (Graham 2016): nature works as a force that makes no difference between manmade objects and surrounding substances. In fact, in this case, the water cycle is influenced by exchanges with the outside, too, and informed by moisture evaporation from soil, buried structure, and surroundings.

Fig 05 Bestiario from the illustration series by Simone Carraro, realized for the exhibition "Paesaggi Forti", 2022.



MARCO FERRARI, SARA FAVARGIOTTI

Thus, while open terraria usually constitute more arid environments compared to closed ones, this architectural version still offers additional humidity in relation to the outside: humidity is kept in the underground parts of the fort and in soil layers, the vapor condenses onto the walls, and water gets stored inside their extreme thickness. Moreover, the now porous enclosure allows for heat and light to enter, guaranteeing a constant water supply and encouraging photosynthesis, besides the income of nutrients for plants and soil. This unique water cycle is paired with a solid one, in which organic waste, artificial ruin, and discarded elements are all digested together with scraps, memories, and organisms from the fort's past and present (Lowenhaupt Tsing, Bubandt, Gan and Swanson 2017), resulting in a comprehensive decomposition process that affects the structure and keeps regenerating it. So, besides the dichotomies between organic and inorganic, animate and inanimate, artificial and natural features an additional narrative unfolds: a narrative involving cycles of life and death, waste and construction, building and decomposition. The whole fort turns into a cyborg organism (Haraway 1991), a detritophagus being continuously assembling and disassembling substances and matter, digesting them into a sort of hybrid humus.

From an architectural perspective, this *ruin-as-a-project* conception calls for the application of a terrarium-logic to the design process, and for the introduction of architectural decomposition opposed to classic architectural composition - amongst the other disciplinary fields. The ruin can be interpreted as the only architectural typology capable of becoming compost (Haraway 2019): often able to introduce more processes than those interrupted by its presence, it shows the possibility of stimulating biodiversity (Barchetta 2021) instead of reducing it. In this sense the aim of the imaginary museum of planetary terrariums we propose is to raise awareness on the whole range of actors involved in the formation of living spaces and in the reconfiguration of the built environment, constituting a catalog of self-contained laboratories, open-air tests, and co-design solutions depicting a series of mutual adaptation and assemblage strategies. Learning from the ruin and trying to replicate this approach means acting towards the promotion of a paradigm of indistinctness between architecture and landscape, where both dimensions find an integration as a way to cohabit the world. Expanding terrarium's behavior to architecture could also imply understanding architectural objects as terrariums already from the design phase, conceiving them not as purely human constructions but even as possible platforms of support for the emergence of specific geo-ecological formations (Escobar 2018).

239 FORT ECOLOGIES AND THE PLANETARY TERRARIUM

Merging artificial space with the notion of ecosystem in the way we design and build could help us bridge the spatial inside/outside gap and detachment from the surrounding environment, promoting a more comprehensive fusion between local landscape, architectural elements, and emerging ecology (Steiner, Weller, M'Closkey, Fleming 2019). In this perspective, the unconscious ecosystems of the abandoned WWI forts of Trentino-Alto Adige offer the example of a century-old ongoing spatial experiment based on a self-driven evolution process and the radical coexistence of opposite forces, inhabitants, and dimensions, materialized in a series of more than 60 terrariums on a planetary scale.

TERRARIUM

HASSAN AHMED

Hassan (Bevbe) Ahmed is a Maldivian environ- Architect, in 2020 founded in Bergamo with Sermentalist and coral scientist. In 2007, he founded the NGO "Save the Beach Maldives". Since design studio, winner of architecture awards for then, he is fighting for an ecologically sustainable development of the country, involving local communities and schools. In 2014 he started his (PoliMi - AUID) (2019 -). Participates in academic first coral restoration project. He led projects on conferences in Italy and abroad such as CA2RE 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.

KEVIN AMENDT

Kevin Amendt is an independent researcher engaged in the study of underground guarries, 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 re- compositional practice. aion Lièae (BE) - Limbura (NL/BE).

MARGHERITA AUTORINO

tient 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 the Master's Degree in Architectural Design at Versailles-Marseille, and on-site internships with Wagon-Landscaping and the Botanical Garden Senior Lecturer in Architectural Theory and Deof Rome. In 2023, she graduated with honors in partment Head of Equality, Diversity and Inclu-Architecture - Urban Design at Roma Tre, guided sion at Northumbria University, Newcastle. by A. Metta, presenting with C. Condemi Maglia Boscata, a landscape architecture thesis on the material and immaterial, microscopic and cos- Federico Broggini is architect graduated at Acmic geographies of the Magliana Stream.

ANNALISA AZZOLA

Annalisa Azzola is a marine ecologist and recharacterization, monitoring, and assessment of coastal ecosystems. Part of her research potentialities in landscape design practices. also focuses on assessing local and global anthropogenic impacts. Her studies are based on scientific diving techniques, including visual field Thomas Cabai is an Italian architect and Ph.D. surveys and photographic sampling.

BEATRICE AZZOLA

Beatrice Azzola is an architect and academic researcher. She worked in several architecture firms in Italy. Portugal and Switzerland. In 2021 she started her PhD on Italian highway archiand ecology.

GINO BAI DI

ena Comi, Vacuum Atelier, an architecture and young architects and architecture competitions. He holds a doctorate in architectural composition Milan and Ljubljana (2020-21) and Conceptual Design of Structures in Zurich (2021). Workshop Urban regeneration and Industrial heritage EPFL - Lausanne (2023)

MATTIA BALDINI

Mattia Baldini is an architect, founder and member of Fuoriformato Architettura, and PhD researcher in Architecture. Theories and Design (cycle XXXVIII, SSD: ICAR/14) at La Sapienza, University of Rome. He has conducted research in Italy (Florence, Rome) and abroad (ETSA in Seville). The main field of research application concerns the relationship between the theoretical pretexts of design and their applications in

NADIA BERTOLINO

Nadia Bertolino, PhD, is an architect, writer and educator concerned with ethical design practic-Born in Rome in 1997, curious explorer and pa- es in response to socio-spatial inequalities and environmental emergency. She is Assistant Professor in Architectural and Urban Design at the University of Pavia, Formerly, Nadia coordinated Sheffield School of Architecture and she was

FEDERICO BROGGINI

cademia di Architettura di Mendrisio. Since his early experiences he focused on urban and landscape design, in particular dealing with soil and water management concerns. He is part of Latisearch fellow at University of Genoa. She fin- tude Platform for Urban Design and Research. In ished her PhD in Marine Science and Tech- 2022 he started a PhD in landscape architecture nologies in 2023. Her research topics include at RomaTre University. The thesis explores the world of urban soils, in particular sealed soils by of the ecological status and change over time asphalt, investigating their intrinsic values and

THOMAS CABAI

candidate at the Department of Architecture and Urban Studies (DAStU) at Politecnico di Milano, where he is also a teaching assistant in the Landscape and Infrastructure Design Studio, His main research interest lies within the relationship between ecology and built environment in anthropic territories. He is part of the National Bitecture and landscape. She also works on the odiversity Future Center and is currently working disciplinary interferences between architecture on several projects of Restoration Ecology and Phytoremediation in the Metropolitan City of Milan, Tuscany and Friuli Venezia Giulia.

CHIARA CARAVELLO

Chiara Caravello is a PhD candidate in architecture in a double programme between the University of Liège (BE) and Politecnico di Milano (IT). Awarded with a FNRS fellowship, she is carrying designs gardens and landscapes at her office out her research on underground guarries in the cross-border area of the 'Three Countries Park' in the Euregio Meuse-Rhine (BE-NL-DE).

GIULIA CAZZANIGA

Architect and researcher. Giulia Cazzanida 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 Damiano Di Mele, architect, PhD candidate at of future transformations. Recently, she has ap- the Sapienza University of Rome in international plied this reflection to the River Po basin. She is co-tutorship with the Universidad Politécnica de part of the research team financed by Enel Green Madrid (UPM). Graduated cum laude from the 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.

AMINA CHOUAIRI

Amina Chouairi is a PhD student in Urbanism at Università luav di Venezia and holds a Master of Science in Landscape Architecture from Delft University of Technology. Since 2019, she has been researching and working on the Venetian Lagoon complex transitional territory, exploring the debated relations among its cultures and natures. Crucial for her is the understanding of the Sara Favaroiotti is Associate Professor at the agency of the barene landscape - the brackish University of Trento, DICAM, Her research inmarshes, i.e. the ignition point from which to rethink the Venice-in-a-lagoon system.

FELICE CIMATTI

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

PIFTRO CONSOLANDI

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 Envi- Marco Ferrari is a researcher at the University ronmental 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 project and partner and co-founder of the artistic with art and ecology foundation TBA21-Academy since 2020, where he develops various collaborative didactic initiatives as OCEAN / UNI Research Lead

CASSANDRA CO77A

Cassandra Cozza, architect, PhD, is Lecturer and Assistant Professor in Architectural and and Urban Studies. Politecnico di Milano. Her research topics focus on contemporary paradiams of architectural and urban design studying changes with a design approach aimed at enhancing both spatial relationships and contexts. She is a member of the scientific editorial board of the magazines Territorio (Franco Angeli) and Ardeth (Rosenberg & Sellier).

BIOGRAPHIES

SASKIA DF WIT

Saskia de Wit is landscape architect and assistant professor at the Section of Landscape Architecture, Delft University of Technology. She 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

luav 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 Paisaie 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

vestigates 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.I. SB.

MARCO FERRARI

of Trento. DICAM and adjunct Professor of Architectural Design Theory at the University of Ferrara. He is project leader of PaesaggiForti 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

Urban Design at the Department of Architecture 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 Offfl Limits International Workshop's organization team.

442