



The upcoming exhibition at the Architekturmuseum of the TU Munich highlights the urgent need to rethink our food systems, both environmentally and politically. It presents critical research on food production and territories that shape European agricultural trade.

Visitors are invited to reflect on the political, architectural, economic, and social dimensions of food. The exhibition explores architectural settings by questioning how we can incorporate principles of conviviality, as opposed to industrial (over)productivity, into landscapes surrounding food production. Bringing together architecture, environmental journalism, as well as the arts and sciences, it positions statistical analyses alongside material installations to explore a broad range of questions:

- → How does food enter cities?
- → How sustainable and public are high-tech greenhouses in practice?
- → How did tomatoes become a year-round staple in Europe? And how is their cultivation connected with other value chains, such as salmon production?
- → What kind of agricultural and spatial adjustments, such as seed and soil innovation, follow the swath of desertification at Europe's southern fringe?
- → Are animals food? How did cattle breeding evolve alongside architecture in the Netherlands? And how did the design of European farmhouses progress throughout the twentieth century to create an ecosystem of devices that maximizes milk and beef production?
- → How do barns function as panopticons for insemination bulls, confined for their entire life and kept solely as carriers of genetic information?
- → How does the ratio of catch and operational spaces differ between small-scale fisheries in Portugal, aquaculture in Germany, and industrial fishing worldwide?

- → How do feed crop landscapes, such as soy and grain monocultures, support the industrialization of livestock in the final production of food?
- → How do the Amazon rainforests in Brazil operate as open factories, advancing deforestation in order to ship soybeans for animal feed globally, including to Western European ports?
- → What old and new spatial infrastructures have emerged following the dissolution of Ukraine's breadbasket region?
- → How can living soil help the convivial reconstruction of agro-industrial food systems?

The exhibition's narratives feature food products as anthropomorphized characters, including a tomato, a strawberry, a salmon, tropical fruits, a cow and a bull, an octopus, a carp and a shrimp, soy, grains, and a worm. In a metabolic process where one product is consumed by another—and waste, supporting materials, and food are absorbed into a giant cycle of labor, territories, and capital—these protagonists have been selected because they not only feed one another, but also embody the major food issues that Europe faces.

Such challenges include the nitrogen crisis, the rise of AI-driven, climate-controlled environments for food production, the desertification of Sicilian soils, the overfishing of European seas, the dissolution of the breadbasket regions, and the migrant crisis surrounding cheap manual labor linking Europe and Africa.

Additionally, the protagonists represent a range of universally essential—or are they?—foods that our bodies require, such as fruits and vegetables, milk and meat, fish and grains, with their histories playing an important role in European legislation and constitutions. Finally, these cases share trade routes and actors, such as companies, universities, governments, and, eventually, the labor that op-

The architecture at stake is not solely a building, but a set of spatial and territorial constellations created to respond to economic demands that drive these

The exhibition will be on view at the Architekturmuseum of TUM at the Pinakothek der Moderne in Munich from April 23 to October 11, 2026.



Climate-as-a-Service The Architecture of **Dutch Controlled-Environment** Horticulture



The usual narrative surrounding the sustainability of Dutch controlled-environment agriculture (CEA), particularly greenhouse horticulture, often focuses on the aspect of it being an innovative and reliable solution for future food production. Such narratives, promoted by cities, agritech firms, and corporate actors, suggest that high-tech greenhouses can overcome climatic and geographic limitations, driving transformative change in the way food is grown. CEA is frequently positioned as a sustainable solution to global food insecurity, claiming to reduce CO₂ emissions, energy and water consumption, and pesticide use, all while increasing

These technologically intensive systems are framed as delivering optimal performance, improved decision-making, and resilience against climate change and labor market instability. The integration of automation technologies to control indoor climate is further celebrated as a way to manage environmental unpredictability and to ensure the continuity of capital reproduction.

Given the extensive portfolio of innovations and related know-how, Dutch indoor climate solutions are typically exported to new geographic contexts and adapted to local environments, with the stated aim of helping to secure forms of sustainable food production. The integrated hardware-software-orgware system, developed over centuries of Dutch horticultural practice and refined through successive political, economic, and environmental crises, is now offered internationally as a "climate-as-a-service" model. Under this paradigm, recipient nations may obtain individual components—physical infrastructure, digital climate-control platforms, or organizational expertise—yet they increasingly adopt the system mentioned above, which decouples controlled environments of food production from their immediate milieus. Indoor climate solutions are reproduced and spatially diffused across different geographic areas as a service that not only boosts food production but also subjugates "nature."

In effect, these services give rise to, support, and produce spatial fixes and contribute to new geographies of "artificially engineered" and controlled environments for food production.

This exhibit explores the significance of climate-controlled environments and underscores their reliance on "more-than-human" elements (Rutherford and Marvin 2025) for maintaining food production. Visions and claims of food security and sustainability are further scrutinized to reveal the processes, sociotechnical systems, and materials upon which these narratives rest.

Reference: Jonathan Rutherford and Simon Marvin, "Climate-Controlled Conservation: Remaking 'The Botanical Metropolis of the World," Transactions of the Institute of British Geographers 50, no. 2 (2025).



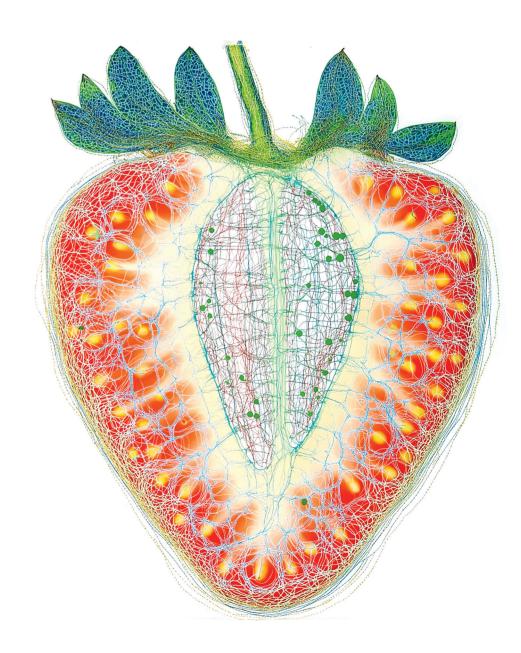
The Strawberry and the Greenhouse A Parable of Anthropocene Landscapes

During the twentieth century, Munich and its surrounding areas experienced significant changes in food production, distribution, and consumption. The suburban belt took over small farms that had supplied the city's markets.

Much of the peri-urban territory around Munich is defined not only by production, but also by global supply chains and extensive logistics infrastructure. Economic pressure on a global scale has now transformed rural economies that were originally based on direct links between productive landscapes and urban dwellers.

In trying to feed the growing city of Munich, productive hinterlands are moving farther away from consumers, both mentally and physically. This spatial transformation is the result of changes in consumer culture. The cultivation of strawberries today can be used as a metaphor to analyze this spatial shift. From supermarkets to pick-your-own farms and strawberry-themed merchandise, strawberries have become a heavily commercialized part of Bavarian culture. A few decades ago, they could be found in the gardens of rural settlements in the Alpine foothills and suburban fields bordering Munich. Strawberries in Germany are today predominantly cultivated in controlled environments, such as plastic-covered fields and technologically advanced greenhouses heavily entrenched within international supply chains. Contemporary urban environments offer strawberries year-round in supermarkets, signifying a growing disconnection from natural ecosystems, seasonal cycles, and the landscapes that sustain human nutrition.

The exhibit, in the form of a drawing essay, comprises multiple illustrations that reveal the spatial dynamics and alienation experienced in relation to the urban settings of Munich, the surrounding hinterlands, and the food infrastructure they encompass. JAN MÜLLER





The Salmon and the Tomato and Commensality

The project "The Salmon and the Tomato" introduces the concept of food imperialism and the social and ecological impacts of food supply chains using the example of salmon farming and greenhouse tomato production.

Salmon farming is an enormous global industry, with Norway alone exporting 1.2 million tons per year. The industry relies on wild-caught fish, which are processed into fishmeal and fish oil as feed, with 2.5 percent of every marine fish caught being used to feed farmed salmon.

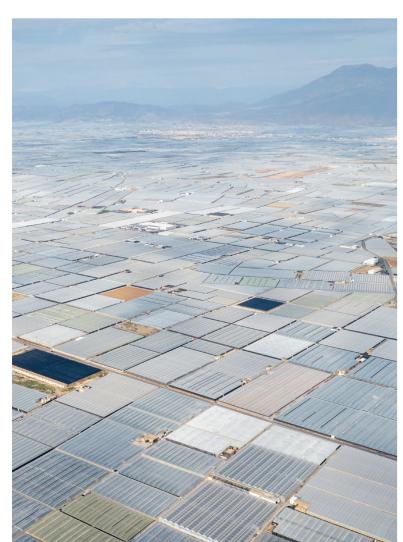
Taken from heavily overfished regions in West Africa, this results in a shortage of fish for human consumption in Senegal, The Gambia, and Mauritania. The resulting collapse of artisanal fishing and lack of livelihoods is a contributing factor, driving people to migrate, typically traveling up to 1,200 kilometers by sea in small boats to reach the Canary Islands. Once in Spain, some become trapped working in undocumented industries, such as the greenhouse agricultural industry in Almería, which exports millions of tons of tomatoes across Europe.

This photojournalism project examines the social and environmental tolls of these linked supply chains.

"Commensality" is a social research photography project that explores the relationship between food and sense of place experienced by African migrants working in intensive greenhouse agriculture in Almería, Spain. This vast area of 32,000 hectares of plastic greenhouses produces over 3.8 million tons of fruit and vegetables each year, with 80 percent destined for export to neighbors like Germany, France, and the United Kingdom. Undocumented migrant workers from the Maghreb and West Africa work insecure jobs, while living in unsafe accommodations.

Commensality aims to use the universal language of food to understand how the experiences, cultural background, and identity of these migrant workers affect their relationship with food, and subsequently their mental well-being. Using photo-elicitation methods throughout 2024 and 2025 in migrant settlements in Almería, participants have recorded food diaries as in-depth interviews. The result is a visual exploration of how they prepare and share food under the pressures of agricultural labor exploitation.

NEAL HADDAWAY, JOSÉ LUIS VICENTE VICENTE, MARÍA D. LÓPEZ-RODRÍGUEZ





A Natale Torre, owner of the largest tropical plant nursery in Italy, offers a wide range of exotic species to local growers adapting to Sicily's rapidly changing agricultural landscape / Photo: Jean-Marc Caimi, Valentina Piccinni



Tropicalia

Southern Europe is undergoing a silent revolution. As climate change accelerates, regions once defined by temperate seasons are shifting toward subtropical and tropical conditions. Nowhere is this transformation more visible than in Sicily, where rising temperatures, shifting rainfall patterns, and extreme weather events are forcing a radical rethinking of agriculture, identity, and survival.

"Tropicalia" is an in-depth photographic exploration of this evolving landscape. The aim of the project was to document how the island is responding to the pressure of a changing climate—through the voices of farmers, scientists, and entrepreneurs. From experimental crops and new food cultures to the reconfiguration of land and infrastructure, Sicily emerges in the photographs as a microcosm of the challenges and opportunities that await the rest of Europe. The documentary was developed in collaboration with the Department of Agriculture, Food, and Environment at the University of Catania, the "Mixwheat" project, and the Mediterranea University of Reggio Calabria's Department of Agriculture. Through this partnership, Tropicalia addresses a series of interconnected topics:

- → Scientific research aimed at identifying specific fertilizers for areas undergoing desertification.
- → Experiments involving a broad spectrum of wheat varieties tested across diverse microclimates in Sicily.
- The rapid transformation of the agricultural sector, highlighted by the emergence of high-quality tropical fruit cultivation, a business flourishing on Sicilian soil for the first time.



The Animal Is Present Metabolism, Architecture, and Bodies of Cattle Farming

Cattle farming is a realm of contradictions. It collapses the boundaries between the abstract organizational layouts outlined in a zootechnical handbook and the muddy reality of a farm. It is a planetary phenomenon that poses global threats and is also a local political concern and a source of livelihoods. It is a sophisticated industry of genomic and reproductive technologies, and a culture which celebrates national breeds and unique specimens.

Particularly in Europe, it is a radical testing ground for digital technologies within an anonymous collection of industrial barns and a conservative field purportedly safeguarding idealized representations of the rural landscape.

Intensive animal farming is also a realm of representations—of the cows, of the buildings, and of the zootechnical landscape. It is a place where animal bodies are imagined, designed, fed, grown, and killed, and then reimagined into attractive marketable products.

The architecture of cattle farming is also a place for labor—of both human and nonhuman animals. But is this really the case? Do these animals work, or are they perceived as (living) technologies and machines operating on the site? Do farmers work, or have they increasingly become supervisors and managers who operate through apps and screens?

This section unravels the dichotomies around cattle farming and the foodspaces of milk and beef by operating as a paradox: although the section is about cows and bulls, real animals are not the main point of focus. Instead, the animals are embodied in a series of installations that allow visitors to experience the design, complexities, and controversies of industrial cattle farming.

VÍCTOR MUÑOZ SANZ, SOFIA NANNINI / PHOTO CONTRIBUTION: JOHANNES SCHWARTZ / MURAL: KEES DE KLEIN

5 Circular milking barn, Dairy Campus Leeuwarden, Netherlands / Photo: Nicole Humiński, Nikolai Huber © A.M.



Technominotaurus

The art installation <u>Technominotaur</u> addresses the invisible labor of breeding bulls as carriers of genetic information and their role in the reproduction not only of individual animals and food, but also of a highly exploitative ecological and economic system. This system operates according to the principles of techno-Darwinism and capital-Darwinism, following an evolutionary trajectory.

The work's point of departure is the salt licks that the bulls consume and shape. An object in constant flux and transformation, the salt lick becomes an interface between animal, human, and technology. The ever-changing form of the salt lick highlights agency and the metabolism that connects us to the non-human.

At the same time, <u>Technominotaur</u> considers the bull and the salt lick in terms of their physicality and materiality, and as a mythological figure and object of symbolic significance.

The multimedia installation comprises objects, sounds, and photographs, meditating on containment, masculinity, and mechanistic rituals.



A portion of the "Sea of Plastic" in Almería, Spain, 2024 / Photo: Neal Haddaway

DÁNIEL SZALAI

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Octopus Choreographies The Fishing Community of Angeiras

This case study explores how the fishing village of Angeiras—located in the municipality of Matosinhos in northern Portugal and once predominantly dependent on local waters—is ever susceptible to global influences, while remaining embedded within complex national and international food networks.

The global sea is also experienced inland through terrestrial networks. It has become essential to supply imported fish to local restaurants and markets, particularly in response to the demands of the thriving tourism sector—now the dominant economic driver in Angeiras.

In terms of volume and stability, local fisheries are unable to fully meet this demand. On the other hand, their profitability is comparatively stronger, largely because fish caught through small-scale methods command higher market values than those harvested by industrial trawlers or obtained through aquaculture.

Angeiras's stone houses, which are built close to the beach, play an active role alongside vessels engaged in small-scale fisheries targeting a variety of species, including pouting, sea bass, shrimp, lobster, and, most notably, the common octopus. Once caught, they are brought ashore and weighed at the auction house, and then sold at the local market, either to restaurants or to regional food distribution networks. These choreographies between fisherfolk and octopus transform the animal into a commodity.

This exhibition section unfolds in three interconnected steps, combining cartography, physical artifacts, and film to explore the octopus's journey between sea and land, along with the way in which its fishery is reflected in the built environment.



An octopus being cleaned after landing, Angeiras, Portugal, 2023 / Photo: Jorge Nogueira

RAFAEL SOUSA SANTOS, DIEGO INGLEZ DE SOUZA, ANDRÉ TAVARES





Monks and Machines Stories of Carp and Shrimp

From monastic ponds in Bavaria to automated shrimp tanks on the urban fringe, the landscapes of food production reveal the shifting relationships between culture, economy, and ecology. For centuries, carp have shaped a living cultural landscape rooted in religious rhythms, ecological knowledge, and small-scale economies. These pond systems, created by monks and farmers alike, mirror the surrounding fields reflecting a world in which the landscape is both our home and our livelihood.

By contrast, shrimp represent a new kind of landscape in the search for sustainable alternatives to industrial production. Cultivated in a closed-loop, mechanized aquaculture system, shrimp inhabit a world of controlled temperatures, artificial intelligence, and displaced ecology. Although genetically engineered and energy-intensive, this method is efficient and holds promise for reducing pressure on natural ecosystems. Yet, it reveals how food production has become increasingly detached from landscape and place.

Together, carp and shrimp mark a shift in how we produce, consume, and relate to our environment. While one production method eagerly looks to the future, the other, rooted in the past, challenges us to reconsider whether tomorrow's visions might be found in yesterday's practices. Carp and shrimp, more than just two species, are symbols of continuity and rupture, of rootedness and estrangement. What ends up on our plates carries more than taste: it conveys the stories of landscapes, economies, and values in flux.



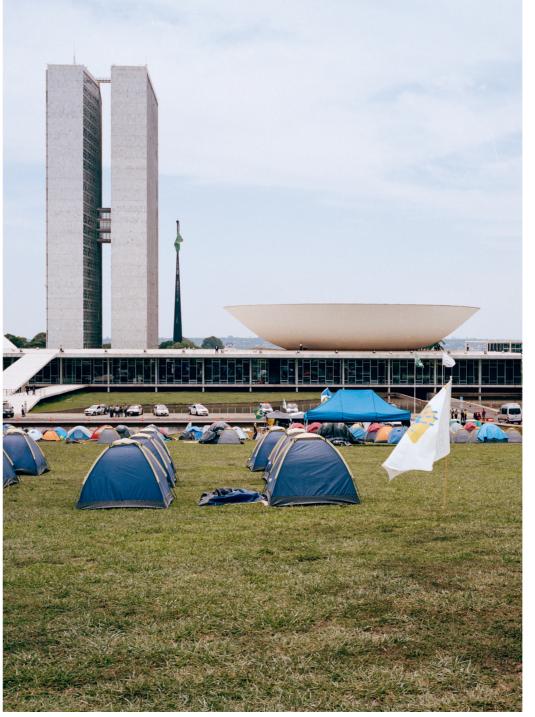
Livestock Hinterglobes

This contribution critically examines the geographical contradictions of industrial livestock production within the framework of "hinterglobes": planetary networks of extraction, logistics, and capital flows that sustain agro-industrial intensification, while displacing its socioecological burdens.

Unlike the regional systems of biogeographical interdependencies assumed by city-centric hinterland models, the concept of "livestock hinterglobes" aims to conceptualize the globalization of food systems under planetary urbanization as an assemblage of multiscalar operational landscapes of primary production, circulation, and waste disposal. It explores how industrial livestock production is not confined to the technical landscapes in which animals are raised and slaughtered, but is instead embedded within a vast, trans-scalar operational geography of material flows, territorial transformations, and financial circuits that link distant ecosystems, labor regimes, and governance structures. Hinterglobes are the spatial manifestation of food systems' evolving transformation into a complex web of globalized supply chains and production networks. They constitute a significant factor in the geographical organization of life on the planet. Rather than resolving ecological contradictions, hinterglobes exacerbate them by rearticulating planetary metabolic relations, simplifying landscapes, and exhausting ecological surpluses in pursuit of profit.

The contribution examines the core processes behind the emergence of livestock hinterglobes, highlighting their core spatial elements, economic relations, and properties. By mapping the operational landscapes of livestock, feed, energy, and environmental degradation, this contribution aims to reveal how these hinterglobes underpin uneven ecological transformations. Understanding such dynamics is crucial for grasping the planetary scale of contemporary agro-industrial contradictions and envisioning alternatives beyond extractivist food regimes.

NIKOS KATSIKIS



Protest camp in Brasília against PEC 215, a proposed constitutional amendment in Brazil that threatened Indigenou land rights in favor of agribusiness. National Indigenous Mobilization, Brasilia, Brazil, 2015 / Photo: Giulia Bruno.

Accompanying the exhibition is a richly illustrated volume published by Archi-Tangle in separate German and English editions. It brings together transdisciplinary voices exploring the relationship between food production, landscapes, and architecture. Contributors include architects, historians, sociologists, scientists, students, artists, economists, environmental journalists, activists, farmers, historians of science, photographers, and curators. The book features substantial essays that examine the complex interdependencies among spaces, politics, and food systems. It also opens up discussion on holistic approaches to change with a view to post-urbanization and postcolonial practices, including bioregionalism, degrowth, food sovereignty, agroecology, and the work of social movement agencies. In addition to written contributions, the volume incorporates visual formats such as graphic novels, photographic documentaries, and drawing essays. It is further expanded through digital supplementary content available in BOOK+, including expert interviews and more. Aimed at a broad readership, it spans academic writing, journalistic formats, and political commentary.

ArchiTangle is an award-winning, independent publishing house based in Berlin that focuses on knowledge transfer and socially relevant projects related to the living environment. It actively collaborates with professionals, scholars, and academic institutions, fostering research-driven and interdisciplinary dialogue. ArchiTangle's publishing program covers the entire spectrum of architecture and is dedicated to facilitating and preserving the exchange of architectural knowledge through publications and digital services. With a global network of authors and a wide range of expertise and disciplines, it addresses current and future architectural challenges from various perspectives. By integrating insights from a range of disciplines, the publisher fosters critical reflection and promotes innovative methodologies for understanding and shaping the built and natural environments.

WITH CONTRIBUTIONS BY GRACE ABOU JAOUDE, MAXIMILIAN ATTA, ANDJELKA BADNJAR, SEPP BRAUN, GIULIA BRUNO, JEAN-MARC CAIMI, NEAL HADDAWAY, DIEGO INGLEZ DE SOUZA, NATALIE JUDKOWSKY, NIKOS KATSIKIS, ANDRES LEPIK, MARÍA D LÓPEZ RODRÍGUEZ, JAN MÜLLER, VÍCTOR MUÑOZ SANZ, SOFIA NANNINI, RAJ PATEL, VALENTINA PICCINNI, OLGA PINDYUK, STEFAN PIELMEIER, RÉKA ROZSNYÓI, TIAGO SARAIVA, GENT SHEHU, KATRIN SCHNEIDER, DÁNIEL SZALAI, AMELIE STEFFEN, CAROLYN STEEL, RAFAEL SÓUSA SANTOS, ANDRÉ TAVARES, MARK TITLEY, JOSÉ LUIS VICENTE VICENTE, SINAN VON STIETENCRON, ET AL.

EDITED BY ANDRES LEPIK AND ANDJELKA BADNJAR / WWW.ARCHITANGLE.COM



Soyscapes Tracing the Footprint of Europe's Soy Imports in Brazilian Forests

European demand for soy, and the land required to produce it, shapes landscapes and drives deforestation across the planet. Nowhere is this more evident than in Brazil, an agricultural powerhouse that exports more soy than any other country in the world and is simultaneously losing more of its forest.

However, the supply chains that connect European retailers and consumers to impacts in Brazil are complex and opaque. This makes it very difficult to understand these linkages or take urgently needed action to ensure that the economic benefits of the soy trade do not come at the cost of the world's most valuable ecosystems. Fortunately, new data and innovative uses of existing data make it possible to map the flow of soybeans from the place of production to the destination markets, via processing facilities, storage silos, trading companies, and

This section explores the latest insights into the link between European soy demand and deforestation in Brazil. It reveals opportunities to make the European soy supply more sustainable by showing that these impacts are highly concentrated in specific locations and among certain actors. It considers how existing measures, from both the demand and the production sides, have been helpful but insufficient.

Finally, it discusses how the rapidly evolving policy and political landscape in the European Union, Brazil, and other regions mean that an understanding of these transatlantic spatial connections is now more critical than ever.



The Ukrainian Grain Chain

Undoubtedly, no other topic highlights the food security crisis in Europe more than Ukraine's failed breadbasket region, which transitioned from being a major grain exporter to experiencing utmost devastation of its soils. This instance particularly illustrates the importance of soil as a medium for food production, here severely affected by war.

Ukraine evolved into Europe's—and the world's—grain production superpower, relying on Soviet-era infrastructure and the organization of sovkhozv (agricultural towns), until this nexus was severely undermined by the bombing of silos, the disruption of irrigation systems, and the ensuing soil contamination from minefields.

In the short term, the disruption of the grain supply chain has influenced European legislation and redefined political export routes, with the aim of safeguarding vulnerable African nations. In the long term, however, it has indicated a decline in both the economic and environmental place of grain, as land becomes polluted. This situation spans from the historical context of the breadbasket region, which was shaped by communist spatial planning, to the impact of the current war playing out on Ukrainian terrain.



<u>Living Soils</u> Foundation for a Thriving Future

Ecological crises, turbulent global politics, and rapid technological advances. Amidst all this, one simple truth often escapes our attention: without living soils, life as we know it would not exist. Industrialized food production systems are becoming increasingly disconnected from the local terrain, climate, and soil.

However, this connection can be restored. Adopting a perspective grounded in living soils allows us to address land use and food-related issues in an integral, hopeful way, and to highlight solutions that foster thriving futures for both human and nonhuman beings.

Although they may appear humble, soils form the skin of our planet: a thin, dynamic layer teeming with microbial life, organic matter, minerals, and water. Soils store carbon, cycle nutrients, filter water, and provide the foundation for almost all food systems. Yet this very basis of most ecosystems that surround and nourish us is being quietly eroded—physically, chemically, and culturally.

The final exhibition segment concludes and reflects on this theme, taking the perspective and research on soil as a possibility for renewal and regeneration in the domain of food production. This theme also responds to the question of what can come after food systems reach their limit.

NATALIE JUDKOWSKY, FRÉDÉRIC SCHNEE



SINAN VON STIETENCRON



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