Soil & Water – Foundations of a Resilient Future

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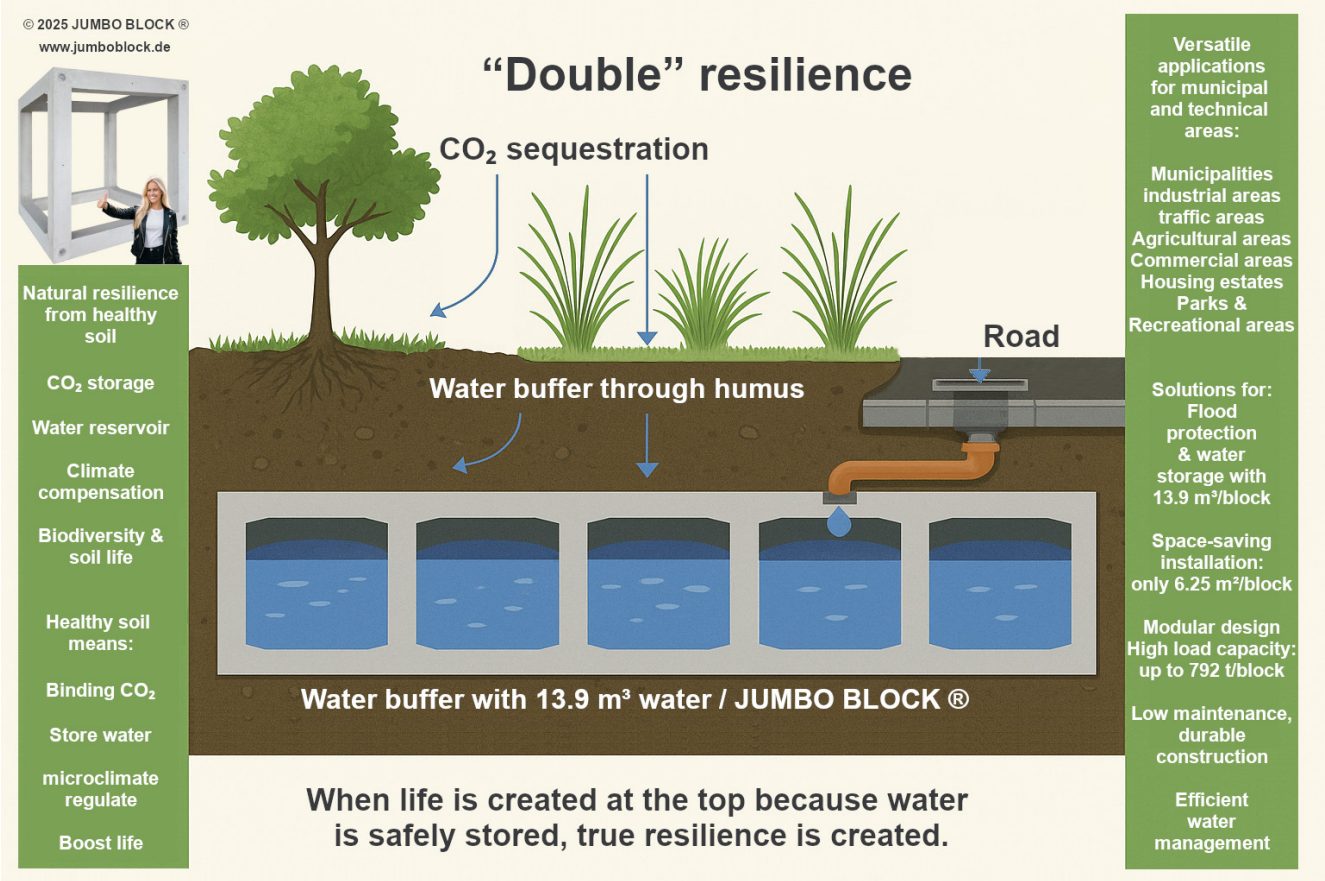

Soil & Water – Basics

A concept for the sustainable strengthening of our living environments through healthy soils and decentralized water storage

Summary:

Extreme weather events, dried-out soils, and flooded cities make one thing clear: our environment needs new answers — and sooner than expected. Global temperatures are rising far faster than previously predicted.* Many thresholds have already been crossed. Time is becoming the decisive factor.

This concept shows how healthy soils can store CO_2 and water over the long term — and how technical systems like JUMBO BLOCK® can serve as immediately effective complements in creating resilient urban spaces. The combination of natural soil regeneration and intelligent infrastructure forms the foundation of a future-proof society.

* 2024 - A Year of Records (Full Presentation)

1. Healthy Soil – Our Quiet Hope

Soils are more than just carriers of our infrastructure. They are living ecosystems that store CO_2, absorb water, nourish plants, and regulate our microclimate. Through humus formation alone, up to 5 billion tons of CO_2 could be sequestered worldwide each year (Source: FAO, 2020). A single hectare of soil with just 1% more humus can store between 30,000 and 50,000 liters of additional water — and bind up to 50 tons of CO_2 in the long term. This makes healthy soil a vital buffer in the face of heavy rainfall and drought.

How soils store CO_2:

Humus-rich soils bind carbon in the form of stable organic compounds, which are created through plant residues and microbial activity in the soil. Particularly important is what's known as stable humus, or “permanent humus,” which can persist in the soil for decades. Increasing the humus content by just 1% can, depending on the soil type, sequester between 30 and 50 tons of CO_2 per hectare on a long-term basis.

Life in the soil as a CO_2 engine:

Earthworms, bacteria, fungi, and especially mycorrhizae — symbiotic fungal networks connected to plant roots — play a central role. They enhance nutrient supply and increase the carbon exchange between plants and soil. Soils with high biological diversity not only store more CO_2 but are also more resilient to extreme weather.

Challenges:

- Loss of humus and soil biodiversity
- Sealed surfaces prevent water infiltration and retention
- Monocultures, pesticides, and deep tillage destroy soil structure

Potential:

- Restoring soil structure through regenerative agriculture: Projects like the Living Soil Project in France or the Humus Building Program in Austria demonstrate that farms can measurably increase humus content within a few years while maintaining stable yields.
- Promoting mycorrhiza to improve CO_2 sequestration and plant resilience
- Using compost, biochar, and mulch to build humus

Approaches:

- Programs for unsealing and greening surfaces
- Strong cooperation between agriculture, municipalities, and research institutions
- Incentives for humus-enhancing farming practices and political frameworks that promote soil stewardship in a way similar to CO_2 certificates — through support for humus-building programs, urban greening initiatives, and partnerships between municipalities and universities

Political and societal relevance:

Although soils represent a major carbon sink, they are often overlooked in national climate strategies. Yet initiatives like the international “4 per 1000” strategy aim to increase the humus content of agricultural soils by 0.4% annually — enough to significantly slow the global rise in CO_2. Municipalities also play a key role here, through smart land management, deep-rooted urban greenery, and unsealing efforts.

Best-practice-examples:

- In **Linz (Austria)**, unsealing schoolyards and parking lots has significantly improved soil quality. Asphalt and concrete were replaced with green, permeable surfaces. This allows better water infiltration, revitalizes soil life, and promotes biodiversity. At the same time, the local microclimate improves noticeably — an important step toward reducing urban heat islands. Projects like Climate-Friendly Schools demonstrate how schoolyards can become climate-active spaces.

- In **Germany**, many **Bioland-certified farms** use humus-building crop rotations, composting systems, cover crops, and reduced tillage. These methods not only enhance carbon sequestration but also improve water retention and soil health, creating more resilient farming systems with stable yields — even under changing climate conditions.

- In **France**, the Living Soil Project showcases the effectiveness of regenerative methods in practice. By linking scientific insights with real-world farming operations, it demonstrates through field trials how soil fertility, carbon storage, and water retention can be significantly improved. The project is part of a broader European movement to restore soil ecosystems.

Vision:

A healthy soil is not just protection against drought and erosion — it is an active part of a carbon strategy and a driver of biodiversity, water management, and regional resilience.

Transition to practice:

While restoring healthy soils secures CO_2, stabilizes water cycles, and protects habitats over the long term, urban areas require additional solutions to cope with the immediate effects of heavy rainfall and drought. This is where the JUMBO BLOCK® system comes in — as a rapidly deployable complement to natural solutions.

2. Water Storage in Urban Areas – Resilience Beneath Our Feet

The Challenge:

Our current infrastructure is designed to drain water — not to retain it. Heavy rainfall, dry spells, and heatwaves are today's reality. Yet our built environment — shaped by asphalt, concrete, and stormwater systems — is not equipped to deal with this new dynamic.

- Sewer systems are overwhelmed during heavy rain
- Impermeable surfaces prevent infiltration
- Traditional retention basins require large areas

The JUMBO BLOCK® system as a solution:

- Large water reservoirs installed directly beneath load-bearing, buildable surfaces
- Storage volume: 13.9 m³ of water on just 6.25 m² of surface area
- Relief during extreme rainfall, backup supply during drought
- Modular, low-maintenance, and highly load-bearing — certified for F 900 and beyond

Advantages:

- No need for additional land
- Reduced surface sealing through multifunctional use
- Suitable for urban areas, industrial zones, traffic infrastructure, and rural regions

Technical Performance:

A single JUMBO BLOCK® can bear up to 792 tons of load and meets the F 900 heavy-load class. This makes the system ideal for airfields, industrial sites, or highly frequented traffic zones. It can also be installed with shallow depths into existing structures — without the need for extensive new construction.

Societal impact and synergy with green urban development:

The combination of underground water storage and aboveground greening creates new quality of life in cities. Streets, plazas, and parking areas evolve into climate-active spaces. In addition, the underground modules can be integrated with filtration or heat exchange systems — forming a bridge between technological function and ecological value.

Best-practice potential:

- Installed under industrial parks to prevent operational disruptions from flooding
- Used as decentralized retention systems in new residential areas to relieve stormwater networks
- Integrated into urban mobility and greening concepts (e.g., planting trees directly above water storage units)

3. A Shared Perspective – Synergy, Not Opposition

What grows above must be protected below. And what buffers below creates renewal above.

The challenges of the future cannot be solved through technology alone — nor solely through ecology. Real strength lies in the interplay between both. Healthy soils and technical systems like JUMBO BLOCK® complement one another ideally — in time, space, and function.

Soil as a natural resource:

- Stores CO_2 and water in the long term
- Supports biodiversity and soil fertility
- Regenerates through humus formation and biological diversity

The JUMBO BLOCK® system as a technological complement:

- Provides short-term, scalable water retention
- Creates usable space beneath sealed or utilized surfaces
- Modular, highly load-bearing, and low-maintenance

Technology and nature as cooperative systems:
Rather than competing, natural and technical solutions work in harmony. While soils regenerate and develop long-term storage capacity, JUMBO BLOCK® delivers immediate buffer systems — especially in urban areas. Where asphalt once dominated, new multifunctional spaces emerge: quality of life above, water retention below.

A practical path for municipalities and regions:

- Combined strategies integrating soil restoration and retention technology
- Leverage existing funding programs for climate adaptation, urban greening, and infrastructure upgrades
- Embed within urban development, land-use planning, and integrated water management

Call to action:
The time for isolated measures is over. Only through intelligent synergies can we create living spaces that adapt to extreme weather, safeguard water resources, and remain ecologically viable.

Space for water below — space for life above.

Conclusion for Decision-Makers:

The combination of healthy soils and intelligent water retention is not a future concept — it is a strategic response to challenges we already face.

Global average temperatures are rising much faster than anticipated — and have already exceeded thresholds once considered “critical.” Reality has outpaced the forecasts.

With this integrated approach, municipalities, counties, and regions can:

- Design multifunctional, climate-resilient spaces
- Reduce costs caused by extreme weather events
- Create long-term ecological and social value

Investing in soil fertility and systems like JUMBO BLOCK® means investing in stable infrastructure, quality of life, and long-term resilience.

But it’s no longer just about investment — the decisive factor is time.

Those who understand that the projections have been exceeded also know: time is running out. **Now is the moment to act, connect concepts, take responsibility — and strengthen the spaces we live in.**

Further information:

Published:	April 23, 2025
Author:	Andreas Zanni e.K. ZANNI GROUP
Website:	jumboblock.de
Contact:	jumboblock.app/contact
Legal notice:	zanni.group/imprint

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