

How to Create a Pocket Forest

A step-by-step summary inspired by the Dubai Culture ICOM Dubai 2025 Legacy Forest at Terra, Expo City Dubai

Terra

DUBAI Culture للثقافة



What is a Pocket Forest?

A pocket forest is a small, dense woodland created using the Miyawaki Method — a science-based technique that restores native ecosystems in compact, urban or degraded plots. These forests grow up to 10× faster, absorb 30× more carbon, and support 100× more biodiversity than conventional landscaping.

Step 1: Vision & Site Selection

- Define the purpose (e.g. pollinator forest, educational forest).
- Select a sunny, well-drained site (as small as 100 m^2 works).
- Study local native species and historical vegetation of the pocket forest site to identify the potential natural vegetation.
- Engage community and institutional partners early.

Step 2: Soil Preparation

- Loosen soil to 80 cm – 1 m for root growth.
- Mix organic compost (3–25 kg/m^2) and local biomass (e.g. wood chips, shredded palm fronds).
- Optionally inoculate with beneficial fungi/mycorrhizae.
- Install irrigation lines if needed in arid climates.

Step 3: Species Selection & Design

- Use identified native species across 4 forest layers:
- Canopy (10–15 m+) – structural, long-lived trees
- Sub-canopy (6–10 m) – fast-growing species
- Shrubs (1–5 m) – pollinator attractors
- Ground cover (<1 m) – herbs, grasses, climbers
- Aim for 3–5 saplings per m^2 for high density and competition.

Step 4: Planting

- Mix plant species and forest layers within each square metre.
- Apply 5–10 cm mulch to retain moisture and suppress weeds.
- Involve volunteers or students to build community connection.

Step 5: Maintenance (Years 1–3)

- Water regularly (2–3×/week initially; taper later).
- Weed manually; replenish mulch annually.
- Maintain ≥ 85 % plant survival in year 1 by replanting if necessary.
- Monitor growth, biodiversity, and soil moisture.

Step 6: Transition & Monitoring

- After 2–3 years, canopy closure reduces weeds and irrigation needs.
- Allow natural regeneration and wildlife return.
- Continue biodiversity and soil monitoring and use data for interpretation and education.

Impact

30× more carbon stored

100× more biodiversity

10× faster growth

40+ % water retention

–4 °C cooler microclimate

Start Yours

Every courtyard, museum garden, or schoolyard can become a living ecosystem.

Contact Terra – Expo City Dubai to learn more.

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Pocket Guide to Creating Pocket Forests

A practical guide for cultural institutions, inspired by the ICOM 2025 Legacy Forest at Terra, Expo City Dubai

Foreword

We meet in Dubai at a moment of change. Cities are growing quickly, communities are adapting to shifting patterns of life, and the climate crisis is making its impact felt more strongly each year. The theme of ICOM Dubai 2025, The Future of Museums in Rapidly Changing Communities.

As places of learning, dialogue, and reflection, museums hold a unique position of influence. Their soft power enables them to shape understanding, inspire action, and lead collective efforts to care for our planet.

To mark this gathering, Dubai's first public pocket forest has been planted at Terra, Expo City Dubai, in collaboration with Dubai Culture. Though compact in size, the forest has been designed to grow many times faster and capture far more carbon than conventional landscaping, offering a living pilot of regenerative urban design, ripe for scaling across arid cities. A diverse mix of native trees and shrubs has been planted by school children, creating an ecosystem that connects biodiversity, culture, and community.

This guide draws inspiration from the forest and looks outward. It has been developed as a practical, open-source resource that museums, cultural institutions, cities, schools, and institutions worldwide can adopt to create their own pocket forests. In doing so, it demonstrates how even the smallest spaces in our cities can be reimagined as thriving ecosystems where human and natural life coexist and thrive.

Pocket forests are an ecological accelerator and a statement of intent: that cities can become spaces for humans and nature to thrive in harmony.



Before and After - The Beirut Riverless Forest

Source: theOtherDada

1. What is a Pocket Forest?

A pocket forest is a dense, fast-growing woodland created using the Miyawaki Method - a technique that restores native ecosystems within small, urban, and degraded plots.

Pioneered in the 1970s by Japanese botanist Dr. Akira Miyawaki, his research on native vegetation and potential natural vegetation (PNV) at Yokohama National University demonstrated that degraded land could be rapidly restored to reflect the ecological structure of mature forests. By studying the historical records and then recreating the natural layers of old-growth forests - ecosystems that have undergone hundreds of years of ecological succession to reach maturity - and by planting diverse native saplings very close together to encourage cooperative and competitive growth, these forests can grow up to ten times faster than conventional landscaping, absorb thirty times more carbon, and support one hundred times more biodiversity.

Over time, this method has been refined and adapted worldwide by environmental organizations, researchers, and practitioners — from India and Europe to the Middle East — as a model for accelerated reforestation and urban biodiversity restoration. This presents an exciting opportunity for cultural institutions to champion and replicate pocket forests as living examples of ecological restoration.



Original Pilot Miyawaki Pocket Forest in Japan

Source: Afforestt

2. Why Pocket Forests?

Cities and cultural institutions often have small parcels of land that seem overlooked or underused. Courtyards, schoolyards, office gardens, hospital grounds, industrial areas and community parks all hold untapped ecological and social potential. With the right approach, these areas can be transformed into vibrant ecosystems that bring nature back into daily life.

Specifically for cultural institutions, the visitor experience of a pocket forest offers multiple opportunities:

- *A living classroom* that teaches through direct experience
- *A place of reflection* where visitors and communities find calm and connection
- *A symbol of renewal* that connects cultural and natural heritage
- *A demonstration of sustainability* in action paying respect to local, native ecology
- *A testbed* for local ecologists to study native flora and fauna

The Benefits of a Pocket Forest

Although the realized benefits are location-specific, over 50 years of pocket forest plantings around the world include:

- **Growth:** 10x faster plant growth than conventional tree planting
- **Carbon sequestration:** up to 30x more CO_2 absorbed per m^2
- **Biodiversity:** up to 100x increase in pollinator and insect species
- **Cooling:** surface temperature reductions of up to 4°C
- Water & Soil: 40% higher water retention and 60% increase in soil organic matter
- **Wellbeing:** access to nature linked to 20–25% reduction in stress indicators

Even at the scale of a courtyard, pocket forests act as green infrastructure, creating cooler, healthier, more connected urban environments.



Impact: Monoculture vs Pocket Forest

Source: Afforestt

The Miyawaki method is a structured ecological-design approach that enables the creation of small, dense native woodlands that establish rapidly and evolve into resilient ecosystems in a short period of time. It is particularly well suited for urban and institutional sites.

Core Principles

The method is guided by a set of technical principles that ensure rapid establishment and long-term ecological resilience:

- **Planting density:** three to five saplings per square metre. A 100 m^2 site requires approximately 300–500 plants.
- **Species diversity:** Plant between 10 -50 native species. Although the number of species based on the PNV study may change based on the local ecology and availability of plants, more species are desirable for larger sites to enhance resilience and ecosystem stability.
- **Layering:** Plant heights must be planted according to their 4 natural forest heights, canopy (10–15 m+), sub-canopy (6–10 m), shrubs (1–5 m), ground cover (<1 m).
- **Soil preparation:** loosened to 80 cm–1 m to ensure water can infiltrate and is mixed with 3–25 kg of organic compost per m^2 - depending on initial soil conditions - to ensure microbial richness and water retention.
- **Mulching:** 5–10 cm of organic material applied across the surface to prevent moisture loss through evaporation and suppress weeds.
- **Succession:** After two to three years of care, the forest becomes largely self-sustaining.



Microbial soil health is key to a thriving pocket forest
Source: Afforestt

Step-by-Step Implementation:

Below is the sequence of steps from project inception to long-term monitoring:

Step 1: Vision, Site Selection & Preliminary Research

- Engage stakeholders such as institutional leadership, community members and forest builders to define the purpose and scale of the pocket forest.. Deciding on a focus for the forest such as a pollinator, food or evergreen forest is helpful at this stage.
- Select an appropriate site: consider sunlight exposure, soil condition, drainage, existing vegetation/obstructions, accessibility for human engagement.
- Conduct baseline research to identify what the native forest of the region should look like: survey local natural vegetation fragments, use historical data/maps of native flora, speak to local ecologists or custodians of land to understand what species once thrived there. Natural history museums, botanical gardens or local universities are great places to start.
- Define the "forest profile" of the forest. Decide what the restored woodland could look like in the region in terms of canopy height, the ratio of each layer, species mix and habitat goal.

Step2: Soil & Ground Preparation

- **Soil assessment:** Understanding the baseline soil is critical to creating forest soil that allows water to reach the plant roots and retains it. Ideally, test pH, texture and composition (sand/silt/clay), compaction and current drainage/percolation.
- **Clear site:** Remove rubble, turf, invasive vegetation, roots, old pavement if required. Reduce compaction: till or excavate down to 80 cm-1 m (or as local conditions allow) to loosen root zone.
- **Soil enrichment utilizing local biomass:** Mix in organic compost, manure and other identified local biomass plus coarse material for aeration (wood-chips, sand, coconut-husk) ensures that microorganisms are able to thrive in the forest soil. This ensures that needs for fertilizers are not needed in the future. Consider inoculating the soil with beneficial fungi/mycorrhizae to further increase microbial help.
- **Install irrigation infrastructure:** drip-lines or perforated pipe under mulch if needed, especially in arid climates. Prepare water source for initial critical years.

Step 3: Species Selection and Layout Design

Diversity is essential for resilience. A pocket forest should reproduce the layered structure of natural woodland, balancing different heights and growth patterns.

- Choose a broad mix of native species across the four forest layers:
  - Canopy trees (10–15 m+ or local equivalent) tall, long-lived trees providing structure and shade.
  - Sub-canopy (6–10 m) medium-sized, fast-growing trees that fill space and cool the forest interior.
  - Shrubs (1–5 m) smaller trees and woody plants that add density and attract pollinators.
  - Ground-cover / herbs / climbers (<1 m) climbers, grasses, and herbs that lock in soil moisture and protect the forest floor.



The four layers of old growth, climax forests

Source: Afforestt

Principles for species choice

- Prioritise species adapted to local climate/ soil, with cultural/ecological significance (food, medicine, habitat) if relevant.
- Determine density: aim for approximately 3-5 saplings per m^2 (or site-specific adjustment) to mimic dense woodland.
- Plan irregular, clustered planting rather than straight rows: random spacing (~60 cm or less) to mirror natural woodland patches.



Seed Bank


Nursery


Forest

Native Seeds to Native Pocket Forest

Source: Afforestt

Step 4: Procurement and Pre-Planting Preparation

- Source healthy native saplings or grow in an onsite nursery of the chosen species. Ensure root systems
- are robust and plants are acclimatised.

Step 5: Planting / Installation

- Planting of a pocket forest is both a practical exercise and a symbolic act of care for the future. An opportunity exists for community involvement for those who will
- have direct access to the forest to be part of its initial planting. By inviting schools, families and/or volunteers, a community can also take root alongside the forest itself.
- On planting day, hydrate saplings, prepare planting pits (30-50 cm diameter, 30-40 cm depth or as per local root system) and water immediately after planting.
- Plant the saplings after distributing them to 3-5 saplings per m^2, mixing layers and species in each square metre unit.
- After planting, apply 5-10 cm (or more where needed) of organic mulch evenly across surface to retain moisture, suppress weeds, and protect soil surface.
- Stake or protect fragile plants if necessary (especially in windy or exposed sites).

Step 6: Initial Care & Maintenance (Years 1-3)

- Water regularly: during the first 6–12 months, maintain consistent soil moisture; in hot/arid climates 2-3 times
- per week; taper frequency as site matures.
- Weed removal: manually remove invasive plants and weeds. Year 1: frequent, Year 2: moderate, Year 3: minimal as canopy closes.
- Mulch maintenance: keep 5–10 cm layer of mulch; replenish annually if required to avoid moisture loss through evaporation.
- Monitor survival rates: aim for survival above ~85 % in Year 1 (or locally defined target). Replant where necessary.
- Monitor growth: measure heights, canopy closure, soil moisture, biodiversity indicators (insects, ground fauna) to assess progress.

Step 7: Transition to Self-Sustaining Forest

- After about 2–3 years (in optimal conditions) the dense canopy should reduce weed ingress, shade the soil, and stabilise the microclimate.
- Cease intensive maintenance: watering reduced to only during extreme stress, weeding minimal, mulch not required annually.
- Encourage natural regeneration: allow seedlings of native species to establish, dead wood to remain, small fauna to inhabit.

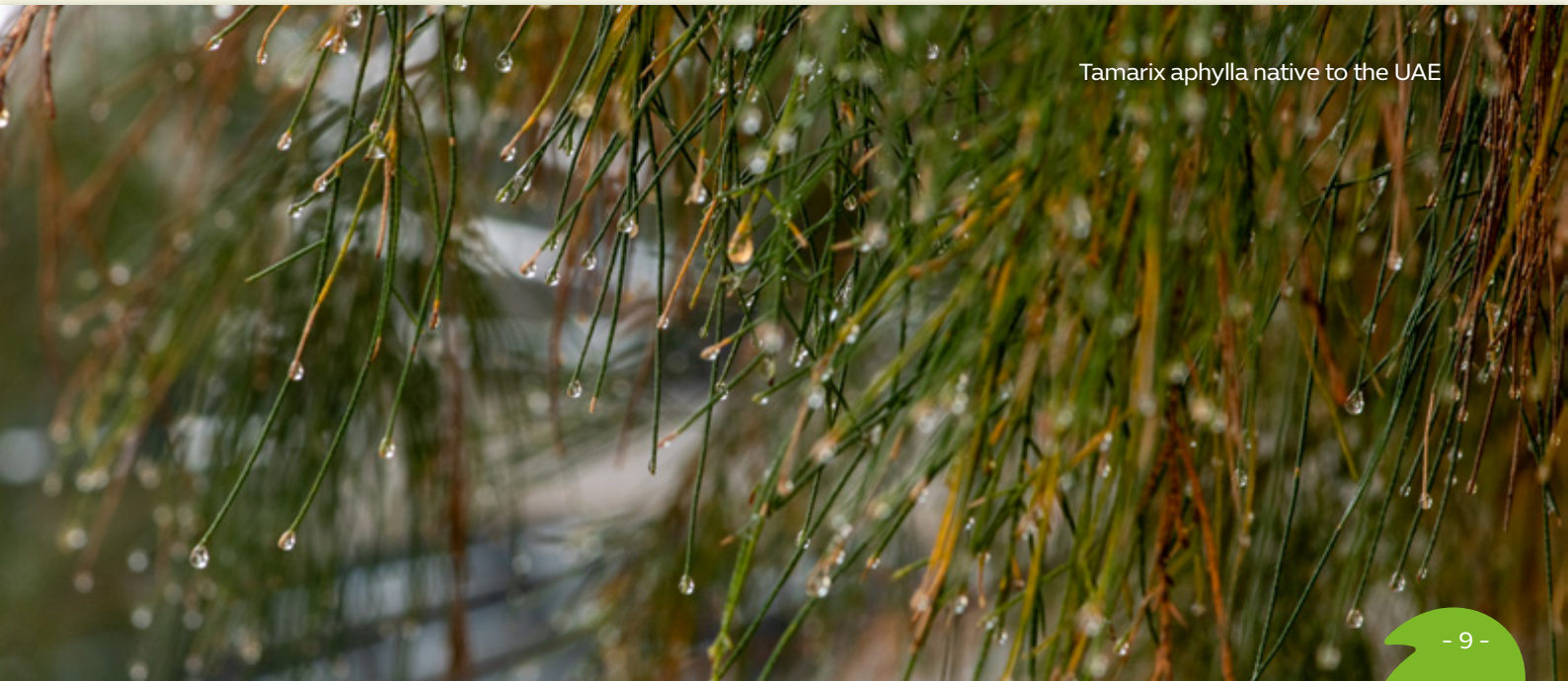
Step 8: Long-Term Monitoring, Engagement & Adaptive Management

- Maintain a monitoring program: survival, growth rates, layer development, biodiversity returns (pollinators, birds, ground fauna), soil health (organic matter, moisture).
- Use data for storytelling and visitor engagement: display growth charts, use apps or dashboards if relevant to your institution.
- Embed the forest in the institution's programming: educational visits, citizen-science, interpretive signage, community events.
- Review and adapt: if certain species are underperforming, adjust planting in future expansions; if site shows stress (drought, pests), implement remedial care.

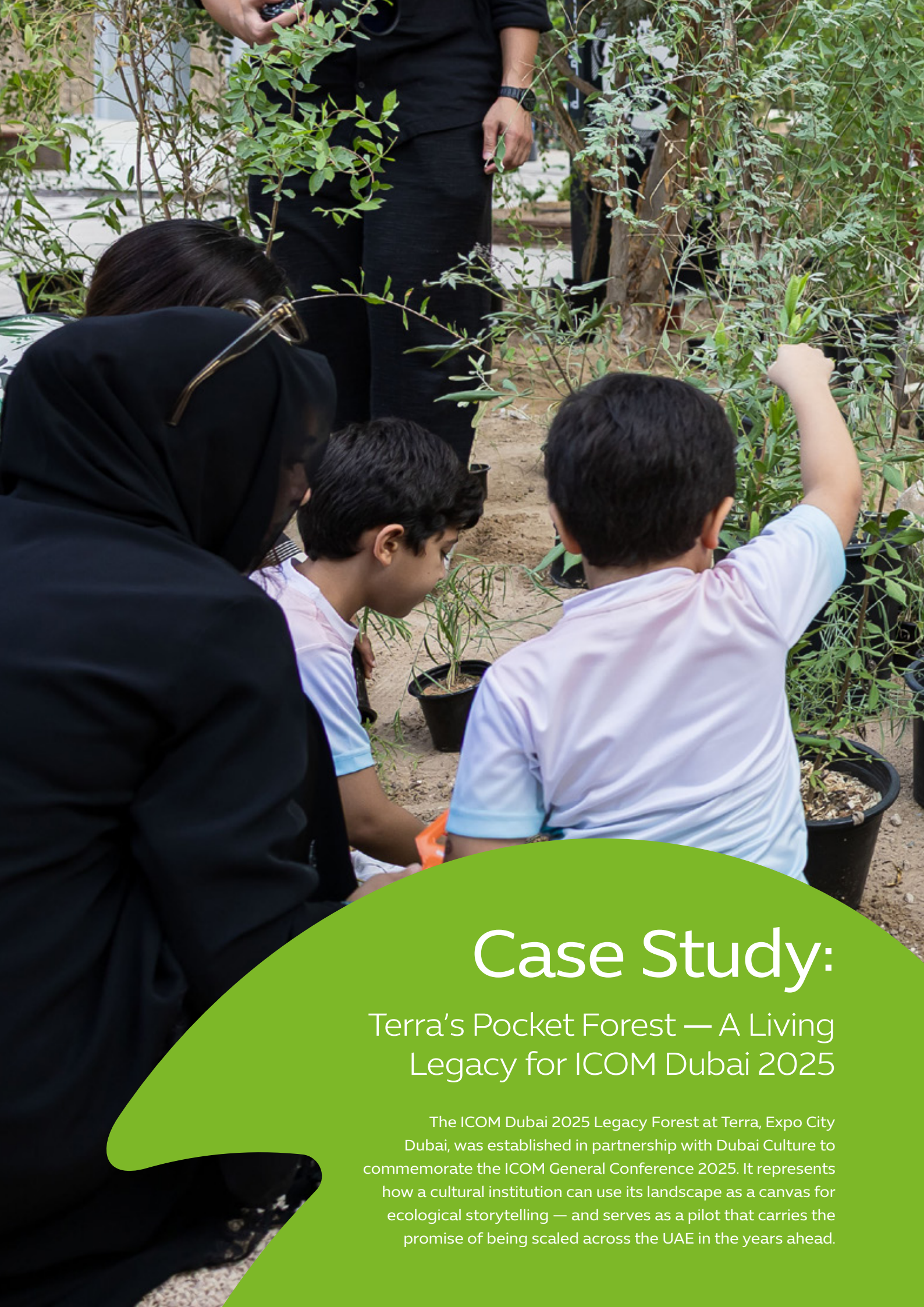
Step 9: Celebrate and Communicate Results

- Mark key milestones (e.g., Year 1 survival, Year 3 canopy closure) with community events, signage, social media.
- Share the story of transformation: from underused space → native woodland. This amplifies institutional mission and public engagement.

Parameter	Typical Target (based on literature)
Planting density	~3-5 saplings per m^2
Species mix	20-50 species (varies by site size/region)
Soil depth loosened	80 cm–1 m (or depth determined by root zone)
Mulch depth	5–10 cm organic material
Initial survival aim	≥ 85 % in Year 1
Maintenance period	Intensive for 2-3 years, then taper



Tamarix aphylla native to the UAE



Case Study:

Terra's Pocket Forest — A Living Legacy for ICOM Dubai 2025

The ICOM Dubai 2025 Legacy Forest at Terra, Expo City Dubai, was established in partnership with Dubai Culture to commemorate the ICOM General Conference 2025. It represents how a cultural institution can use its landscape as a canvas for ecological storytelling — and serves as a pilot that carries the promise of being scaled across the UAE in the years ahead.



Native Plant Species

Covering 114 m^2, the forest draws inspiration from the Miyawaki method, with more than 360 native trees and shrubs planted — each chosen for its ecological function and cultural meaning: All twenty species within this pocket forest are native to the UAE or the region. Together, they not only increase biodiversity but also tell stories of survival, craftsmanship, and connection between people and place. A selection of species have been highlighted below:

- **Ghaf Tree (Prosopis cineraria)**
  The UAE's national tree and a symbol of endurance. Its deep roots find hidden water, its flowers feed bees, and its pods nourish wildlife.

- **Acacia, Samar Tree (Vachellia tortilis)**
  One of the UAE's iconic trees. Its yellow blooms attract bees, and its broad canopy provides shelter and shade for desert animals.

- **Toothbrush Tree (Salvadora persica)**
  The roots are used to make miswak—natural toothbrushes. Its sweet fruits are edible, and the leaves have healing properties for joint pain.

- **Jujube Tree, Sidr (Ziziphus spina-christi)**
  Known for its healing leaves and sweet fruit, this tree is beloved by bees and produces the prized Sidr honey celebrated across the region.

- **Frankincense Tree (Boswellia sacra)**
  Its bark yields the world-famous frankincense resin, used for centuries in perfumes, rituals, and traditional medicine. Though native to neighbouring Oman, existing trees on the site were preserved.

The creation of Terra's forest became a story of ecological rediscovery. It began with research to identify native species capable of thriving in the arid ecosystem of the UAE. Although the surrounding landscape today is primarily desert, geological and palaeoecological studies reveal a far more dynamic past. Around 7 million years ago, during the Late Miocene, much of the region was covered by coastal forests and savanna-like woodlands, supporting species adapted to wetter climates. By 125,000 to 150,000 years ago, during a humid phase of the Pleistocene, the UAE hosted freshwater lakes, wetlands, and mangrove-fringed coastlines, rich in wildlife. Even as recently as 7,000–8,000 years ago, the early Holocene brought a grassland–savanna mosaic with stands of acacia and sidr that thrived under monsoon-influenced conditions.

Reimagining a forest in a place where dense woodland no longer naturally occurs was, therefore, both a scientific and symbolic challenge. The team collaborated with local botanists, landscape architects, and natural historians — drawing on fossil records and natural history studies to envision what a "UAE forest" could look like today. We visited Al Fay park in Abu Dhabi and Mushriff Park in Dubai to see what native species have thrived when planted in nearby proximity.

Fellow forest builders supported in the process. A visit to Terra in early 2025 by forest maker and regenerative architect Adib Dada of theOtherDada helped the team select between one of two locations for the pocket forest in Terra's gardens. Later in the year Shubhendu Sharma of Afforestt came to visit and provided guidance on plant layout, soil composition and team training.
The team extended the same type of thinking when designing built elements of the forest. A low stone wall reminiscent of the dry-stacked stone walls used in traditional desert farms was built, blending cultural heritage with ecological function. A path made of paving mimicking the patterns of a desert after a rainfall has dried up the pools of water and bilingual interpretive signage that connects visitors to the Why behind the pocket forest were also added.

Building living soil came next. The team experimented with organic amendments, collecting gazelle excrement from nearby desert land and Terra's pygmy goats, both used to make a nutrient-rich compost tea. They collaborated with The Waste Lab, a UAE-based SME, to incorporate compost made from local food waste, including from Terra's own café to the biomass used was hyper-local and circular.
A local Food-Soil-Web expert Evelyn Pereira was also engaged to mix her compost in with the soil.

Sourcing native seedlings proved equally challenging: the team spent months visiting nurseries across three of the UAE's seven emirates to locate resilient, regionally adapted species.



Students from The Arbor School, joined to support in planting.

Ultimately, the project challenged assumptions about what is possible in arid landscapes. It transformed a forgotten corner of Expo City into a living classroom — a space where local schoolchildren, volunteers and Sheikha Latifa bint Mohammed bin Rashid Al Maktoum, Chairperson of Dubai Culture and Arts Authority, alongside Her Excellency Reem Al Hashimy, Minister of State for International Cooperation and CEO of Expo City Dubai Authority, joined together to plant the forest. Year 6 students from The Arbor School, a nearby environmental education-focused school joined to support in planting 100 of the forest's plants.
In collaboration with universities and research institutions, Terra intends to measure the forest's ecological and social impact over time through:

- **Biodiversity monitoring –** tracking the return of pollinators, birds, fungi, and soil microorganisms as indicators of ecosystem recovery.
- **Soil and microclimate studies –** analysing changes in soil carbon, organic matter, and moisture retention, as well as surface temperature reduction in surrounding areas.
- **Hydrology and water-use efficiency –** assessing how soil amendments and mulching improve irrigation efficiency in arid environments.
- **Community engagement research** – evaluating how participatory planting and cultural storytelling influence environmental awareness, wellbeing, and stewardship among visitors and schools.

The long-term goal is to develop a replicable data model that can be applied to other cultural, educational, and municipal landscapes across the UAE. By linking science with public engagement, the project positions cultural institutions as catalysts for both research and restoration — spaces where ecology is not only observed but experienced as part of living heritage.

The Terra Pocket Forest serves as a living laboratory — a small-scale pilot designed to generate data, insight, and methods that can inform larger rewilding and urban greening efforts across the UAE. More than a garden, the Terra Pocket Forest redefines how museums and cultural districts can serve as agents of environmental change. It demonstrates that ecology itself can be an exhibit — a story of identity, resilience, and renewal rooted in place.









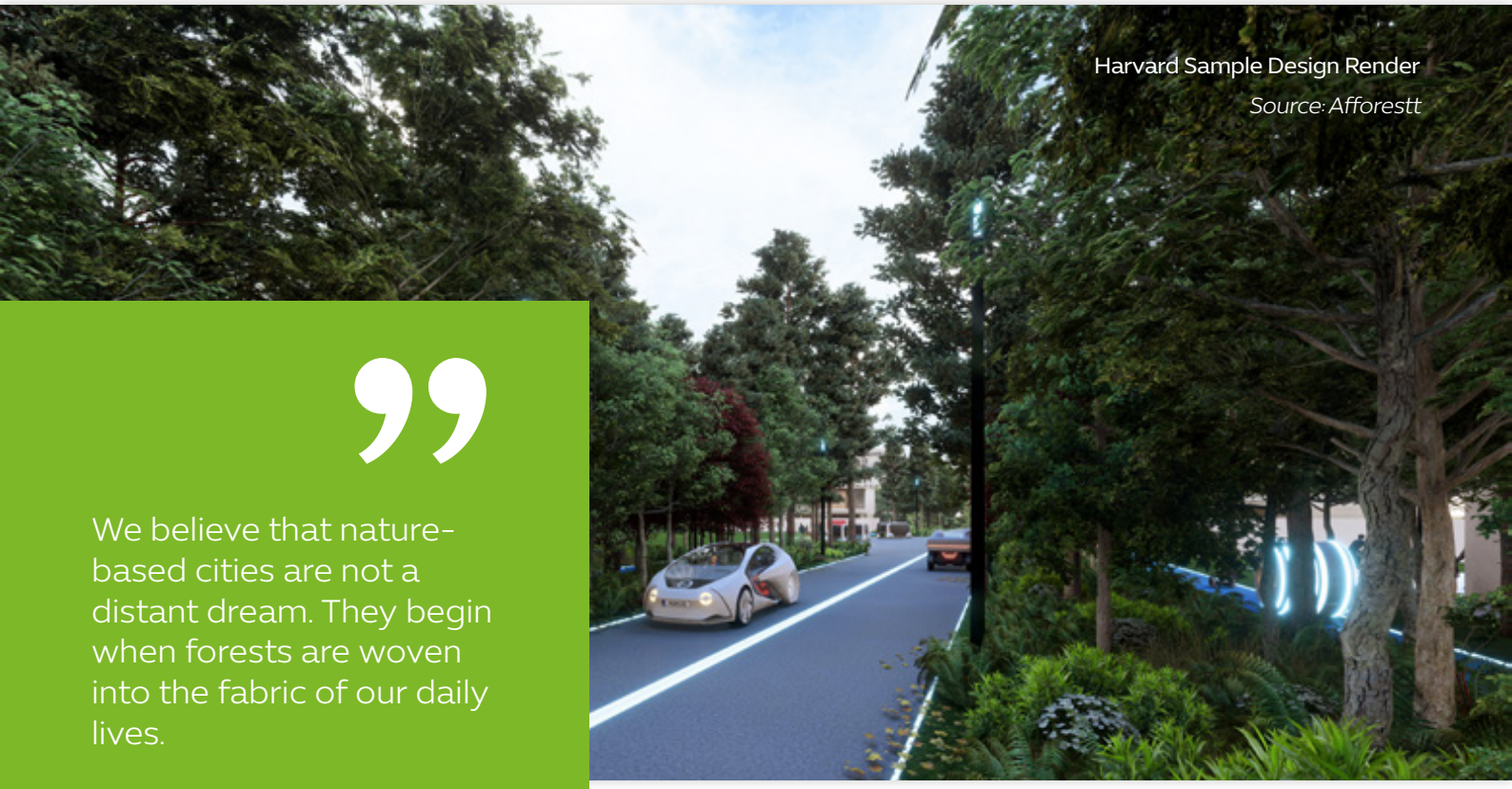
Case Study:

Afforestt: Restoring Indigenous Forests for Nature-Based Cities

Afforestt is on a mission to restore the world's lost indigenous forests. The organization specializes in recreating multi-layered native forests through field studies, research, documentation, design, and practical application. Since its founding, Afforestt has completed more than 100 projects across 10 countries, including the United States, the Netherlands, Mexico, Nicaragua, Iran, Lebanon, Singapore, and India.

In the United States, the Linear Urban Forest project is reimagining streets as forests. By conducting ecological surveys across New England and designing forest palettes for entire roadways, Afforestt is helping cities turn asphalt corridors into living infrastructure.

In Saudi Arabia, Afforestt is supporting NEOM in rediscovering and reestablishing its unique native landscapes - studying flora from the Gayal coast to Wadi Al Disah and the 'Secret Garden.' These efforts anchor futuristic urban development in the region's deep ecological heritage.



Harvard Sample Design Render

Source: Afforestt

> We believe that nature-based cities are not a distant dream. They begin when forests are woven into the fabric of our daily lives.
>
> By bringing native forests back into homes, streets, institutions, and community spaces, we can build cities as truly representative of harmony, well-being, and natural abundance.
>
> **Shubhendu Sharma**
> **Founder - Afforestt**



Afforestt at NEOM

Source: Afforestt



Planting of the
Beirut Riverless Forest

Case Study:

the OtherDada: Forest building in the MENA region as a tool for ecological and social regeneration

Across Mediterranean cities, urban degradation, biodiversity loss, and climate vulnerability have become deeply rooted challenges. Drought, pollution, and relentless urbanization have left little room for nature to breathe, let alone thrive. Yet amid this reality, theOtherDada (tOD) is planting seeds of change, literally. Through theOtherForest, a regenerative design initiative inspired by biomimicry and rooted in the Miyawaki Method, tOD is restoring native ecosystems and reconnecting communities with nature. These pocket forests are dense, fast-growing, and composed entirely of native species, each one a living testament to resilience and renewal .

To date, more than 12,000 native trees have taken root across degraded urban lands, planted with the help of over 2,000 community members. From schoolyards and cemeteries to bank parking lots and riverbeds, each forest tells a story of revival. Even under harsh Mediterranean conditions, these forests have achieved an 80% survival rate, proving that ecological restoration is possible even in the most challenging urban contexts.

The Beirut RiverLESS Forest, one of tOD's landmark projects, transformed an overlooked concrete edge of the Beirut River into a thriving pocket of biodiversity. Once a neglected, polluted site, it now hosts a dense mix of native trees that reduce urban heat, absorb air pollution, and invite pollinators, insects, and birds back into the city. More than an ecological intervention, it stands as a symbol of hope and restoration for a city scarred by crisis and environmental neglect.

At the Azarieh School Forest, what was once a damaged playground has been reborn as a living, learning ecosystem. Students, teachers, and parents came together to plant native trees, transforming the space into a natural classroom where children can connect with the environment daily. This project embodies tOD's belief that ecological restoration can also heal communities, linking nature, education, and emotional well-being.



Azarieh School Forest

Source: theOtherDada

Meanwhile, the Banque BEMO Forest reimagined what a single parking space could mean for a city. At the Bank's headquarters in Beirut, tOD and the BEMO community planted 52 native saplings that will soon form a self-sustaining urban forest, cooling the air, combating pollution, and reducing flood risk. The planting day gathered the CEO, board members, staff, clients, neighbors, and even passing tourists, proving that regeneration begins when people come together. Each participant left behind more than trees; they left behind a shared legacy of care and responsibility.

Planting native trees is more than an act of greening, it is an act of reclaiming balance. Each species supports pollinators, birds, and beneficial insects while strengthening local nurseries and the ecological economy. Together, these Pocket forests, the Beirut RiverLESS, Azarieh School, and BEMO Bank demonstrate that even the smallest and most degraded spaces can host new life when given a chance.

As theOtherDada continues to grow its network of urban forests, it invites organizations, municipalities, and citizens to reimagine their underused spaces and transform them into living ecosystems. Each pocket forest is proof that cities can heal when communities act together, small spaces, big impact.





Banque BEMO Forest

Source: theOtherDada

Conclusion



The future of cities and institutions is not only about infrastructure and collections, but also about renewal and resilience.

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Pocket forests demonstrate that transformation does not require vast land or resources. Even the smallest plots can host thriving woodlands that cool the air, restore biodiversity, and create places of connection for communities.

These forests bridge cultural memory with ecological action, give young people a visible role in stewardship, and show how technology can sustain living systems with precision and care. They serve as classrooms, gathering spaces, and sanctuaries, proving that nature can once again be woven into the heart of urban life.

Start Yours

Every courtyard, museum garden, or schoolyard can become a living ecosystem.

Contact Terra – Expo City Dubai to learn more.

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