



**tinyforest**

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AUSTRALIA



# **Tiny Forests**

## Growing Resilient Cities

# What is a Tiny Forest?

Tiny Forests are densely packed patches of native bushland the size of a tennis court, right in the heart of our cities. These urban wildlife oases are a unique nature-based solution, reconnecting people with nature and helping to mitigate our urban climate and biodiversity challenges.

Using an established planting method (called the Miyawaki method) that includes soil enrichment, hyper-diverse indigenous plant selection, and a dense planting structure; Tiny Forests are supercharged, growing up to 10 times faster than traditional forests and becoming up to 100 times more biodiverse than monoculture forests.



Building a Tiny Forest in Leicester, England. © Earthwatch UK

“Miyawaki forests are becoming increasingly popular for urban greening to rehabilitate degraded areas and increase biodiversity”

Dr Grey Coupland

# Social & Environmental Outcomes

## Accelerated Growth

Grow about 10x faster than traditional forests

## High density

About 30x more dense than traditional forests

## High biodiversity

Up to 100x more biodiverse than monoculture forests

## Employee engagement

Employees gain skills, knowledge and motivation to take action for biodiversity and climate change

## Thermal cooling

Reduce urban heat island effect

## Community education

improved community understanding of biodiversity and value of trees.

## Improved soil

Soil texture, health and moisture content improves

## Student and teacher education

Teachers and students gain skills, knowledge and motivation to take action for biodiversity and climate change

## Stormwater mitigation

Forest traps excess water during rain events

## Wellbeing

Improved social cohesion and connection to nature



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# Tiny Forest outcomes

Tiny Forests can help address a range of environmental and social issues, and help achieve relevant strategies and targets. Below are some of the outcomes that Tiny Forests can provide:

## Environmental Outcomes

### Restore biodiversity

By planting a dense forest using locally native plants encourages native faunal species to return and inhabit the forest too. First insects and soil microbes appear, followed by birds, reptiles, and then mammals. Overall, this results in a rich biodiversity, which can be up to 100 times more biodiverse than a monoculture forest.

### Reduce Urban Heat Island effect

The dense planting structure of the Tiny Forest acts like a natural air conditioner, providing cooling through transpiration and shade, helping create a place of respite for hot summer days.

### Trap storm water

The deep soil remediation and dense structure of the plants helps to trap storm water in the forest, preventing it from entering waterways; where it often collects pollutants along the way.

### Carbon sequestration

One of the most effective methods of carbon sequestration is tree planting, as trees convert atmospheric CO<sub>2</sub> into carbon stored in their leaves, wood and roots. In total, about half the dry weight of a tree is carbon! And as Tiny Forests are so dense, that's a lot more carbon per square metre than a traditional forest.

### Reduced maintenance

Due to the dense planting method, and the layers representing a traditional forest structure, it is expected that the Tiny Forest will need very little maintenance after about 2 years as it becomes self-supporting.

# Tiny Forest outcomes



March 2020, the UK's first Tiny Forest in Witney is planted. © Earthwatch UK

One year of growth



May 2021, the Tiny Forest after one year. © Earthwatch UK

# Tiny Forest outcomes

## Social outcomes

### Community and corporate groups

Local community members are directly connected to the project, learning about biodiversity, climate change, and how their own private gardens are part of a wider biodiversity corridor. The activities provide basic horticultural training, encouraging greening in the private realm. Social cohesion and wellbeing of residents is improved by providing incorporated seating, or an outdoor classroom within the forest, giving people a place to spend time interacting with each other, and with nature. Corporate organisations can sponsor Tiny Forests as part of their Corporate Social Responsibility (CSR) and Environment, Social and Governance (ESG) commitments.

### Schools

Teachers are equipped with the tools, confidence and knowledge to teach students about the value of biodiversity and climate change resilience in urban landscapes. Schools use the Tiny Forest as an outdoor classroom, teaching students about the value of biodiversity and climate change; and learning the skills and knowledge to take action including how to plant native and biodiverse gardens at school or home.

### Tertiary

Tertiary institutions use the tiny forest to teach undergraduates urban greening methods including the Miyawaki method. Students will understand the importance of soil properties and amendments when selecting native plants for successful establishment and growth of urban greenspace.

### Environmental Education Centres

EEC's use the Tiny Forest as an outdoor classroom and develop modules for teaching about biodiversity and climate resilience in urban landscapes.

# Tiny Forest design criteria

**A Tiny Forest is a dense, fast-growing, native woodland around the size of a tennis court (approximately 200 m<sup>2</sup>), which is combined with an engagement programme to support community ownership and provide social benefits.**

The Tiny Forest criteria includes physical characteristics, social characteristics and scientific monitoring as follows:

## Physical characteristics

- Only contains locally native trees and shrubs representing all forest layers
- Is the product of field and literature research to select indigenous species and proportions
- Has soil that has been prepared according to the Tiny Forest planting method
- Uses no chemicals (fertilisers or pesticides)
- Has at least 3 trees per square metre
- Provides space for the trees to grow undisturbed for at least 10 years (no tree thinning or timber harvesting unless in exceptional circumstances (e.g. disease, safety))
- Branches, leaves, and dead trees are left to lie where they have fallen
- Is at least 4m wide across the full length of the forest, without interruptions (such as a path)
- Has a layer of mulch (such as straw) at least 15cm deep

## Social characteristics

- Includes an outdoor classroom where feasible
- Has a local partner (volunteer / community group / council)
- Was planted by local residents, corporate employees and/or school children
- Can be used as a place for local residents to come together and for outdoor lessons with school children
- Enables engagement opportunities for local residents, corporate employees and/or school children
- Is maintained (weeding/watering/litter picking) by a "Keeper Team" team of 4-5 local volunteers for the first 2 years

## Monitoring requirements

- Using Earthwatch's methodology, carry out monitoring a minimum of 2 times a year for the first 2 years after planting, preferably through citizen science
- Submit the monitoring data collected to Earthwatch at the end of each growing season

# Tiny Forest site criteria

- A site of approximately 200m<sup>2</sup> for the Tiny Forest, plus space for heavy machinery to do preparation work so total space possibly up to 500m<sup>2</sup>. This area can be of any shape/orientation, but the forest must not be narrower than 4m across at any given point
- No underground infrastructure: soil typically excavated to 1m depth
- No overhead infrastructure: trees could grow to 20m+
- Need a site that is accessible for large machinery: mini digger needed for soil preparation, plus truck delivery of straw and other soil supplements
- Possible water access point: trees may need watering during first 2 years of maintenance, so either a water access point located nearby, or access for a vehicle and water bowser to the site
- A site that is not causing obstruction to people's right of way (the forest becomes very dense and impassable unless a specific pathway is incorporated into the design)
- Need a site that is within an urban setting and that is easily accessible to users (e.g. local residents, school children, employees)
- Site should not be designated as sensitive in any way, eg Ramsar site etc.
- Site should be an open area (we do not want to remove trees to plant new ones!), some scrub or low vegetation is fine, as are trees on the edge of the proposed site as these could potentially be incorporated into the design
- The forest should be as compact as possible and is not suitable for using as hedging
- Paths and an open classroom can be included into the design. The forest is fenced at least for the first 2 years with access through an open gate

# Engagement programme

**Earthwatch will facilitate the following engagement activities:**

## **Citizen science activities**

- Baseline biodiversity survey
- Planting day
- Monitoring surveys:
  - Growth-rate
  - Thermal comfort
  - Pollinators
  - Ground dwellers
  - Carbon capture
  - Soil moisture/soil texture

## **Workshop options\***

- Indigenous knowledge sharing - i.e. forest species and other cultural stories (site dependent)
- Professional Development workshops for local educators including how to use the Tiny Forest as an outdoor classroom
- Professional Development workshops for landscapers, detailing the Miyawaki planting method and working with indigenous plant species
- Scientist-for-a-day (S4AD) workshops for corporate employees

## **Resources\***

- How-to guides for planting indigenous plants and developing your own Tiny Forest
- Indigenous seedlings for local participants to take home
- Learning materials for corporate groups on climate change and biodiversity
- Informative signage
- Social surveys to better understand the benefits of the Tiny Forest on the community
- Lesson plans and learning modules developed for schools and Environmental Education Centres

## **Maintenance**

- A group of 4-5 "Keeper Team" members are identified, trained and provided the responsibility of watering, weeding and rubbish-removal for the first two years.

*\*some of these activities will be optional*

# Project timeline

## FUNDING RECEIVED

## VEGETATION SURVEY

Desktop study combined with ground truthing to determine the remnant vegetation type and suitable species for the Tiny Forest

## LAND SECURED

A suitable site has been identified that meets the Tiny Forest criteria

## PLANTS ORDERED

Nurseries need 6-12 months notice to plant and establish seedlings

## FOREST DESIGNED

Through consultation with our research partners and landscape designers

## SOIL SURVEY

Assess soil texture, pH, Carbon, Nitrogen and microbes to determine the best materials for soil enrichment (i.e. compost, manure etc.)

## ENGAGE KEY GROUPS

Local schools, community groups and/or corporate employees are engaged to assist with citizen science activities.

## PLANTATION

The species are laid out as per design to represent forest layers; then are planted, staked and provided optional tree guards. Mulch is then laid out

## SOIL REMEDIATION

Includes excavation by machinery followed by manual engagement activity to incorporate soil enrichments.

## MAINTENANCE

"Keeper Team" will water and weed the Tiny Forest at designated intervals for the first two years

## MONITORING

Citizen science activities to monitor biodiversity, temperature, growth and biomass.

## DATA ANALYSIS

Interpretation of the data to quantify the benefits the Tiny Forest provides, and promote the Miyawaki method more widely



# References

## **Western Australia's Tiny Forest**

[https://www.murdoch.edu.au/news/articles/western-australia-s-first-tiny-forest-for-community-led-urban-greening\\_](https://www.murdoch.edu.au/news/articles/western-australia-s-first-tiny-forest-for-community-led-urban-greening_)

## **Canberra's micro forests**

Based on the same methodology as Tiny Forests

<https://climatefactory.com.au/projects/>

## **Tiny Forests Earthwatch UK**

<https://tinyforest.earthwatch.org.uk/>

## **The Miyawaki method**

Detailed methodology for the Miyawaki method

<https://www.afforestt.com/methodology>

## **Results from the Miyawaki method**

<https://www.afforestt.com/results>

# About Earthwatch

Earthwatch is a global environmental charity founded in 1971. We take action to address global change through a time-tested model of citizen science and education that inspires behaviour change, and positive action for nature.

By engaging all sectors of society directly with researchers in the field, and educators in outdoor classrooms, Earthwatch teams have helped to safeguard critical habitats, conserve biodiversity, and promote the sustainable use of natural resources.

## Contact

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