

AUSTRALIA 2020-2023

# Bringing Back the Forest

Reforestation Provides Global Opportunities  
for Disturbed Landscapes







A highly disturbed surface coal mine in central Queensland that is located adjacent to a State Forest. Disturbed landscapes such as these demonstrate the need for reforestation.

## GLOBAL REFORESTATION OPPORTUNITIES IN AUSTRALIA

Sequestration of carbon by forests has been identified as a tangible method for limiting the rise of carbon dioxide in the atmosphere and mitigating climate change. The Intergovernmental Panel on Climate Change recently reported that an increase of 1 billion hectares of forest on Earth could limit global warming to 1.5°C by 2050. Where these 1 billion hectares, or approximately 1 trillion trees, will go is a tricky question.

With concern about global food shortages in a changing climate, forest establishment on productive agricultural lands would be discouraged. However, disturbed lands that were previously forested and marginal agricultural lands would be suitable if soils can facilitate forest growth.

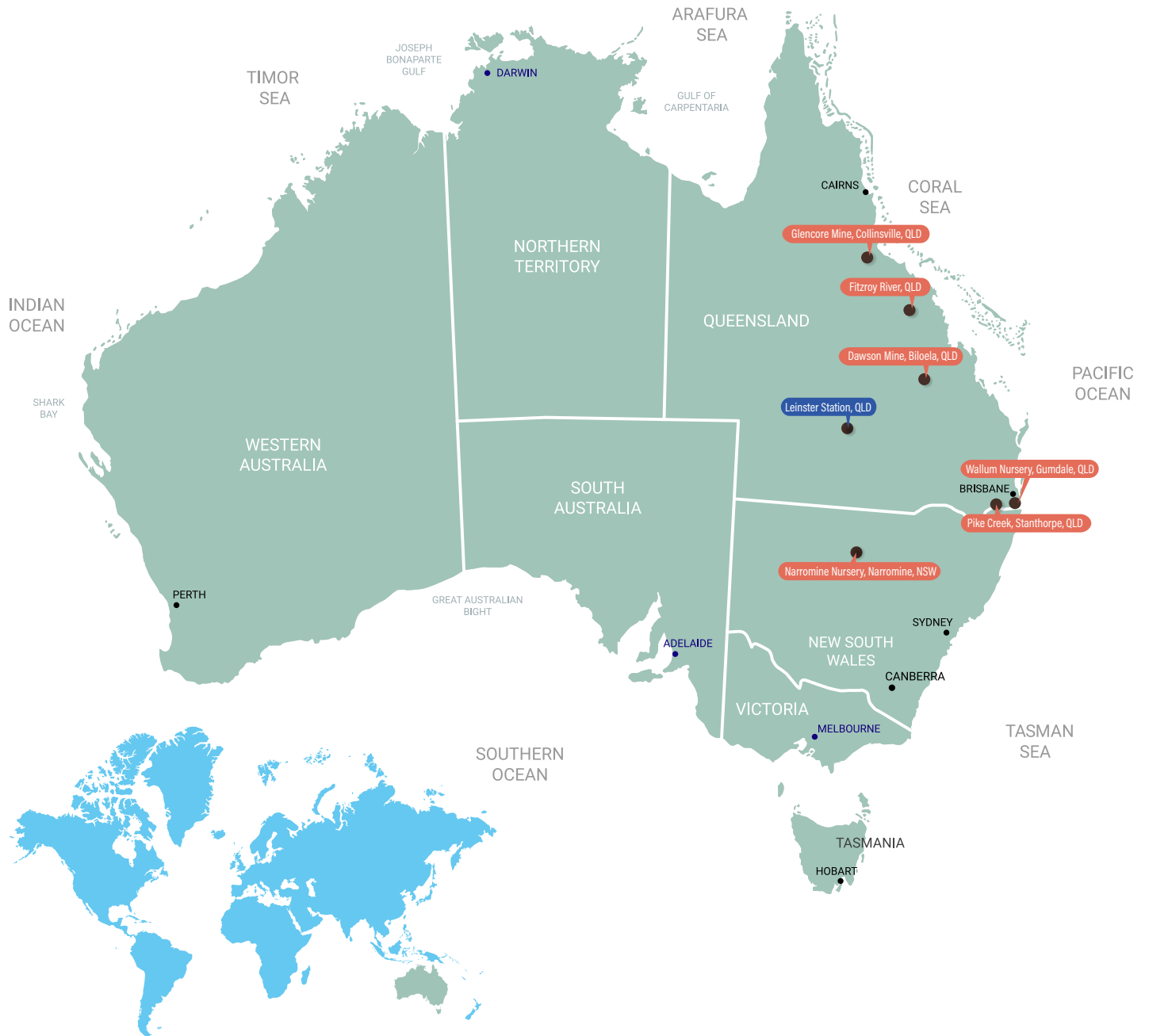
In the US, millions of hectares of forest have been lost or disturbed, producing significant economic, environmental, and ecological challenges. Similar land disturbances have occurred in Australia. Successful rehabilitation and revegetation of disturbed lands are vital for mitigating climate change and protecting biodiversity. Green Forests Work (GFW) is primarily focused on reforestation of coal mines in the Appalachian region of the US and our work has resulted in a number of research findings that informed mine rehabilitation policy, new restoration techniques, and the planting of millions of trees. Our hope is to test the global application of our reforestation work on disturbed lands in eastern Australia and see if similar results can be achieved.

GFW has initiated several projects in Australia to promote techniques for disturbed land rehabilitation following methods developed and implemented in the US. Working with groups from university, government, and professional affiliations we outlined the global transferability of our reforestation approach. We also met with many NGOs, conservation groups, and private industry representatives to discuss potential projects and form collaborations. These efforts and a commitment from the Arbor Day Foundation to support planting projects in Australia have led to the development of projects that will plant nearly 400,000 trees on disturbed landscapes at five locations in Queensland. These resulting forests will restore lost or impaired ecosystem services and sequester thousands of tons of carbon dioxide.

By improving our ability to rehabilitate disturbed lands, we create new opportunities for areas that are often considered marginal, we protect biodiversity, improve environmental quality and contribute significantly to the development of a sustainable future for affected communities.

# REFORESTATION SITES IN AUSTRALIA

Project areas have all been in Queensland and included coal mine reforestation projects at the Dawson Mine near Biloela and the Glencore Mine near Collinsville; riparian restoration along the Fitzroy River near Yaamba; and old pasture reforestation at Pike Creek near Stanthorpe. Native containerized seedlings were sourced from Wallum Nursery in Gumdale, Queensland and Narromine Transplants in Narromine, New South Wales. A potential project site for 2024 is a former agriculture and livestock farm called Leinster Station near the town of Roma, Queensland. We have 87,250 seedlings dedicated to the 2024 project.







Anglo American, Komatsu, and GFW join forces, along with local school children from Moura and Banana State Schools, and Traditional Owners from the Gangulu Nation, to begin planting more than 4,000 trees at Dawson coal mine in Central Queensland in March 2020.

## 2020 PILOT PROJECT

The Forestry Reclamation Approach, a regional reforestation model we employ, was created for disturbed lands in Appalachia but likely has global application. Although the tree species, weather and site conditions may differ from those in Appalachia, the fundamentals of soil science and restoration ecology are transferrable to other regions of the world. The Anglo American’s Dawson Mine near Biloela, Australia was the test site to initiate this global experiment. Just before the COVID-19 pandemic started to close things down, GFW’s President Dr. Chris Barton, GFW Director of Operations Michael French, and Dr. Nardia Grant of Unearthed Environmental Services were joined by employees of Anglo America, Komatsu, students from Moura and Banana State Schools and Traditional Owners from the Gangulu Nation to plant over 4,000 trees. Albeit a small planting, but an empowering opportunity for all that were involved. Dr. Barton recited the words of Wangari Maathai who noted that “...the act of planting a tree reconnects the human spirit to the beauty and importance of the natural world – the basis for all life on Earth.”

Table 1. 2020 Dawson Mine planting

Trees and Shrubs	# Planted
Bimble box ( <i>Eucalyptus populnea</i> )	879
QLD blue gum ( <i>Eucalyptus tereticornis</i> )	959
Dawson River black butt ( <i>Eucalyptus cambageana</i> )	417
Narrow-leaved ironbark ( <i>Eucalyptus crebra</i> )	879
Lemon-scented gum ( <i>Corymbia citriodora</i> )	835
Red bloodwood ( <i>Corymbia erythropholia</i> )	160
Dawson river weeper ( <i>Callistemon viminalis</i> )	60
<b>Total</b>	<b>4,189</b>



Seedlings for projects growing at the Narromine Nursery.



# PARTNERING WITH THE ARBOR DAY FOUNDATION

## 2021

After the successful installation of the pilot project near Biloela, GFW staff began planning with our US partners and Australian colleagues to scale up native ecosystem restoration in Australia. Taking into account the unprecedented scale of the devastating brush fires experienced across eastern Australia in 2019-2020, these discussions revolved around the potential for plantings on surface mined lands to sequester carbon to mitigate the effects of climate change. As these discussions continued, we found a great deal of enthusiasm for ecosystem restoration not only for mined land rehabilitation and fire rehabilitation, but also due to the ability of trees to improve water quality. Projects in Australia have the capacity to meet multiple objectives including restoration of ecosystem services, habitat restoration, as well as improving water quality inputs to the Great Barrier Reef.

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Table 2. Planted tree species for 2020 Fitzroy project.

Trees and Shrubs	# Planted
River oak ( <i>Casuarina cunninghamiana</i> )	428
Moreton bay ash ( <i>Corymbia tessellaris</i> )	1,279
River red gum ( <i>Eucalyptus camaldulensis</i> )	53
QLD blue gum ( <i>Eucalyptus tereticornis</i> )	1,289
Weeping paperbark ( <i>Melaleuca leucadendra</i> )	458
Weeping tea-tree ( <i>Melaleuca fluviatilis</i> )	438
Tea-tree ( <i>Melaleuca trichostachya</i> )	311
Weeping bottlebrush ( <i>Melaleuca viminalis</i> )	311
Coolabah ( <i>Eucalyptus coolabah</i> )	1,270
Fig tree ( <i>Ficus spp.</i> )	63
Cocky apple ( <i>Planchonia careya</i> )	82
Swamp box ( <i>Lophostemon suaveolens</i> )	83
Black ironbox ( <i>Eucalyptus raveretiana</i> )	82
<b>Total</b>	<b>6,147</b>



Komatsu, Green Forests Work and Anglo American host a second community tree planting event at the Dawson mine in 2021.



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In 2021, we initiated a project with the Arbor Day Foundation and others for the planting of 230,000 trees in Queensland. Two projects were on coal mines, Anglo American’s Dawson mine and Glencore’s Collinsville mine, one project aimed to reforest old pasture for carbon sequestration benefits and the fourth project focused on reforesting riparian areas adjacent to the Fitzroy river in an effort to reduce erosion to the Great Barrier Reef.

As with our projects in Appalachia that fateful year, COVID-19 did delay the start of the pasture reforestation project and limited our ability to travel and host volunteer events. However, with assistance from our collaborator, Nardia Grant of Unearthed Environmental Services, two community events were held. On October 26th an event that included staff from Komatsu and Anglo American, 5 Gangulu indigenous traditional owners, and 50 school children planted 1,500 seedlings. On November 16th Glencore hosted a community event that involved their staff, 8 Birriah traditional owners, and 44 school children from two schools (Scottville State School and Saint John Bosco’s Primary School) and 1,000 seedlings were planted.

In all, 26,147 trees were planted between December 2020 and November 2021 at three sites in Queensland (see Tables 2-4).

Table 3. 2021 Dawson Mine

Trees and Shrubs	# Planted
Spiny head mat rush ( <i>Lomandra longifolia</i> )	1,240
Black tea-tree ( <i>Maleluca bracteata</i> )	640
River tea-tree ( <i>Maleluca trichostachya</i> )	560
Red river gum ( <i>Eucalyptus camaldulensis</i> )	1,476
QLD blue gum ( <i>Eucalyptus teriticornis</i> )	1,340
Weeping bottlebrush ( <i>Melaluca viminalis</i> )	780
Knob sedge ( <i>Carex inversa</i> )	500
Dawson river black butt ( <i>Eucalyptus cambageana</i> )	600
Silver-leaved ironbark ( <i>Eucalyptus melanophloia</i> )	464
Lemon-scented gum ( <i>Eucalyptus citriodora</i> )	600
Soap wattle ( <i>Acacia holosericea</i> )	440
Western silver wattle/ Wattle ( <i>Acacia decora</i> )	760
Brewster’s cassia ( <i>Cassia brewsteri</i> )	600
<b>Total</b>	<b>10,000</b>

Table 4. 2021 Glencore Project

Trees and Shrubs	# Planted
Morton bay ash ( <i>Corymbia tessellaris</i> )	1,250
River red gum ( <i>Eucalyptus camaldulensis</i> )	1,250
QLD white gum ( <i>Eucalyptus argophloia</i> )	365
Narrow-leaved ironbark ( <i>Eucalyptus crebra</i> )	2,503
Silver-leaved ironbark ( <i>Eucalyptus melanophloia</i> )	1,652
QLD blue gum ( <i>Eucalyptus tereticornis</i> )	1,650
River tea-tree ( <i>Melaleuca bracteata</i> )	1,330
<b>Total</b>	<b>10,000</b>

## PIKE CREEK PROJECT 2022

Green Forests Work partnered with the Arbor Day Foundation, Unearthed Environmental Services, and Corporate Carbon on a project to regenerate forest on neglected and disused pasture land near Pikedale, Queensland. With support from the Arbor Day Foundation’s Team Trees campaign, this project saw more than 200 hectares of land reforested. The site was compacted from continuous grazing and overrun by weeds and grasses.

Using site preparation techniques proven for mine lands, compaction was mitigated by ripping with a bulldozer and 200,000 seedlings were planted by hand and watered. Through this project, 95,000+ metric tons of carbon dioxide will be sequestered in the trees and a healthy, functioning native ecosystem that

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To kick-off the planting phase of the project, a community planting event was held at the site on the 21st of January, 2022. The 34 volunteers planted 800 seedlings. A great day for all involved, beautiful weather and much enthusiasm to reforest this site.



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supports biodiversity will be protected for 100 years.

Unlike the tree species we plant in Appalachia (oaks, hickories, maples, pines etc.), the reforestation area in Queensland was planted with a variety of Eucalyptus species such as white box, narrow leaf ironbark, red gum, gray box, and dusky leaved ironbark, to name a few. These trees will grow to provide forested habitat for a variety of animals that we do not encounter in Appalachia including: glossy black cockatoo, wedgetail eagle, black-faced rock wallaby, kangaroo, echidna, and the Australian reed warbler. Many native fish in streams on the site including threatened species such as the Murray cod, silver perch, purplespotted gudgeon, olive perchlet, and freshwater catfish will also benefit from the project as the trees reduce erosion and provide shade, helping to cool surface water and improve the local hydrology.



Volunteers plant trees during a community planting event at Pike Creek in Queensland, Australia.

Table 5. 2022 Pike Creek

Trees and Shrubs	# Planted
White box ( <i>Eucalyptus albens</i> )	25,000
Broad-leaved stringybark ( <i>Eucalyptus caliginosa</i> )	5,000
Narrow-leaved ironbark ( <i>Eucalyptus crebra</i> )	50,000
Red gum ( <i>Eucalyptus dealbata</i> )	30,000
Red ironbark ( <i>Eucalyptus fibrosa</i> )	10,000
Silver-leaved ironbark ( <i>Eucalyptus melanophloia</i> )	15,000
Yellow box ( <i>Eucalyptus melliodora</i> )	20,000
Grey box ( <i>Eucalyptus microcarpa</i> )	20,000
Gum-topped box ( <i>Eucalyptus moluccana</i> )	25,000
<b>Total</b>	<b>200,000</b>



Nardia Grant of Unearthed Environmental Services and Gary Wyatt of Corporate Carbon plant trees at Pike Creek in Queensland, Australia.







Aerial view of browse study established in 2023 showing a plot with trees protected with both fence and tree shelters and another with just tree shelters.

## 2023

In March 2023, Dr. Barton returned to Pike Creek to finish planting the site and to do some clean-up on the project that was started in 2021. The weather was perfect for planting and an inch of rain fell the day after planting was completed. Barton and his partners were able to plant 32,750 trees in a little over three days. Afterward, a “browse study” was established at the site to examine the influence of herbivores on reforestation success. This was done by erecting 900 m<sup>2</sup> exclusion fences in replicated plots in the reforestation area and compared to similar sized plots where tree shelters were utilized (no fence) and control plots where no protection was provided. These plots will be measured annually.

With help from partners like the Arbor Day Foundation, Komatsu, Anglo American, Glencore, the Fitzroy Basin Association and Corporate Carbon, we have a vision to scale-up and restore 10,000 hectares over the next 10 years in Australia, which will require the planting of nearly 10 million trees.

Table 6. 2023 Pike Creek

Trees and Shrubs	# Planted
White gum ( <i>Eucalyptus scoparia</i> )	9,829
Narrow-leaved ironbark ( <i>Eucalyptus crebra</i> )	7,144
Red gum ( <i>Eucalyptus dealbata</i> )	8,621
Grey box ( <i>Eucalyptus moluccana</i> )	7,156
<b>Total</b>	<b>32,750</b>



Tree planters prepare for a day of work at the Pike Creek site in March 2023.



Links to two videos that came out about these projects can be found here:  
[https://www.youtube.com/watch?v=GKwbgp\\_W60s](https://www.youtube.com/watch?v=GKwbgp_W60s)  
<https://www.youtube.com/watch?v=hSmaMkLG5e0&t=6s>