# Green Forests Work

*Restoring healthy and productive forests on formerly mined lands in Appalachia and beyond*

Investment Memo Presented by The USIT Foundation in Spring 2023

# Green Forests Work

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# Charity Summary

**Charity Overview**

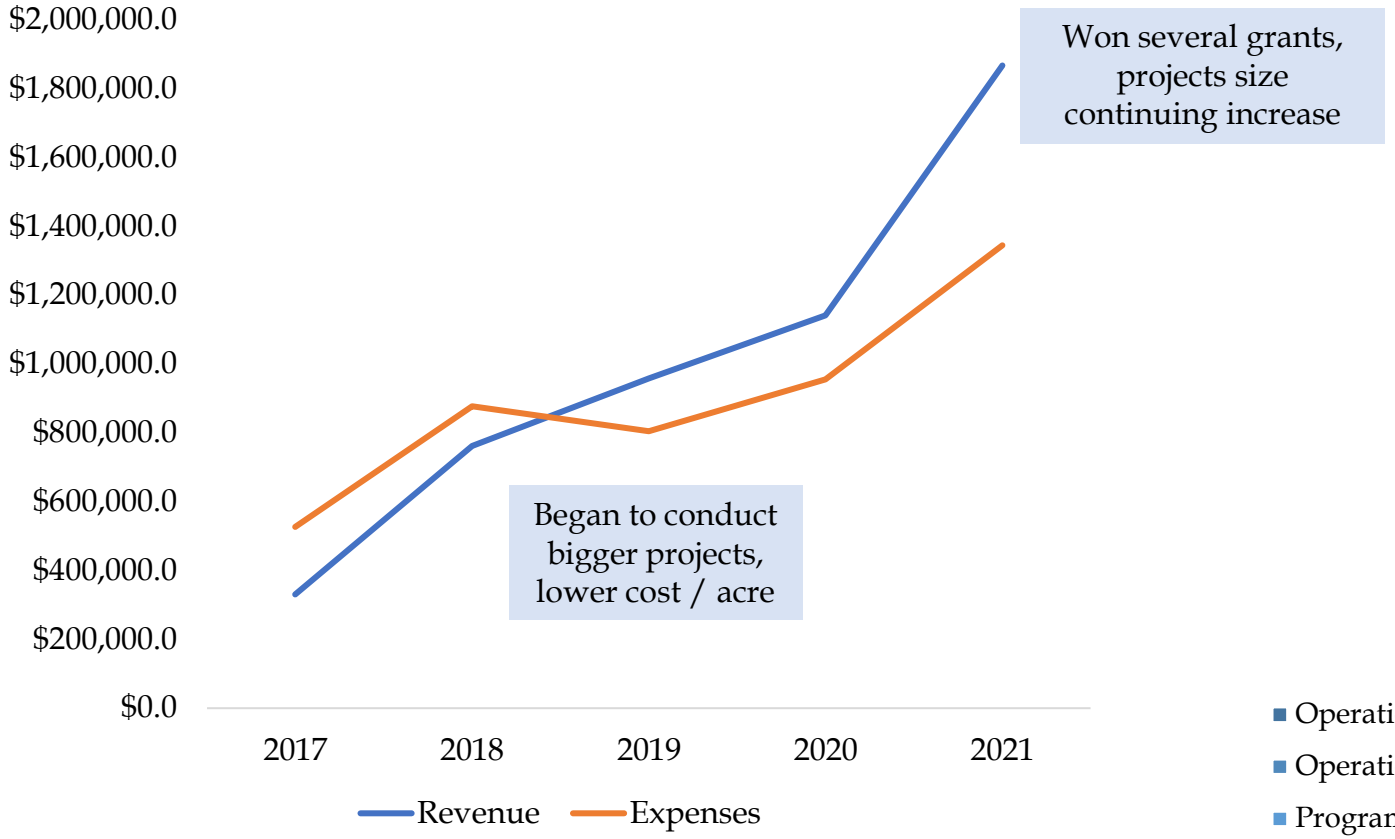
- **Green Forests Work (GFW) aims to combat climate change by planting trees, which consequently reduces carbon emissions and helps the environment**
  - GFW reforests land in Appalachia, an area identified by The Nature Conservancy (TNC) as one of four globally important regions for terrestrial biodiversity. It has planted over 5 million trees across more than 9,400 acres using a research-backed approach
  - GFW uses a modified version of Forestry Reclamation Approach to convert compromised lands back into healthy native forests with 5 steps: secure, site prep, tree selection, tree planting, monitoring
- **Green Forests Work utilizes a network of volunteers, partnerships, and corporate backing in order to create impact in the country**
  - GFW has maintained the relationships with its community partners, such as Amazon Smile, Ebay, Kroger, All People Marketplace, and Good Living Challenge
  - GFW's strategies in operation guided it through the pandemic and was still able to increase amounts of planted tress without volunteer involvements

**Donation Thesis**

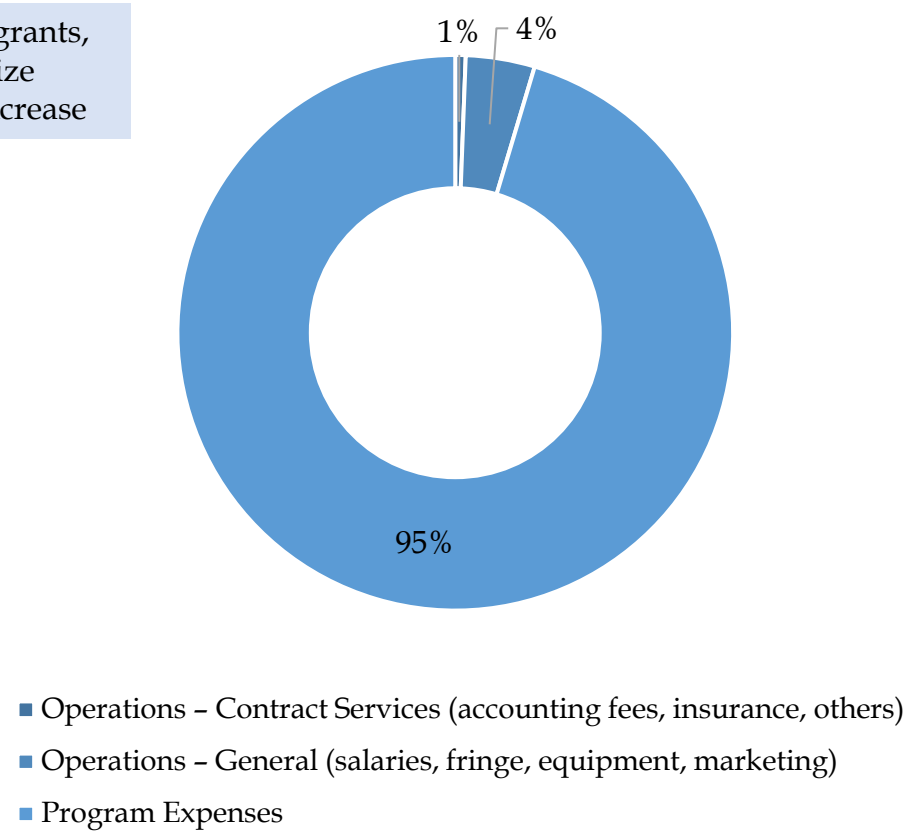
- **Green Forests Work is a relatively efficient charity within the tree planting sphere, making it uniquely poised to create impact**
  - In 2022, GFW estimates its cost per tree planted to be $2.50, while a comparable set of charities averaged $130.15 per tree planted, making the charity ~52x more cost efficient in the tree planting sphere
- **Green Forests Work is looking towards long term expansion, both domestically and abroad – a piece of expansion that the USIT Foundation's donation can help catalyze**
  - GFW methodologies are applicable for the restoration of drastically disturbed landscapes globally; prior to the pandemic, GFW had considered expanding to Indonesia, the Amazon, and Africa
  - In 2021, it nearly doubled the number of trees and acres from the previous annual record, indicating long term growth

# Financial Snapshot

## Revenues and Expenses Over Time




## [FY 2023] Organizational Budget



# Program Summary

## Reforestation for Landowners

- Step 1: Private or public landowners reach out to GFW about reforestation.
    - No financial contribution from the landowner is needed
- Step 2: Local contractors are hired to remove or control exotic, invasive vegetation.
- Step 3: A mix of native shrub species and valuable hardwoods are selected
- Step 4: Seedings are planted by professional or volunteer groups in high density to prevent invasive species from becoming reestablished
- Step 5: Post-planting site visits are conducted by GFW employees to assess tree survival and growth. Follow-up maintenance and plantings are performed when necessary

## Reforestation Projects

- The same reforestation method is used (step 2-4)
- Monongahela National Forest, WV
- Surface mined land in Mammoth, WV
    - Donated by Appalachian Headwaters
- Cumberland Forest, KY-TN border
    - Partners with The Nature Conservancy (TNC)
    - Received a grant from the US Forest Service that allowed TNC and GFW to perform restoration work
- Forests in the Cumberland Plateau
    - Completed in 2022
- Daniel Boone National Forest
    - Completed in 2022

# Risks and Mitigants

| Risks | Mitigants | Assessment |
|---|---|---|
| **H2b visa foreigners as majority of planting crews** | - Since the COVID pandemic began, most of GFW's planting crews are here on H2b visas, working for American companies<br>- By travelling to and throughout the region, they bring economic effects by spending money in hotels and stores, which benefits local communities in the retail, service, hospitality, and transportation sectors |  |
| **Tree diseases** | - GFW plants ~ 20 mix of native species, so these plantings are not subject to decimation that monoculture plantings sometimes experience<br>- They try to restore species that have undergone declines in recent decades, some potentially resistant to certain diseases |  |
| **Droughts and crown fires due to global warming** | - Fires are not a big concern in Appalachian region as they are in more arid environments, only one exception in Gatlinburg, Tennessee in 2016<br>- Among mined land projects, only one of the early mined land reforestation plantings was somewhat damaged by an arson fire<br>- Since GFW plants hardwoods, most of the trees resprouted |  |

# Program Activities

# Overview of Model

*GFW uses heavy soil compaction to convert compromised lands back into healthy forests, providing sustainable economic development and opportunities for entrepreneurship*

**STEP 1: SECURE PLANTING SITE**

**STEP 2: SITE PREP**

**STEP 3: TREE SELECTION**

**STEP 4: TREE PLANTING**

**STEP 5: MONITORING**

# Program Breakdown

## Cumberland Forest, KY-TN border

- The Nature Conservancy (TNC) has identified Appalachia as one of four globally important regions for terrestrial biodiversity
- In 2019, TNC acquired 253,000 acres in Tennessee, Kentucky, and Virginia, including the Ataya property spanning 100,000 acres at the KY-TN border, thousands of which have been impacted by surface mining
- In 2021, grant from the US Forest Service supported TNC and GFW to begin performing ecological restoration work on Ataya
  - Restored shortleaf pine-upland oak habitat that has been declining for decades due to overharvesting of timber, fire suppression, pine beetle and other insect damage, and other factors
- In 2022, a professional crew was hired to plant nearly 96,000 trees and shrubs across the 100 acres of ripped ground, and an additional 38 acres of steep slopes that lacked tree cover
- A total of **102,775** seedlings had been planted across nearly 150 acres
- Funding was provided by: Arbor Day Foundation, Sheldon and Audrey Katz Foundation, Angel's Envy, Beam Suntory, Artic Express, and numerous other GFW donors





# Program Breakdown – Australia Projects

*Interest in reforestation in Australia has grown substantially due to the devastating bush fires across Australia in recent years and the urgent need to combat climate change*

## 2020

GFW began a global experiment to test the global transferability of the Forestry Reclamation Approach

- Planting of 4,000 trees on a coal mine near Biloela, Australia

## 2021

Funds from the Arbor Day Foundation supported the planting of 230,000 trees in Queensland

- Two projects were on coal mines:
  - Anglo American's Dawson mine: aimed to reforest old pasture for carbon sequestration benefits
  - Glencore's Collinsville mine: reforested riparian areas to reduce erosion to the Great Barrier Reef

## 2022

GFW regenerate forest on neglected and disused pasture land near Pikedale, Queensland

  - Partnered with Unearthed Environmental Services and Corporate Carbon
  - Supported by Arbor Day Foundation & the Team Trees campaign
- > 500 hectares of land reforested
- 200,000 seedlings were planted, indicating **95,000+ metric tons of CO2** will be sequestered in the trees and a protected ecosystem with biodiversity for 100 years
  - Provides a forested habitat for a variety of animals that were not encountered in Appalachia
  - Many native fish in streams on the site including threatened species also benefits as the trees reduce erosion and provide shade, helping to cool surface water and improve the local hydrology

# Theory of Change

# Issue Overview

*1.5 million acres of grasslands does not organically return to their native forest ecosystem in the U.S.*

## History of Mining & Deforestation

- In the 19th and 20th centuries, the mining industry caused the deforestation of millions of acres of forest in the Appalachian region.
- The soil in mining locations was left so compacted that trees cannot successfully grow, and water cannot be retained.

## Why We Should Care

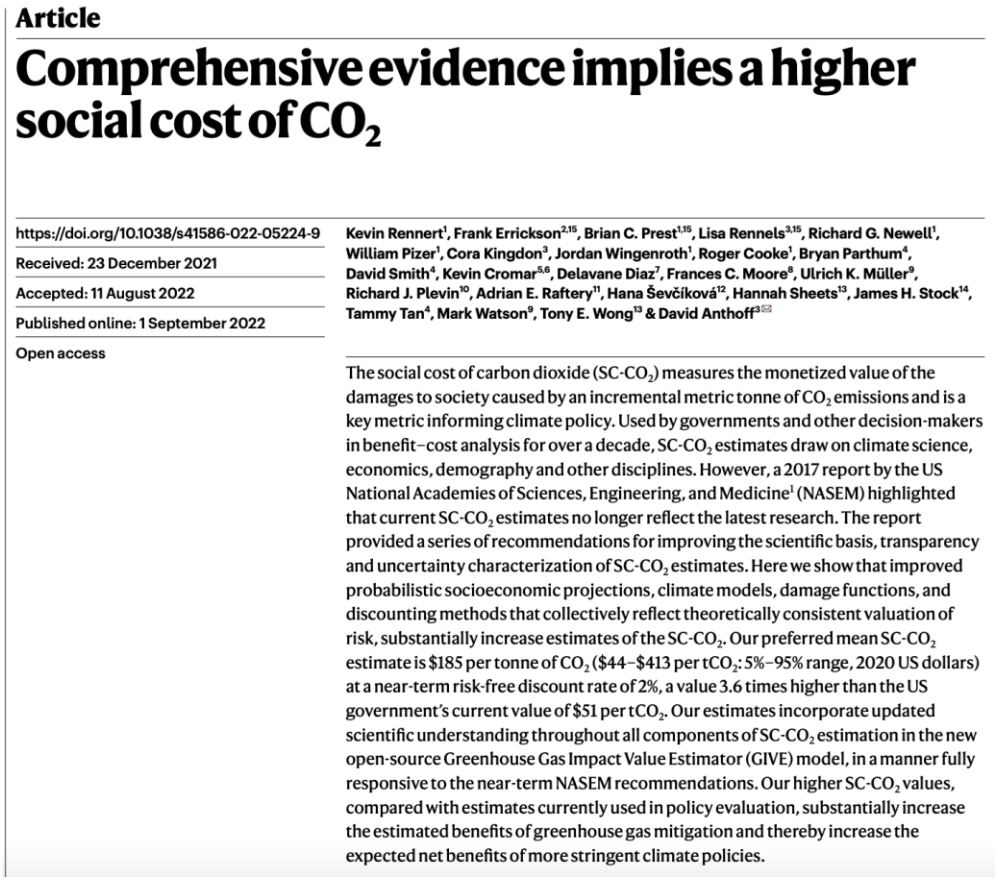
- One acre of forest can **absorb 4.5 - 40.7 tons** of CO2 and produce 4 tons of O2 per year.
- Destruction of ecosystems can put wildlife in danger of extinction. Some relevant examples in the Appalachian region include the Indiana bat and golden-winged warblers.
- Reducing soil compaction allows for greater water infiltration and storage, reducing surface runoff that transports sediments.
- Riparian forests filter nutrients, pesticides, and animal waste from agricultural land run-off; stabilize eroding banks; and provide wildlife habitat.




- https://www.greenforestswork.org/reforestation-benefits
- https://8billiontrees.com/carbon-offsets-credits/carbon-ecological-footprint-calculators/how-much-carbon-does-a-tree-capture/#:~:text=One%20acre%20of%20forest%20can,driving%20your%20car%2026%2C000%20miles.
- https://www.caee.utexas.edu/prof/maidment/giswr2011/TermPaper/Chambers.pdf

# Root Cause Analysis

*Social Cost of $CO_2$ impacts the most vulnerable populations with increased health risks*



Article

## Comprehensive evidence implies a higher social cost of $CO_2$

https://doi.org/10.1038/s41586-022-05224-9
Received: 23 December 2021
Accepted: 11 August 2022
Published online: 1 September 2022
Open access

Kevin Rennert[1], Frank Errickson[2,15], Brian C. Prest[1,15], Lisa Rennels[3,15], Richard G. Newell[1], William Pizer[1], Cora Kingdon[3], Jordan Wingenroth[1], Roger Cooke[1], Bryan Parthum[4], David Smith[4], Kevin Cromar[5,6], Delavane Diaz[7], Frances C. Moore[8], Ulrich K. Müller[9], Richard J. Plevin[10], Adrian E. Raftery[11], Hana Ševčíková[12], Hannah Sheets[13], James H. Stock[14], Tammy Tan[4], Mark Watson[9], Tony E. Wong[13] & David Anthoff[3]

The social cost of carbon dioxide (SC-$CO_2$) measures the monetized value of the damages to society caused by an incremental metric tonne of $CO_2$ emissions and is a key metric informing climate policy. Used by governments and other decision-makers in benefit–cost analysis for over a decade, SC-$CO_2$ estimates draw on climate science, economics, demography and other disciplines. However, a 2017 report by the US National Academies of Sciences, Engineering, and Medicine[1] (NASEM) highlighted that current SC-$CO_2$ estimates no longer reflect the latest research. The report provided a series of recommendations for improving the scientific basis, transparency and uncertainty characterization of SC-$CO_2$ estimates. Here we show that improved probabilistic socioeconomic projections, climate models, damage functions, and discounting methods that collectively reflect theoretically consistent valuation of risk, substantially increase estimates of the SC-$CO_2$. Our preferred mean SC-$CO_2$ estimate is $185 per tonne of $CO_2$ ($44–$413 per t$CO_2$; 5%–95% range, 2020 US dollars) at a near-term risk-free discount rate of 2%, a value 3.6 times higher than the US government's current value of $51 per t$CO_2$. Our estimates incorporate updated scientific understanding throughout all components of SC-$CO_2$ estimation in the new open-source Greenhouse Gas Impact Value Estimator (GIVE) model, in a manner fully responsive to the near-term NASEM recommendations. Our higher SC-$CO_2$ values, compared with estimates currently used in policy evaluation, substantially increase the estimated benefits of greenhouse gas mitigation and thereby increase the expected net benefits of more stringent climate policies.

- Social cost of $CO_2$ (SCC), an estimate of the economic damages associated with emitting one additional ton of carbon dioxide (CO2), has been **underestimated** in the past
- **Social cost of $CO_2$** is estimated to be **$185** per ton of CO2
- Impacts of climate change are unevenly distributed - affecting the **most vulnerable populations,** such as low-income households, children, the elderly, populations in developing countries, and Indigenous peoples
- These groups **have higher health risks** associated with air pollution, extreme weather events, and to have limited access to adaptive resources such as healthcare and insurance

**Table 1 | Evolution of mean SC-$CO_2$ from DICE-2016R to this study**

| Row | Scenario | Mean SC-$CO_2$ ($ per tCO2) | Incremental change ($ per tCO2) | Share of total change (%) |
|---|---|---|---|---|
| a | DICE-2016R | 44 | | |
| b | GIVE with DICE damage function, 3% near-term discount rate | 59 | 15 | 11 |
| c | GIVE with sectoral damages, 3% near-term discount rate | 80 | 21 | 15 |
| d | This study: GIVE with sectoral damages, 2% near-term discount rate | 185 | 105 | 74 |

# Root Cause Analysis

*Minelands are highly potential to maximize carbon sequestration*

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

## Factors controlling carbon distribution on reforested minelands and regenerating clearcuts in Appalachia, USA

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[b] University of Kentucky, Department of Forestry, United States
[c] University of Kentucky, Department of Plant and Soil Sciences, United States

### HIGHLIGHTS

- Carbon changes in reforested mine lands (years 1, 3, and 8) were compared to regenerating clear-cuts (years 4, 12 and 20).
- Young mines (years 1 and 3) differed significantly from the older mines and all clear-cuts for all parameters were examined.
- Litterfall, microbial activity, litter decomposition and $CO_2$ efflux were similar on year 8 mines and year 12 clear-cuts.
- Soil organic C (SOC) was lower on the mines than the clear-cuts, but SOC accumulation rate was greater on the mine sites.
- Many ecosystem functions of reforested mines were comparable to young naturally regenerating forests.

### ARTICLE INFO

*Article history:*
Received 29 September 2012
Received in revised form 5 December 2012
Accepted 11 December 2012
Available online 16 January 2013

*Keywords:*
Soil respiration
Decomposition
Soil organic carbon
Reforestation
Microbial biomass

### ABSTRACT

Increasing carbon (C) storage in soils of degraded lands, such as surface coal mines, is of interest because of its potential role in mitigating increases in atmospheric $CO_2$. While it has been shown that reforesting degraded lands can significantly increase C storage in soils, there are limited studies addressing what processes control soil C in these systems. A study was initiated with the following objectives: 1) quantify the amount of soil C accumulating on reforested mine lands; and 2) examine several biological processes that govern the amount of C sequestered into soil (decomposition, soil respiration and microbial dynamics). A chronosequence approach was used to examine C changes with time in reforested mine lands (years 1, 3, and 8) and unmined regenerating clear-cuts (years 4, 12 and 20). From a C perspective, our results indicated that the young reforested mines (ages 1 and 3) differed significantly from the older mines (age 8) and all regenerating clear-cuts for all parameters examined. However, after 8 years litterfall, microbial biomass C and nitrogen (N), microbial activity, litter decomposition and $CO_2$ efflux were similar on the mine as that found on the 12-year-old naturally regenerating clear-cut. Although soil organic C (SOC) content was lower on the reforested mines than the regenerating forests, rates of SOC accumulation were greater on the mine sites, likely because the young mine lands were initially devoid of SOC and conditions were suitable for rapid sequestration.



- Many ecosystem functions of the **reforested mines were comparable to young naturally regenerating forests**
- The **type of vegetation** and **the age of the forest stand** were also found to be important factors affecting carbon storage, with older stands and those dominated by hardwood trees having higher carbon content
- **Promoting growth of hardwood trees** and **increasing soil organic matter** help maximize carbon sequestration in reforested minelands

# Theory of Change Summary

| Inputs | Activities | Outputs | Outcomes | Impacts |
|---|---|---|---|---|
| • GFW spent around $1,331,000 per year towards reforestation at 5 locations & 46 planting events<br><br>• Consists of 13 board and staff members, 3 FT workers are employed by the University of Kentucky | • **Reforestation for Landowners:** reforesting acres of bond-released lands for landowners, taking from 6 months to 2 years<br>• **Reforestation Projects:** planting seedlings across 5 states by professionals and volunteers<br>• **Ecological Restoration Job Trainings:** partnering with US Forest Service & Appalachian Conservation Corps, encouraging college students and recent graduates to do conservation work<br>• **Partnering Research on Restoration Success:** researching on current restoration sites to evaluate reforestation success by graduate students from the University of Kentucky | • Reforestation accomplished in 2022:<br>  • 1.16 million trees planted<br>  • 3,000 acres planted<br>  • Planted in 5 states and Australia<br>  • 46 planting events<br>  • 680 professional participants<br>  • 2800 volunteers | • With each tree planted, it absorbs 48 pounds more carbon dioxide and generates oxygen annually, **36M of CO2 will be absorbed when the trees planted in 2021 mature**<br><br>• 36 full-time equivalent jobs are created with each $1M invested in reforestation, **GFW has generated 244+ FT jobs**, including contractors and secondary industries<br><br>• **3+ endangered species can be protected** through enhancing biodiversity by reforestation in Appalachia | • Tree planting is the **best-in-class method** for solving climate emissions<br><br>• **5% decrease** in Appalachia's **unemployment rates** within 10 years<br><br>• Appalachian Mountains represent one of the **largest carbon sinks**, and **one of the most biologically diverse regions** in the world |

# Inputs

GFW spent ~ $1,345,000 per year towards reforestation at 5 locations & 46 planting events:

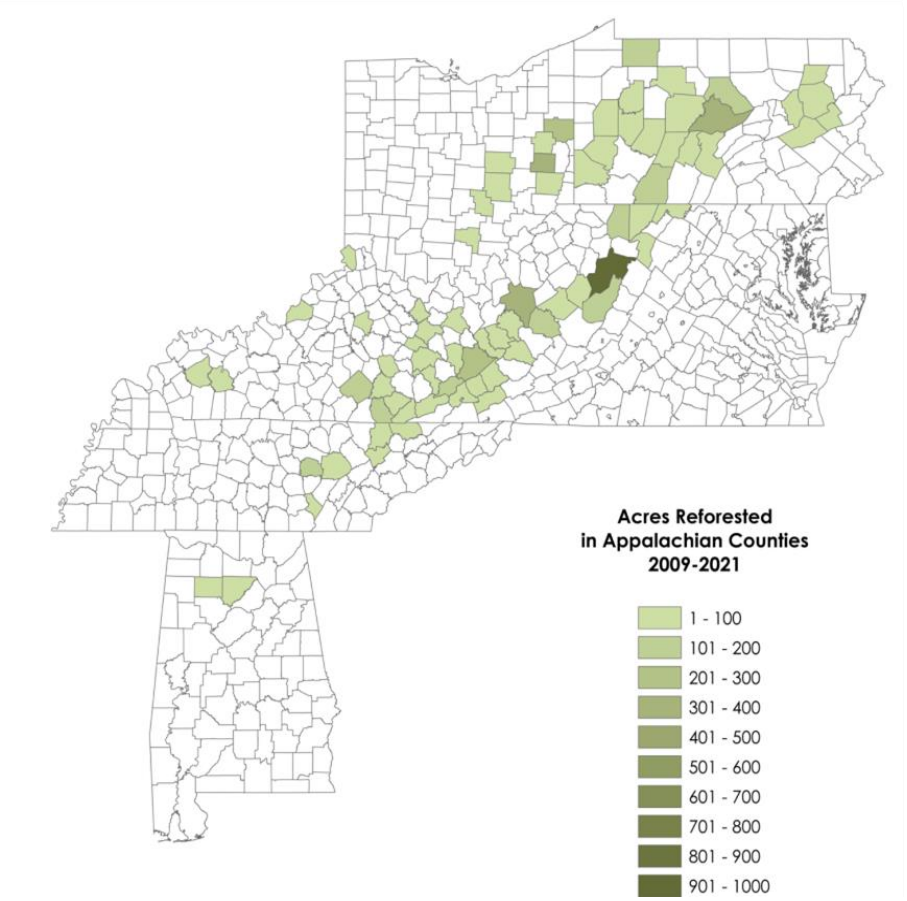
- 36.4 % Site work programs
- 17.6 % Project supplies
- 3.9% International Reforestation
- 1.7 % Travel
- 1% Advertising, administration and others:

Staff:

- GFW consists of 13 board and staff members, including 3 full-time staff employees hired by the University of Kentucky, although often employ a couple of seasonal techs and/or interns annually
- In reforestation projects, GFW hires ~244 full-time workers, mainly contractors and secondary industries
  - When American Forests was lobbying Congress to pass the REPLANT Act, they came up with a figure of 39 jobs/$1M invested in reforestation. In a typical GFW reforestation project, 36 full-time jobs are created per $1M invested

| | | | | |
|---|---|---|---|---|
| 11 | Fees for services (nonemployees): | | | |
| a | Management | | | |
| b | Legal | | | |
| c | Accounting | 1,710. | 1,710. | |
| d | Lobbying | | | |
| e | Professional fundraising services. See Part IV, line 17 | | | |
| f | Investment management fees | | | |
| g | Other. (If line 11g amount exceeds 10% of line 25, column (A) amount, list line 11g expenses on Sch O.) | 526,165. | 526,165. | |
| 12 | Advertising and promotion | 2,602. | 2,602. | |
| 13 | Office expenses | 3,626. | 3,626. | |
| 14 | Information technology | | | |
| 15 | Royalties | | | |
| 16 | Occupancy | 4,813. | 2,761. | 2,052. |
| 17 | Travel | 23,506. | 23,240. | 266. |
| 18 | Payments of travel or entertainment expenses for any federal, state, or local public officials | | | |
| 19 | Conferences, conventions, and meetings | | | |
| 20 | Interest | | | |
| 21 | Payments to affiliates | | | |
| 22 | Depreciation, depletion, and amortization | | | |
| 23 | Insurance | 870. | 870. | |
| 24 | Other expenses. Itemize expenses not covered above (List miscellaneous expenses on line 24e. If line 24e amount exceeds 10% of line 25, column (A) amount, list line 24e expenses on Schedule O.) | | | |
| a | SITE WORK PROGRAMS | 490,130. | 490,130. | |
| b | PROJECT SUPPLIES | 238,538. | 238,538. | |
| c | INTERNATIONAL REFORESTA | 53,132. | 53,132. | |
| d | DUES AND SUBSCRIPTIONS | 53. | | 53. |
| e | All other expenses | 15. | | 15. |
| 25 | **Total functional expenses.** Add lines 1 through 24e | 1,345,160. | 1,342,774. | 2,386. |

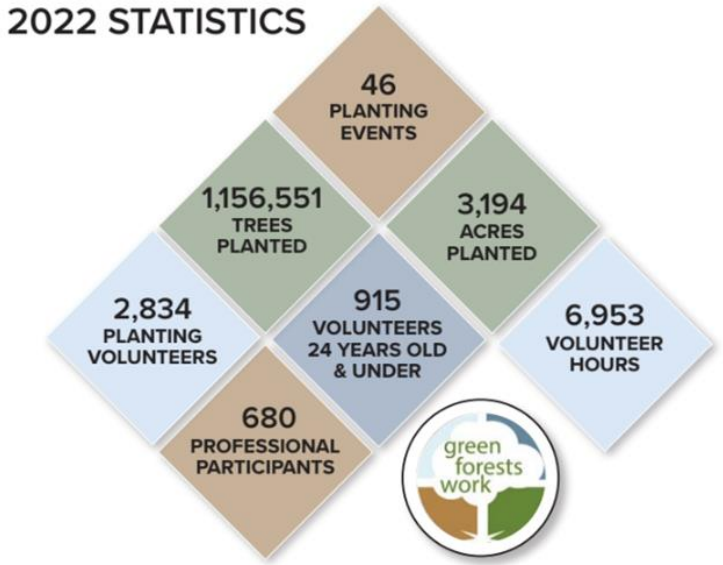
# Activities




- Areas of GFW supported restoration projects: Kentucky, Ohio, Pennsylvania, Virginia, West Virginia, Australia

- **Reforestation for Landowners:** reforesting acres of bond-released lands for landowners, taking from 6 months to 2 years
- **Reforestation Projects:** planting seedlings across 5 states by professionals and volunteers
- **Ecological Restoration Job Trainings:** partnering with US Forest Service & Appalachian Conservation Corps, encouraging college students and recent graduates to do conservation work
- **Partnering Research on Restoration Success:** researching on current restoration sites to evaluate reforestation success by graduate students from the University of Kentucky

# Outputs

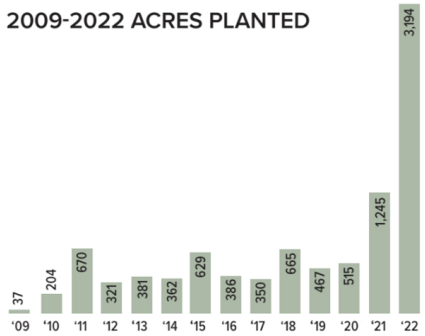




Quantifying GFW Annual Growth in 2022:

- 53% increase in number of Planting Events
- 300% increase in Planting Volunteers
- 150% increase in Acres Planted

Managerial and Operational Growths in 2022:

- New hire: the Director of Marketing and Communications was recently hired to assist in expanding portfolio of projects
- GFW is looking into hiring more foresters and interns as the increase in reforestation activities expands globally





By the end of 2022 planting season, GFW had **surpassed our previous largest annual totals for number of trees planted** and **acres restored**

# Outcomes | Key Performance Indicators

| KPI | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| Trees Planted | 259,305 | 401,728 | 318, 938 | 328,350 (by professional contractors) | 759,184 |
| Average Cost per Tree | $2.96 | $3.04 | $3.65 | $2.68 | $3.12 |
| Acres of lands planted | 349 | 665 | 466 | 515 | 1,277 |
| Numbers of planting events | 41 | 35 | 38 | 0 (by volunteers) | 30 |
| Numbers of planting volunteers | 1,132 | 1,679 | 2,377 | 0 | 578 |
| Pounds of Carbon Dioxide Absorbed | 12,446,640 | 19,282,944 | 15,309,024 | 15,760,800 | 36,440,832 |
| Other Commentary / Timeline of Operations | Marked the two millionth tree milestone | N/A | Projects: Daniel Boone National Forest (KY), Regional Conservation Partnership Program (OH), Monongahela National Forest (WV) | 1st global experiment on transferability of Forestry Reclamation Approach in Biloela, Australia | N/A |

# Impacts


Appalachian Mountains represent one of the **largest carbon sinks**, and **one of the most biologically diverse regions** in the world

- Carbon Emission
  - According to the Arbor Day Foundation, a mature tree will absorb more than 48 pounds of CO2 per year
  - Based upon the 1t.org carbon calculator, the 950,000 trees GFW planted in Appalachia would sequester **333,465 metric tons of CO2** over 50 years
- Economic
  - **5% decrease** in Appalachia's **unemployment rates** within 10 years
- Water quality
  - Forestry Reclamation Approach (FRA) can improve water quality by decreasing levels of pollutants in water discharged from surface mining sites
  - These changes in water quality can **improve the habitat for certain taxa**



https://www.thegiftedtree.com/how-to-improve-water-quality-by-planting-trees/
https://extension.psu.edu/the-role-of-trees-and-forests-in-healthy-watersheds
https://www.usda.gov/media/blog/2015/03/17/power-one-tree-very-air-we-breathe

# Charity Financials

# Sources of Inflows

- Sources of inflows
  - Direct Public Gifts and Grants
    - Corporate (28.4%) , Foundation (50.5%), Individual & Business (5.8%), Direct Public Support (3.3%)
  - Government Contracts
    - Federal Contracts (11.9%)
  - Investments
  - Miscellaneous (0.1%)

| Income | Proposed FY 2023 | Percent of Income |
|---|---|---|
| **Direct Public Gifts and Grants** | $ | % |
| Corporate Contributions | 679,448.00 | 28.4 |
| Foundation Contributions | 1,210,838.00 | 50.5 |
| Pass-through Contributions | - | - |
| Individual, Business Contributions | 138,450.00 | 5.8 |
| Direct Public Support - Other | 78,500.00 | 3.3 |
| In-kind Contributions | - | - |
| **Government Contracts** | | |
| Federal Contracts | 285,500.00 | 11.9 |
| State Contracts | - | - |
| **Investments** | | |
| Other Investment Revenue | 100.00 | - |
| **Other Income** | | |
| Miscellaneous Revenue | 2,500.00 | 0.1 |
| **TOTAL INCOME:** | 2,395,336.00 | 100.0 |

- Funders and amount
  - Corporate donors: Komatsu, Pisgah Banjo Company, Great Lakes Cheese, Arctic Express
  - Foundation supports: Arbor Day Foundation, American Forests, One Tree Planted, the National Fish and Wildlife Foundation, The Nature Conservancy, Mennen Environmental Foundation, the Sheldon and Audrey Katz Foundation

  - Many grants are tied to certain projects:

    National Fish and Wildlife Foundation grants are tied to certain regions or focal areas

    Cooperative agreements with the US Forest Service are tied to work within certain areas of the National Forests (e.g. the Mower Tract of the Monongahela National Forest, the Daniel Boone National Forest)

# Funding and Expense Details

- Program Expense Breakdown
  - Program Service: 39.1%
  - Site Work Programs 36.4%
  - Project Supplies: 17.7%
  - Others: 6.5%

| Expense | Proposed FY 2023 | Percent of Expenses |
|---|---|---|
| **Operations – Contract Services** | **$** | **%** |
| Accounting Fees | 15,000.00 | 0.6 |
| Legal Fees | 1,000.00 | - |
| Fundraising Fees | 1,000.00 | - |
| Insurance | 3,400.00 | 0.1 |
| Other Operations Expenses | 2,500.00 | 0.1 |
| | | |
| **Operations – General** | | |
| Postage and Shipping | 500.00 | - |
| Marketing and Advertising | 5,000.00 | 0.2 |
| Supplies, Equipment | 42,500.00 | 1.8 |
| Telephone and Communications | 2,200.00 | 0.1 |
| Travel, Conferences, Meetings | 3,000.00 | 0.1 |
| Salary and Fringe | 157,362.59 | 6.7 |
| | | |
| **Operations – Programmatic** | | |
| Salaries and Fringe | 171,155.37 | 7.3 |
| Travel and Meetings | 35,000.00 | 1.5 |
| Project Expenses | 1,925,236.00 | 81.2 |
| **TOTAL EXPENSES:** | 2,364,853.96 | 100.0 |

# Impact Calculations

# Social Return on Investment | Overview & Unit Economics

- The current method for calculating our social return on investment was to **quantify the carbon emissions reduction of each tree planted.**
- Due to studies for measuring ancillary benefits – i.e., air and water quality effects – requiring decades to measure results and hefty controls, there isn't much numerical data we can employ in order to understand the other effects.
- Part of the capital GFW receives will go to a data-tracking program that will optimally allow us to understand a lot of this space better.
- Below are some unit economics:

| Statistic / KPI | Metric / Figure |
|---|---|
| 2019 Contractor Costs / Acre | $2050 |
| 2023 Contractor Costs / Acre | $2200 |
| # of Trees in Planting Season | 950,000 |
| # of Necessary Person-Days (24 Man-Hours) | 1,500 |

Site contractors typically work from July / August – February. The work requires a crew of 2-3 operators and 12-40 workers.

# Social Return On Investment | Calculations

| Dollar Benefit - Carbon Capture | | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
|---|---|---|---|---|---|---|---|---|
| **Trees Planted Per Year** | | **1156551.00** | **1214378.55** | **1275097.48** | **1338852.35** | **1405794.97** | **1476084.72** | **1549888.95** |
| Carbon Tons Reduced By Singular Tree | | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 |
| **Carbon Tons Reduced By Annual Tree Cohort** | | **867413.25** | **910783.91** | **956323.11** | **1004139.26** | **1054346.23** | **1107063.54** | **1162416.71** |
| Dollar Cost of Carbon Ton on Agriculture | $ | 84.00 | $ 84.84 | $ 85.69 | $ 86.55 | $ 87.41 | $ 88.28 | $ 89.17 |
| Dollar Cost of Carbon Ton on Energy | $ | 9.00 | $ 9.09 | $ 9.18 | $ 9.27 | $ 9.37 | $ 9.46 | $ 9.55 |
| Dollar Cost of Carbon Ton on Mortality | $ | 90.00 | $ 90.90 | $ 91.81 | $ 92.73 | $ 93.65 | $ 94.59 | $ 95.54 |
| Dollar Cost of Carbon Ton on Sea-Level Rise | $ | 2.00 | $ 2.02 | $ 2.04 | $ 2.06 | $ 2.08 | $ 2.10 | $ 2.12 |
| **Composite Cost of Removing a ton of Carbon** | **$** | **185.00** | **$ 186.85** | **$ 188.72** | **$ 190.61** | **$ 192.51** | **$ 194.44** | **$ 196.38** |
| **Total Dollar Benefit of Annual Tree Cohort** | **$** | **160,471,451.25** | **$ 170,179,974.05** | **$ 180,475,862.48** | **$ 191,394,652.16** | **$ 202,974,028.62** | **$ 215,253,957.35** | **$ 228,276,821.77** |
| Discount Factor | | 1.00 | 1.08 | 1.17 | 1.26 | 1.36 | 1.47 | 1.59 |
| **Total Discounted Return Calculation** | **$** | **160,471,451.25** | **$ 157,574,050.05** | **$ 154,728,963.03** | **$ 151,935,245.64** | **$ 149,191,970.38** | **$ 146,498,226.47** | **$ 143,853,119.60** |

| **Total 20Y Benefit of Annual Tree Cohort** | **$** | **2,825,701,853.03** |
|---|---|---|

| **Control Panel - Income** | |
|---|---|
| 5.00% | Rate of Increase - Trees Planted Per Year |
| 1.00% | Rate of Increase - Dollar Cost on Agriculture |
| 1.00% | Rate of Increase - Dollar Cost on Energy |
| 1.00% | Rate of Increase - Dollar Cost on Mortality |
| 1.00% | Rate of Increase - Dollar Cost on Sea-Level Rise |
| 8.00% | Discount Rate |

| Dollar Cost - Charity Outflows | | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
|---|---|---|---|---|---|---|---|---|
| **Program Expense Spend** | **$** | **1,342,774.00** | **$ 1,395,788.52** | **$ 1,381,830.63** | **$ 1,368,012.33** | **$ 1,354,332.21** | **$ 1,340,788.88** | **$ 1,327,380.99** |
| Proportion of Program Expenses | | 99.82% | 98.82% | 97.82% | 96.82% | 95.82% | 94.82% | 93.82% |
| **Admin Expense Spend** | **$** | **2,386.00** | **$ 9,567.39** | **$ 9,615.23** | **$ 9,663.30** | **$ 9,711.62** | **$ 9,760.18** | **$ 9,808.98** |
| Proportion of Admin Expenses | | 0.18% | 0.68% | 1.18% | 1.68% | 2.18% | 2.68% | 3.18% |
| **Fundraising Expense Spend** | $ | - | $ 7,062.09 | $ 7,097.40 | $ 7,132.89 | $ 7,168.55 | $ 7,204.39 | $ 7,240.42 |
| Proportion of Fundraising Expenses | | **0.00%** | **0.50%** | **1.00%** | **1.50%** | **2.00%** | **2.50%** | **3.00%** |
| **Total Outflows** | **$** | **1,345,160.00** | **$ 1,412,418.00** | **$ 1,483,038.90** | **$ 1,557,190.85** | **$ 1,635,050.39** | **$ 1,716,802.91** | **$ 1,802,643.05** |
| Discount Factor | | 1.00 | 1.08 | 1.17 | 1.26 | 1.36 | 1.47 | 1.59 |
| **Total Discounted Return Calculation** | **$** | **1,345,160.00** | **$ 1,307,794.44** | **$ 1,271,466.82** | **$ 1,236,148.30** | **$ 1,201,810.85** | **$ 1,168,427.21** | **$ 1,135,970.90** |

| **Total 20Y Charity Outflows** | **$** | **21,624,645.10** |
|---|---|---|

| **Control Panel - Charity Outflows** | |
|---|---|
| -1.00% | Rate of Increase - Program Expense Proportion |
| -0.50% | Rate of Decrease - Admin Expense Proportion |
| -0.50% | Rate of Decrease - Fundraising Expense Proportion |
| 5.00% | Rate of Increase in Outflows |

# Social Return On Investment | Calculations

| Unit Economics | | |
|---|---|---|
| **Per Tree 20Y Benefit** | $ | 68.40 |
| **Per Tree 20Y Investment** | $ | 130.67 |
| | | |
| **SROI** | | |
| **Cumulative Total 20Y Benefit** | **$** | **2,825,701,853.03** |
| | | |
| Total Uncertainty Factor | | 1.00 |
| **Total Adjusted Return Calculation** | **$** | **2,825,701,853.03** |
| | | |
| **Cumulative Total 20Y Cost** | **$** | **21,624,645.10** |
| | | |
| **SROI** | | **130.67x** |

| SROI | Source | Cost of Carbon Ton | |
|---|---|---|---|
| 125.30x | Biden Administration | $ | 51.00 |
| 126.62x | EU Estimate | $ | 84.09 |
| 128.26x | EPIC Updated Price | $ | 125.00 |
| 130.67x | Nature Study - Full Price | $ | 185.00 |

# Relative Impact | Comparable Charities - TreeFolks

| Dollar Benefit - Carbon Capture | 2022E | 2023E | 2024E | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E |
|---|---|---|---|---|---|---|---|---|---|
| **Trees Planted Per Year** | 82000.00 | 86100.00 | 90405.00 | 94925.25 | 99671.51 | 104655.09 | 109887.84 | 115382.23 | 121151.35 |
| Carbon Tons Reduced By Singular Tree | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 |
| **Carbon Tons Reduced By Annual Tree Cohort** | 61500.00 | 64575.00 | 67803.75 | 71193.94 | 74753.63 | 78491.32 | 82415.88 | 86536.68 | 90863.51 |
| Dollar Cost of Carbon Ton on Agriculture | $ 84.00 | $ 84.84 | $ 85.69 | $ 86.55 | $ 87.41 | $ 88.28 | $ 89.17 | $ 90.06 | $ 90.96 |
| Dollar Cost of Carbon Ton on Energy | $ 9.00 | $ 9.09 | $ 9.18 | $ 9.27 | $ 9.37 | $ 9.46 | $ 9.55 | $ 9.65 | $ 9.75 |
| Dollar Cost of Carbon Ton on Mortality | $ 90.00 | $ 90.90 | $ 91.81 | $ 92.73 | $ 93.65 | $ 94.59 | $ 95.54 | $ 96.49 | $ 97.46 |
| Dollar Cost of Carbon Ton on Sea-Level Rise | $ 2.00 | $ 2.02 | $ 2.04 | $ 2.06 | $ 2.08 | $ 2.10 | $ 2.12 | $ 2.14 | $ 2.17 |
| **Composite Dollar Cost of a Carbon Ton** | $ 185.00 | $ 186.85 | $ 188.72 | $ 190.61 | $ 192.51 | $ 194.44 | $ 196.38 | $ 198.35 | $ 200.33 |
| **Total Dollar Benefit of Annual Tree Cohort** | $ 11,377,500.00 | $ 12,065,838.75 | $ 12,795,821.99 | $ 13,569,969.23 | $ 14,390,952.36 | $ 15,261,604.98 | $ 16,184,932.08 | $ 17,164,120.47 | $ 18,202,549.76 |
| | | | | | | | | | |
| Discount Factor | 1.00 | 1.08 | 1.16 | 1.24 | 1.32 | 1.40 | 1.48 | 1.56 | 1.64 |
| **Total Discounted Return Calculation** | $ 11,377,500.00 | $ 11,172,072.92 | $ 11,030,881.03 | $ 10,943,523.57 | $ 10,902,236.64 | $ 10,901,146.42 | $ 10,935,764.92 | $ 11,002,641.33 | $ 11,099,115.71 |

| **Total 20Y Benefit of Annual Tree Cohort** | $ 249,153,391.51 |
|---|---|

| **Control Panel - Income** | |
|---|---|
| 5.00% | Rate of Increase - Trees Planted Per Year |
| 1.00% | Rate of Increase - Dollar Cost on Agriculture |
| 1.00% | Rate of Increase - Dollar Cost on Energy |
| 1.00% | Rate of Increase - Dollar Cost on Mortality |
| 1.00% | Rate of Increase - Dollar Cost on Sea-Level Rise |
| 8.00% | Discount Rate |

| Dollar Cost - Charity Outflows | 2022E | 2023E | 2024E | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E |
|---|---|---|---|---|---|---|---|---|---|
| **Program Expense Spend** | $ 866,451.00 | $ 912,792.06 | $ 961,601.09 | $ 1,013,009.05 | $ 1,067,153.80 | $ 1,124,180.50 | $ 1,184,241.99 | $ 1,247,499.17 | $ 1,314,121.47 |
| Proportion of Program Expenses | 75.35% | 75.60% | 75.85% | 76.10% | 76.35% | 76.60% | 76.85% | 77.10% | 77.35% |
| **Admin Expense Spend** | $ 180,170.00 | $ 189,178.50 | $ 198,637.43 | $ 208,569.30 | $ 218,997.76 | $ 229,947.65 | $ 241,445.03 | $ 253,517.28 | $ 266,193.15 |
| Proportion of Admin Expenses | 15.67% | 15.67% | 15.67% | 15.67% | 15.67% | 15.67% | 15.67% | 15.67% | 15.67% |
| **Fundraising Expense Spend** | $ 103,286.00 | $ 105,431.79 | $ 107,533.95 | $ 109,582.75 | $ 111,567.59 | $ 113,476.95 | $ 115,298.34 | $ 117,018.17 | $ 118,621.74 |
| Proportion of Fundraising Expenses | 8.98% | 8.73% | 8.48% | 8.23% | 7.98% | 7.73% | 7.48% | 7.23% | 6.98% |
| **Total Outflows** | $ 1,149,907.00 | $ 1,207,402.35 | $ 1,267,772.47 | $ 1,331,161.09 | $ 1,397,719.15 | $ 1,467,605.10 | $ 1,540,985.36 | $ 1,618,034.63 | $ 1,698,936.36 |
| | | | | | | | | | |
| Discount Factor | 1.00 | 1.08 | 1.16 | 1.24 | 1.32 | 1.40 | 1.48 | 1.56 | 1.64 |
| **Total Discounted Return Calculation** | $ 1,149,907.00 | $ 1,117,965.14 | $ 1,092,907.30 | $ 1,073,517.01 | $ 1,058,878.14 | $ 1,048,289.36 | $ 1,041,206.32 | $ 1,037,201.68 | $ 1,035,936.80 |

| **Total 20Y Charity Outflows** | $ 22,735,186.37 |
|---|---|

| **Control Panel - Charity Outflows** | |
|---|---|
| 0.25% | Rate of Increase - Program Expense Proportion |
| 0.00% | Rate of Decrease - Admin Expense Proportion |
| 0.25% | Rate of Decrease - Fundraising Expense Proportion |
| 5.00% | Rate of Increase in Outflows |

| **Unit Economics** | |
|---|---|
| **Per Tree 20Y Benefit** | $ 85.06 |
| **Per Tree 20Y Investment** | $ 10.96 |
| | |
| **SROI** | |
| **Cumulative Total 20Y Benefit** | $ 249,153,391.51 |
| | |
| Total Uncertainty Factor | 1.00 |
| **Total Adjusted Return Calculation** | $ 249,153,391.51 |
| | |
| **Cumulative Total 20Y Cost** | $ 22,735,186.37 |
| | |
| SROI | 10.96x |

| **SROI** | **Source** | **Cost of Carbon Ton** |
|---|---|---|
| | Biden Administration | $ 51.00 |
| | EU Estimate | $ 84.09 |
| | EPIC Updated Price | $ 125.00 |
| | Nature Study - Full Price | $ 185.00 |

TreeFolks has planted over 3 million trees in Central Texas. Their reforestation projects are in the Bastrop and Austin areas.

- Per Tree 20Y Benefit: $ 85.06
- Per Tree 20Y Investment: $ 10.96
- 20 Y Benefit: $ 249,153,391.51
- 20Y Costs: $ 22,735,186.37
- **SROI: 10.96x**

# Management Engagement & Further Partnership

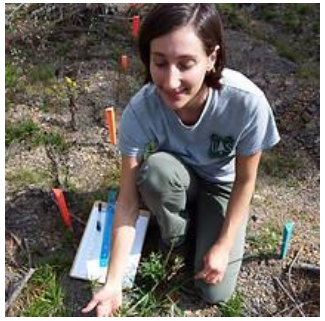
# Management Structure

## Chris Barton

**Founder & President**
Master in Soil Sciences from University of Kentucky

## Michael French

**Director of Operations**



## Anna Maria Branduzzi

**Reforestation Coordinator**
Previous Biological Science Technician in U.S. Forest Service

## May May Barton

**Director of Marketing & Communications**

# Charity Engagement

- GFW is very responsive and willing to provide many data requested within a short amount of time
- Their data is transparent, and their work has been supported by many scholastic articles
- In both qualifying calls, both experts in reforestation expressed that GFW is the only charity that plants trees in this large amount of scale in the region, indicating that GFW is the main go-to for reforestation projects in mine lands

# Charity Growth

## Future plans for growth

- High possibility for expanding new contacts and collaborating organizations during his time abroad
  - Chris Barton, President of GFW, was awarded a Fulbright Distinguished Scholar and is working with CSIRO in Australia for seven months in 2023 to expand upon the work that he started previously

- Looking to hire more staff for marketing, advertising, and communications
  - Like Foundation of America, GFW would love to have more staff for marketing and advertising and communications developing that brand recognition

- Build a model monitoring these plots helpful to carbon estimation
  - They are looking into installing monitoring plugs to measure trees on the ground to verify what is being seen through the remotes
  - If GFW build this model from the mind lens, it'll be in a super helpful in the future estimations and things of that nature remotely

# Appendix

# Contact History & Relevant Links

- Contact History
  - Nov. 17, 2022: First contacted GFW for MLD data and outstanding questions
  - Dec. 6, 2022: First Call with the Director of Operations, Michael French
  - Jan. 27 – Feb. 3, 2023: Updated charity for moving onto High Level, more data requested
  - Mar.10 – Mar. 15, 2023: Followed up with more outstanding questions
  - Apr. 13, 2023: Scheduled a final call with GFW
  - Apr. 17, 2023: Final informational call with the Director of Operations, Michael French
  - Apr. 20, 2023: 2 Qualifying Calls with Sara Fitzsimmons from the American Chestnut Foundation and Claudia Cotton from the Daniel Boone National Forest

- Links
  - Qualifying Call Notes
  - GFW Final Call Notes 0417


# The USIT Foundation

*usitfoundation.org | texasusit.org*

# The USIT Foundation

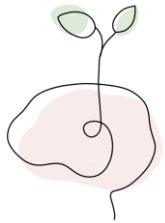
## *About the USIT Foundation*

The USIT Foundation is the 501(c)(3) parent organization of the University Securities Investment Team, the largest student-run investment fund at The University of Texas at Austin. Comprised of alumni who started their investing journeys with the team, the USIT Foundation works closely with student leadership in the contexts of investing, data science, and philanthropy.

The USIT Foundation supports and advises the USIT student organization and marshals and engages its alumni to promote personal and professional growth through active charitable giving. In Spring 2020, the alumni of the USIT Foundation initiated a philanthropic Giving Pledge to commit time and resources to better our communities.

## *Philosophy and Approach*

The USIT Foundation is committed to evidence-based philanthropy and continuously builds upon a model of effective, responsible capital deployment. In its months-long competitive annual process, the Foundation identifies and performs deep diligence, including client testimonials, data room modeling, and impact stress testing, on charities. In the 2022-23 academic year, the Foundation plans to provide $100,000 in donations to several charities that operate within the three observed impact verticals, with the initial donation opening the door for years-long engagement and follow-on investments.



### Education

Ensuring that students of all ages receive high-quality, equitable education while community members are properly supported.

### Justice & Opportunity

Breaking down systemic barriers to assist the reentry transition and reduce nationwide recidivism.

### Climate Change

Reducing emissions and waste to invest in a cleaner planet and higher quality of life for communities.

# Philanthropy Investment Team

## *History*

The Philanthropy Investment Team was formed in Spring 2020 at The University of Texas at Austin by request of the University Securities Investment Team (USIT) Foundation and Alumni Network, which wished to establish a partnership with the student organization to source charitable investment opportunities.

This fund generates ideas and performs diligence on charities that merit a donation with a value investing framework. Through the primary and secondary research of undergraduate Analysts, the Philanthropy Investment Team is developing a model of impact measurement, both for initial investment diligence and subsequent staged donations. Its funds are replenished yearly, comprising 1% of the total Annual Gross Income of the Alumni Network.

## *Portfolio Manager Contact*

Manu is a second-year undergraduate student studying Finance & Philosophy at UT Austin. He is passionate about climate change and the intersection between finance and altruism. For any questions, please contact him at mramineni@utexas.edu.

## *Junior Analyst Contact*

Vanessa is a second-year undergraduate student studying in Business Analytics at UT Austin. She is passionate about creating social impacts with entrepreneurial education. For any questions about this project, please contact her at van.117@utexas.edu