Tree planting programs, including urban forestry and reforestation programs, plant trees that sequester carbon dioxide from the environment. As human-induced global warming continues to change our environment, tree planting programs can partially offset carbon dioxide emissions from human activities.

The success of tree planting programs is captured in the outcome “years of personal carbon emissions offset.” This guide includes protocols for calculating carbon offset and the cost to do so.

This guide is appropriate for nonprofits of any size operating a program whose primary charitable activity is to plant trees, whether in cities or in forests across the world. The impact calculation uses data typically on hand already and does not require intermediate or advanced training in data analysis. The output of this exercise is an impact statement, e.g., $250 offsets one year of personal carbon emissions.

Resources

→ Use this [free template](#) to automatically calculate impact.
→ For more information, see the [impact methodology](#) for tree planting.

**About This Guide**

Impact is the change in social outcomes caused by a nonprofit’s program relative to the cost to achieve those outcomes. The Calculating Impact Series provides how-to guides for nonprofits to estimate impact using data generally already on hand. The series is based on ImpactMatters’ Methodology for Estimating Impact (M.E.I.).

**Calculating Impact Series**

<table>
<thead>
<tr>
<th>Audience</th>
<th>Comms, M&amp;E, program staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burden of data collection</td>
<td>Low</td>
</tr>
<tr>
<td>Required technical experience</td>
<td>Low</td>
</tr>
<tr>
<td>Companion materials</td>
<td><a href="#">Methodology Calculation Template</a></td>
</tr>
</tbody>
</table>
Impact Calculation Steps

1. Define the program (<10 minutes)
2. Gather program data (1-2 hours)
3. Calculate impact (<30 minutes using template)
   a. Estimate outcomes attributable to the nonprofit's program
   b. Count costs needed to achieve those outcomes
   c. Divide costs by outcomes to calculate impact
4. Communicate findings (1 hour)

1. Define the program

Identify the following:

- Name of the program
- Scope of the program. If there are multiple locations, it is acceptable to aggregate them into one equation or analyze them one at a time.
- Time period of analysis. Select a period with complete data on trees planted and completed financial statements.

2. Gather program data

Impact analysis of tree planting programs requires 6 data points, of which at least 3 are supplied by the nonprofit. Below is a list of the most important data points.

When collecting data, keep in mind:

- All data must match the chosen time period
- If missing or incomplete, data can be estimated
- Some data are standard values derived from research literature, government statistics or other organizations. This is indicated.
- Be prepared with the basics of the program: program activities, geography, beneficiary type, and timeframe.
## Data Required for Estimating Impact

<table>
<thead>
<tr>
<th>Data Point</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcomes Data</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Number of trees planted  
  **ID:** 03-007-01 | Use the total number of trees planted over the specified timeframe. | Nonprofit |
| Biome where trees are planted  
  **ID:** 03-007-02 | For reforestation: Select which of the 14 global biomes you operate in: (1) boreal, (2) montane grasslands; (3) temperate grasslands; (4) deserts; (5) temperate broadleaf; (6) tropical grasslands; (7) flooded grasslands; (8) temperate coniferous; (9) tropical moist forest; (10) Mediterranean forest; (11) tropical dry forest; (12) tundra; (13) mangroves; and (14) tropical coniferous.  
For urban forestry: Select the special “biome” option in the calculation template called “urban.” | Nonprofit |
| Carbon sequestered per tree  
  **ID:** 03-007-03 | If this data is not on hand, it is estimated from the research literature on the average amount of carbon sequestered over a tree’s lifetime by trees planted in whichever U.S. cities and 14 global biomes the nonprofit operates in. | Standard value |
| **Cost Data** | | |
| Total program costs related to tree planting  
  **ID:** 04-000-00 | Use total program costs related to tree planting, including costs paid out of pocket by volunteers. Include costs such as rent, purchased supplies and staff time. Exclude expenses incurred using in-kind donations, such as donated supplies and trees. Also, exclude fundraising and management expenses. | Nonprofit |
| Beneficiary costs  
  **ID:** 04-000-20 | Report beneficiary costs if they are substantial. They can be estimated at $0 if they are not substantial. Some nonprofits charge neighborhood residents a small fee for urban trees. Deduct this revenue from program costs, then add this revenue to beneficiary costs. | Nonprofit or standard value |
| Partner costs  
  **ID:** 04-000-10 | Report partner costs if they are substantial. They can be estimated at $0 if they are not substantial. | Nonprofit or standard value |

Learn more at impactmatters.org/nonprofit-center
3. Calculate impact

To calculate the impact of a tree planting program, divide the total program-related costs incurred by all cost-bearing parties (including the government and partner organizations) by the total number of person-years of carbon offset by the nonprofit’s trees. If using the calculation template, follow the instructions there and skip to the next section.

**Outcomes calculation**

\[
Outcomes = \frac{\text{(Number of trees planted} \times \text{Carbon sequestered per tree})}{\text{Carbon emitted by the average American in a year}} \times (1 - \text{Probability of displacement})
\]

**Number of trees planted**: Total trees planted by the program during the specified timeframe.

**Carbon sequestered per tree**: The amount of carbon sequestered per tree, measured in metric tons. Carbon sequestration rates differ by tree species. As a proxy for tree species, carbon sequestration rates are estimated based on the biome where a nonprofit plants trees. Use the 14 global biomes designated by the World Wildlife Fund. Biome-specific sequestration rates are estimated based on the research literature.

**Carbon emitted by the average American in a year**: Amount of carbon emitted by the average American in a year. Constant value of 18.6 metric tons, taken from the research literature. This value is used to convert the total amount of carbon sequestered into years of personal carbon emissions offset.

**Probability of displacement**: The percentage of trees that would have been planted even if the nonprofit did not exist (the “counterfactual” rate of trees planted). This is used to estimate the outcomes attributable to the nonprofit. Displacement is automatically calculated in the calculation template based on the assumption that displacement is more likely to occur the less available land there is for planting. This is modeled using an exponential decay function. The amount of available land is estimated based on the nonprofit’s planting location(s).

**Cost calculation**

\[
Cost = \text{Program Costs} + \text{Partner Costs} + \text{Beneficiary Costs}
\]

**Program Costs**: Direct expenses. Include costs such as rent, purchased supplies and staff time. Exclude expenses incurred using in-kind donations, such as donated supplies and trees. Also exclude fundraising and management expenses.
Calculating Impact Series  Tree Planting Programs

Partner Costs: Expenses incurred by partners to plant trees counted as outcomes. Estimated at $0 unless otherwise reported.

Beneficiary Costs: Include costs such as revenue from tree planting, making sure to remove the same amount from program costs to avoid double counting. Estimated at $0 unless otherwise reported.

Impact Calculation

Impact = Cost ÷ Outcomes

Apply a 5% discount rate to convert impact into current year values.

4. Communicate findings

Impact calculations are presented as an impact statement:

$250 offsets one year of personal carbon emissions.

At a minimum, accompany the impact statement with the name of the nonprofit. Space permitting, the following can be added:

- Program details (name, activities, beneficiaries served, geography)
- Outcome and cost data source and time period
- Method for attributing outcomes
- Outcomes, cost and impact calculations

Website

We recommend you post the impact statement on your website. Impact statements can accompany other program information, such as the number of people served, or be presented standalone on the home, program, impact or other relevant pages.

ImpactMatters Rating

If you have completed the impact calculation template, you may be eligible for an impact rating from ImpactMatters. Submit the spreadsheet here and ImpactMatters will be in touch: https://forms.gle/3N8feJsytTX3TR47E9

Learn more at impactmatters.org/nonprofit-center
GuideStar Platinum

GuideStar is a database of millions of organizations used by donors and nonprofit professionals. GuideStar awards seals based on transparency. This impact calculation can be used to attain GuideStar’s highest seal, Platinum. To do so, follow the steps below:

- Click “Update nonprofit profile” in the top menu. If you haven’t already gained access to your organization, click “Find and get approved” and follow the instructions. Then, click on your organization’s name to get started.
- To receive a Platinum seal, you must first complete the steps for Bronze, Silver and Gold. Follow GuideStar’s instructions for doing so.
  - When filling out the programs section of Bronze, make sure to create a program that matches the program or programs you used to calculate impact. Enter the details for the program, including the budget. We recommend including this note in the program description: “The impact of this program was calculated using ImpactMatters’ Methodology for Estimating Impact and reported through GuideStar’s Platinum Seal program.”
- On the Platinum screen, click “Add a new metric”. Search for “tree” and select the metric “Number of trees planted.” After selecting the metric, enter your result and add details, including totals by year and the locations planted. Select “Output” as the metric type.
- Complete your GuideStar Platinum level.

Example: One Tree Planted

<table>
<thead>
<tr>
<th>Program subtype:</th>
<th>Reforestation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program activities:</td>
<td>Planting trees in forests that have been depleted</td>
</tr>
<tr>
<td>Geography:</td>
<td>International</td>
</tr>
<tr>
<td>Beneficiaries:</td>
<td>General</td>
</tr>
</tbody>
</table>

Data was collected by reviewing nonprofit’s online documents, including their annual report and tax form 990.

We estimate the number of years of carbon emissions the nonprofit offsets by comparing the trees actually planted by the nonprofit to the trees that would have been planted in the absence of the nonprofit (the “counterfactual”). Some trees would have been planted even without the nonprofit, such as by the government or other nonprofits; these counterfactual successes must be netted out of the successes we observe. Otherwise, we would be attributing a change (carbon emissions offset) to the nonprofit when it would have happened anyway. Few nonprofits estimate the counterfactual themselves, so we construct our own counterfactual estimate based on research and publicly available data. We use the percentage of plantable
Calculating Impact Series  Tree Planting Programs

land left where the nonprofit works to calculate the probability of displacing the efforts of other organizations. We net out that change from the changes we observe to get a correct estimate of impact.

Outcomes calculation

\[
3,587 \text{ years of carbon emissions offset} = \frac{[(300,000 \text{ trees planted} \times 0.29 \text{ metric tons of carbon sequestered per tree}) / 18.6 \text{ metric tons of carbon emitted by the average American in a year}] \times (1 - 0.23 \text{ probability of displacement})}{18.6}\]

Cost calculation

\[
$201,255 \text{ total costs} = $201,255 \text{ program costs} + $0 \text{ partner costs} + $0 \text{ beneficiary costs}
\]

Impact Calculation

\[
$104 \text{ to offset one year of carbon emissions} = \frac{$221,913 \text{ total costs}}{2,127 \text{ years of carbon emissions offset}}
\]

5% discount rate has been applied to convert impact into current year values. Impact statement is rounded.

Impact: $100 offsets one year of personal carbon emissions.

Click [here](#) to see their full rating.

This guide was prepared by ImpactMatters, a nonprofit rating agency that helps donors find high impact nonprofits. ImpactMatters develops and disseminates resources, tools and guidelines to help nonprofits communicate impact. Learn more at impactmatters.org/nonprofit-center.

Direct feedback on this guideline to info@impactmatters.org.