FOREST CONSERVATION TARGETING TOOL (FCTT)
VERSION 1.3

INSTRUCTIONS

⚠ This document describes the functions of the FCTT. For a brief overview of underlying methods and data please see "Metadata," which can be downloaded from the FCTT dashboard. For new users, it will be helpful to read that document before reading this one.

Citing the FCTT: Blackman, A., L. Goff, J. Siikamäki and J. Chu. 2018. Forest Conservation Targeting Tool. Washington, DC: Resources for the Future.

Accessing the FCTT: The FCTT is available at: http://fc-targeting-tool.net, http://conservationroi.net and http://fctt.servirglobal.net

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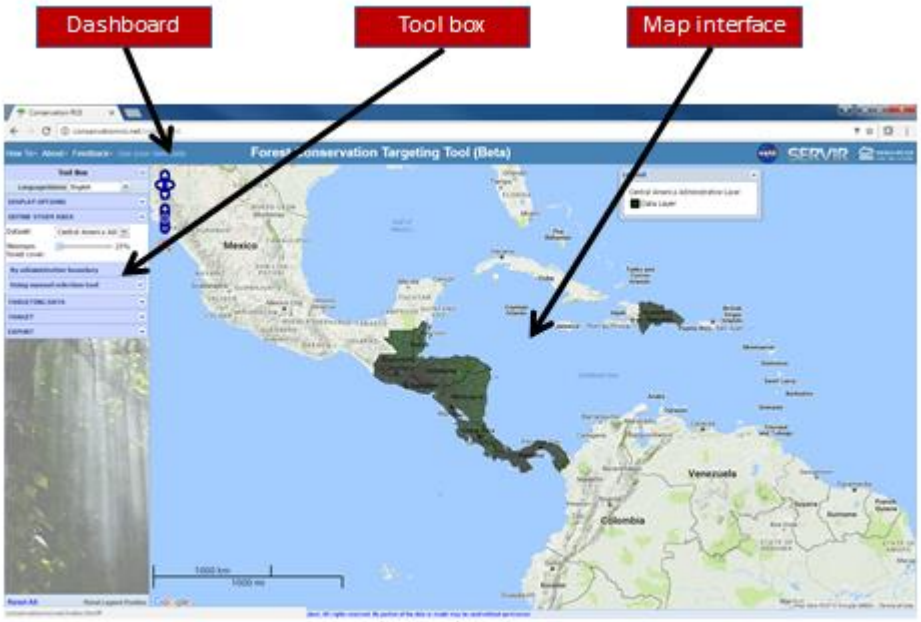
FOREST CONSERVATION TARGETING TOOL (FCTT) INSTRUCTIONS

The Forest Conservation Targeting Tool (FCTT) has three basic components, a Dashboard, a Tool Box, and a Map Interface.

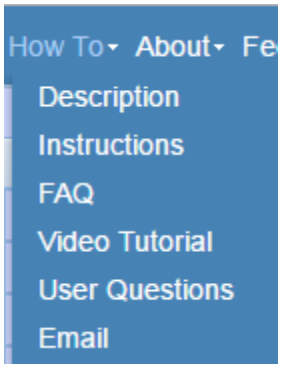


A. DASHBOARD

The Dashboard includes three pull-down menus that allow the user to choose the language the FCTT uses and that provide links to useful background and contact information. Note that the redundancy (e.g., contact information is included in several links) is intentional. In addition, the dashboard contains a portal that allows users to upload and use their own data layers.

A.1. HOW TO

The "How to" pull down menu features the following links



A.1.1. Description

Contains a document that provides a brief overview of the FCTT.

A.1.2. Instructions

Contains the document you are reading.

A.1.3. FAQ (under construction, to be added)

Contains a document with answers to frequently asked questions

A.1.4. Video Tutorial (under construction, to be added)

Contains a video tutorial on using the FCTT.

A.1.5. User questions

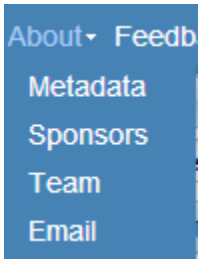
Contains a digital guestbook in which users can post questions about the FCTT. The FCTT team will check the guestbook periodically.

A.1.6. Email

Contains email address that can be used to contact the FCTT team: fc-targeting-tool@rff.org

A.2. ABOUT

The "About" pull down menu features the following links



A.2.1. Metadata

Contains a document that provides details on the FCTT's methods and data.

A.2.2. Sponsors

Contains information on the organizations that have provided funding for the development and maintenance of the FCTT.

A.2.3. Team

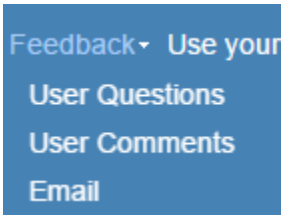
Contains a document with information on the team that built and is maintaining the FCTT

A.2.4. Email

Contains email address that can be used to contact the FCTT team: fc-targeting-tool@rff.org

A.3. FEEDBACK

The "Feedback" pull down menu features the following links



A.3.1. User questions

Contains a digital guestbook in which users can post questions about the FCTT. The FCTT team at RFF will check the guestbook periodically.

A.3.2. User comments

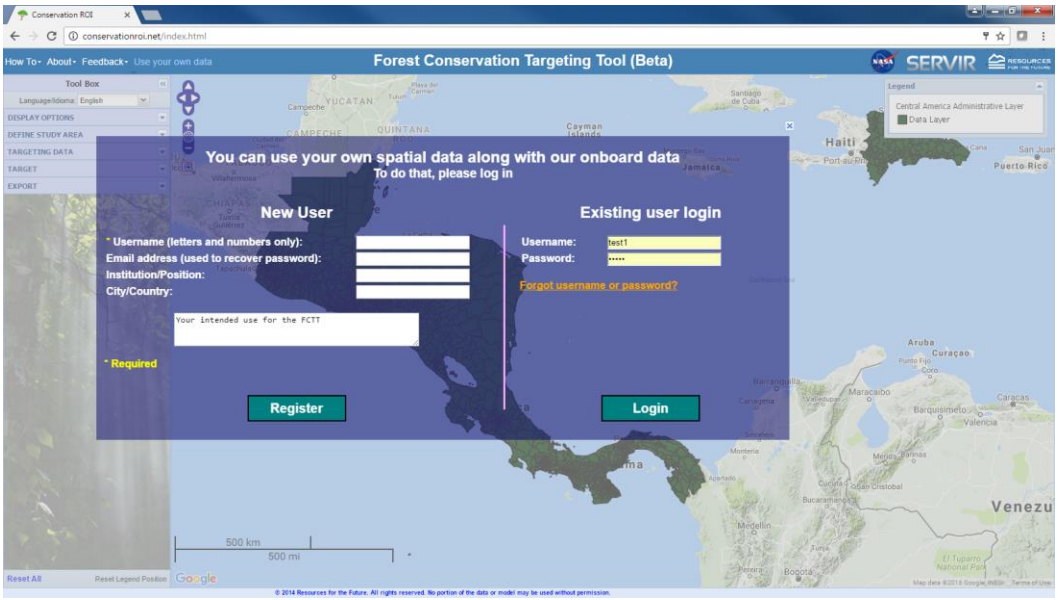
Contains a digital guestbook in which users can post comments about the FCTT. The FCTT team at RFF will check the guestbook periodically.

A.3.3. Email

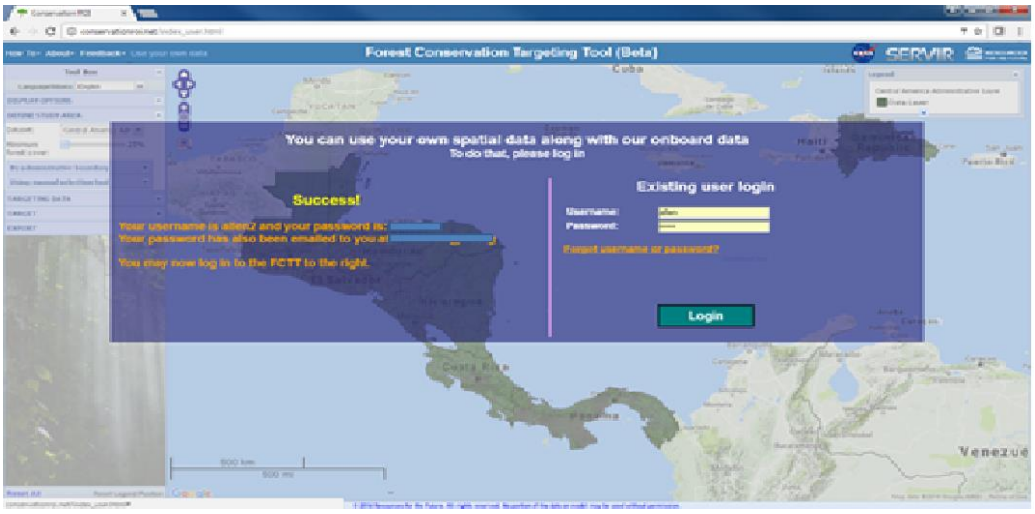
Contains email address that can be used to contact the FCTT team: fc-targeting-tool@rff.org

A.4. USE YOUR OWN DATA PORTAL

This tool allows users to upload and use their own data along with or instead of the FCTT's onboard data. Clicking on "Use your own data" launches the following pop-up box:

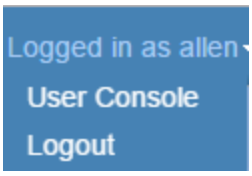


New users register by entering a Username, Email Address, Institution/Position, and City/Country. Only the Username is required. After clicking on "Register," FCTT will launch the following pop-up box that provides a randomly generated five-digit password in the left-hand panel, and automatically enters the Username and Password in the right-hand panel.



Clicking “Login” makes the above pop-up box disappear, and prepares FCTT to receive data. A new menu item appears on the dashboard titled “Logged in as [Username].” For existing users, entering a Username and Password in the “Existing user login” panel has the same effect.

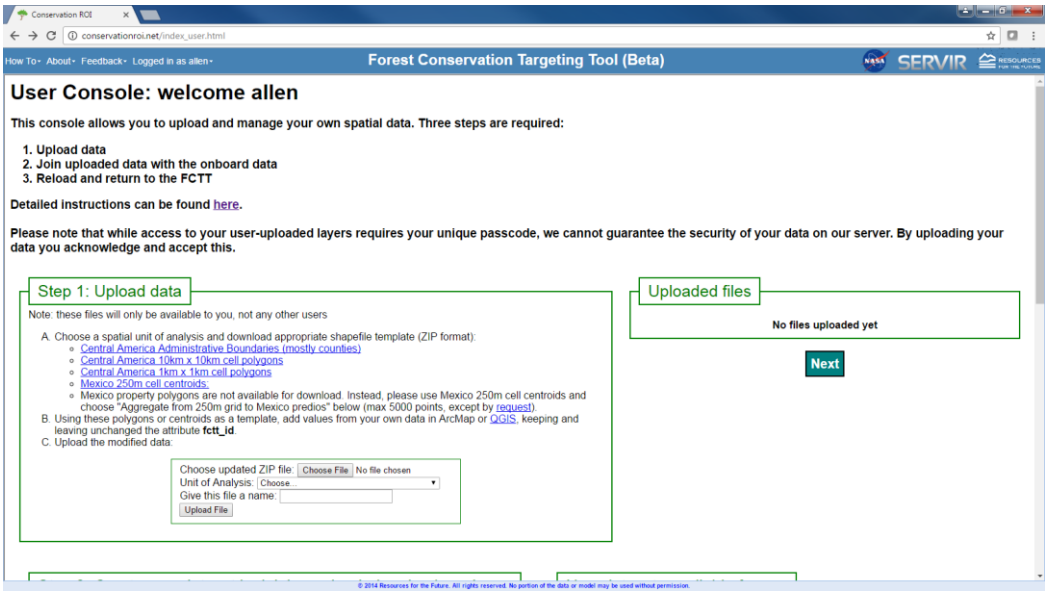
The next step is to click on the new dashboard item, “Logged in as [Username],” which is a pull-down menu with two options: “User Console” and “Logout.”

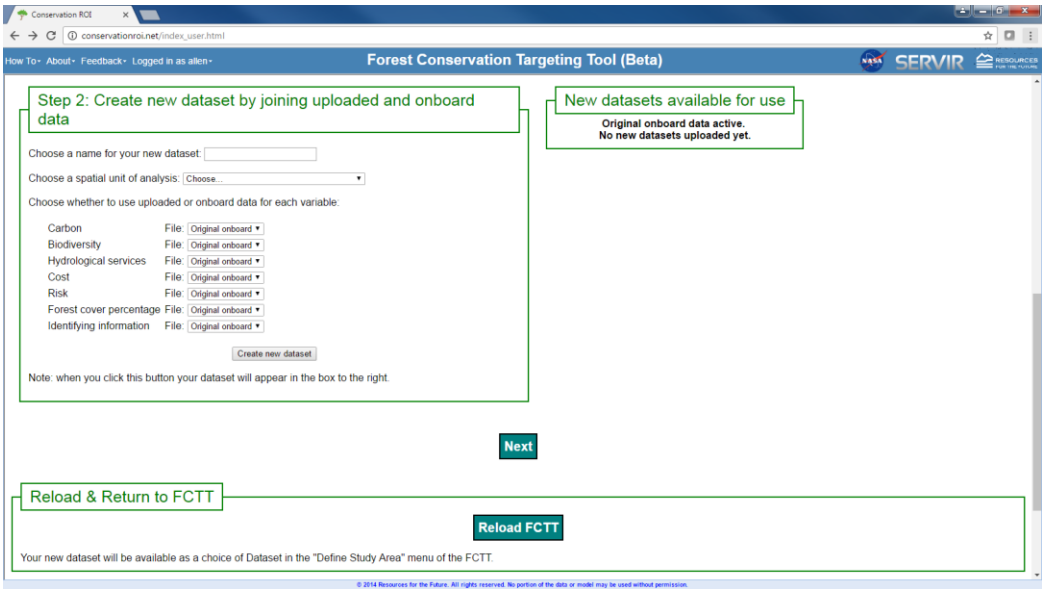


Clicking the “Logout” option logs the user out and displays the original dashboard. Clicking “User Console” restarts the FCTT session, and launches the User Console page, which allows users to upload and manage their own spatial data.

⚠ Clicking “User Console” restarts the FCTT session.

The User Console guides users through the process of uploading their data, step by step and therefore the instructions for using it will not be repeated here.





B. MAP INTERFACE

The Map Interface displays FCTT data and outputs. We explore these data and outputs below. Here, we briefly cover navigation within the interface.

FCTT navigation uses the same tools as Google Map, and should be familiar to anyone who has used that website.

B.1. PAN TOOL

The Pan tool allows the user to pan over the map horizontally or vertically

B.2. ZOOM TOOL

The zoom tool allows the user to zoom in or out. The globe button in the middle of the tool repositions the map to the default setting.

B.3. SCALE

The Scale tool displays distance in kilometers and miles.

B.4. LEGEND

The Legend displays information that helps interpret output displayed in the Map Interface. The information displayed depends on which tool is being used.

The default displays information about the Study Area and unit of analysis (both which are discussed below).

B.5. ALTERNATE MEANS OF PANNING

In addition to using the Pan tool, the user can pan by clicking and dragging the map.

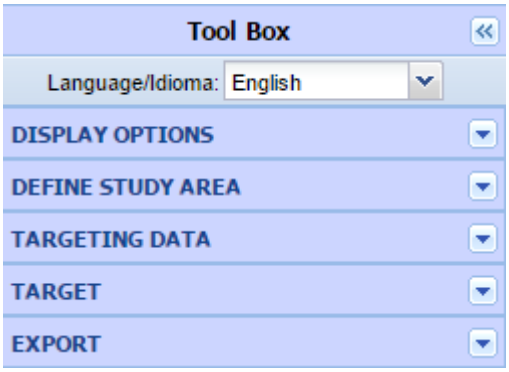
B.6. ALTERNATE MEANS OF ZOOMING

In addition to using the Zoom tool, the user can zoom using the scroll button on a the mouse.

⚠The interface only displays spatial units of analysis (discussed below) with at least 10% forest cover. These are displayed in green.

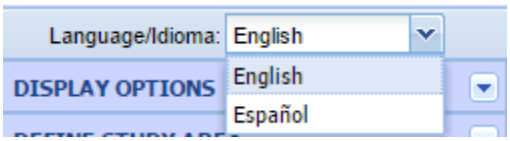
C. TOOLBOX

The Tool Box contains the following six tools, all but the first of which can be expanded or collapsed by clicking on the downward or upward pointing arrow on the right-hand-side of the tool.



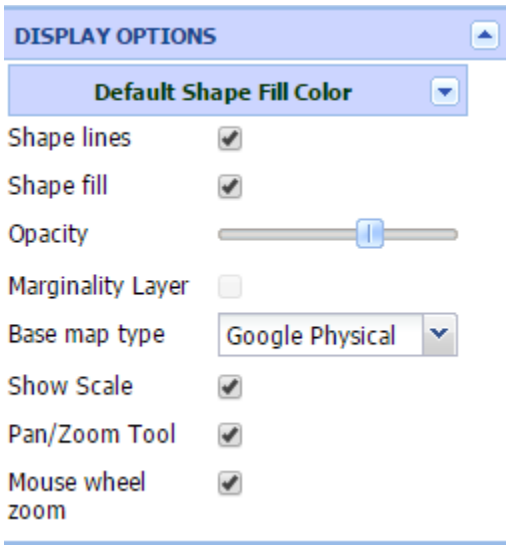
C.1. LANGUAGE

The language pull down menu allows the user to choose either English or Spanish.



C.2. DISPLAY OPTIONS

This set of tools allows the user to choose how data are displayed in the Map Interface.



C.2.1. Shape lines

When the Shape lines box is checked, FCTT displays boundaries around the units of analysis. Displaying these boundaries is particularly useful when the units are forest management units defined by cadastral data, as in Mexico. When spatial units are rectangular cells, this option is less useful. The default is to display shape lines.

C.2.2. Shape fill

When the Shape fill box is checked, FCTT displays forested units in green. The default is to display such units as green.

C.2.3. Opacity

An Opacity slider changes the opacity of the green colored units of analysis. The default is 65% opacity.

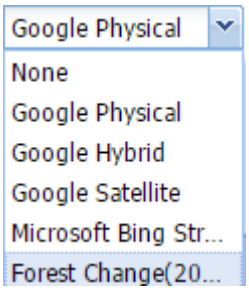
> ⚠ A lower level of opacity is useful for visualizing information in the base-layer such as terrain, roads and cities. A higher level of opacity is useful for visualizing the targeting data discussed below.

C.2.4. Marginality

(Mexico only) When the Marginality box is checked, FCTT displays data on marginality, a Mexican poverty index.

C.2.5. Base map type

A base-map pull down menu that allows users to select the base-map. Options are



C.2.5.1. None removes the base map altogether.

C.2.5.2. Google base maps (physical, hybrid, and satellite) contain the same information used in Google Maps including terrain, roads, rivers, city place names, etc. This information can be visualized by zooming.

C.2.5.3. Microsoft Bing StreetMap contains similar information

C.2.5.4. Forest change displays the University of Maryland (Hansen et al. 2013) 2001-2012 forest cover change map. The legend box contains a key to aid in interpreting the colors of the map.

C.2.6. Show scale

When the Show scale box is checked, FCTT displays the distance scale at the bottom of the Map Interface

C.2.7. Pan/ZoomTool

When the Pan/Zoom box is checked, FCTT displays the pan/zoom tool in the top left-hand-corner of the Map Interface.

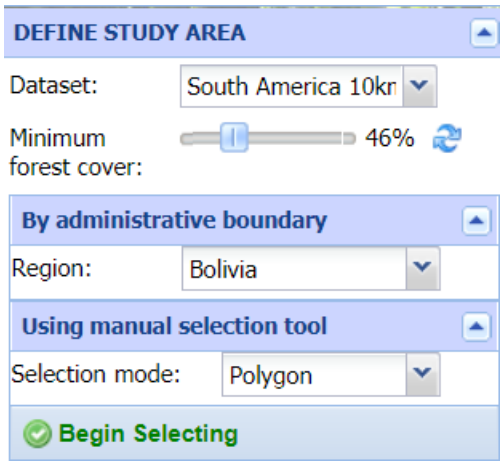
C.2.8. Mouse wheel zoom

Allows the user to zoom using the mouse wheel. The default is to allow that. Disallowing it can be useful when mouse wheel zooming is 'hypersensitive.'

C.3. DEFINE STUDY AREA

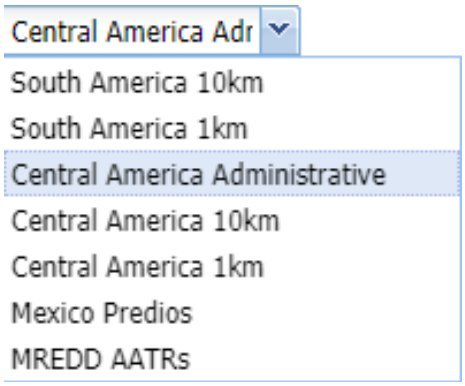
This tool allows the user to select (i) the country, set of countries, or regions within these countries where the FCTT will be applied along with spatial unit of analysis used in those places and (ii) the exact "Study Area" that is, the area in which the user wants to identify forests where conservation will generate the greatest bang-for-the-buck. This tool has the following components.

⚠ The FCTT's current geographic scope is all of Latin America (Mexico, Central America and South America) and the Dominican Republic.



C.3.1. Dataset

This pull-down menu allows the user to choose the country, set of countries, or regions within countries where the FCTT will be applied along with spatial unit of analysis used in those places. It contains the following choices



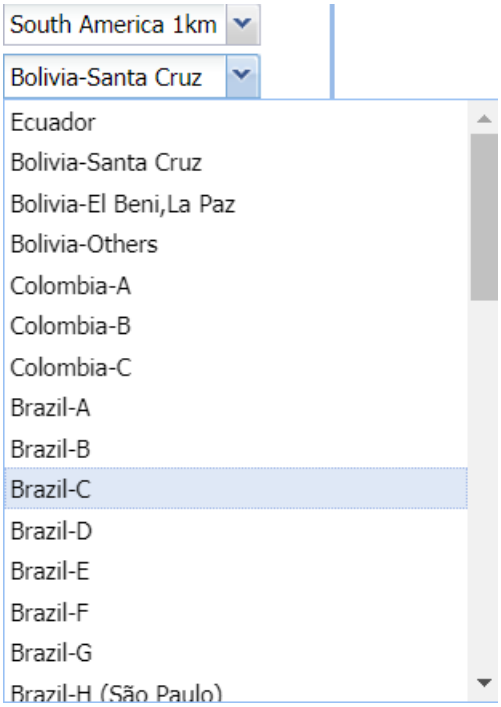
C.3.1.1. South America 10km

This dataset includes the twelve countries of South America and uses 10km cells as the spatial unit of analysis.

C.3.1.2. South America 1km

This dataset includes the twelve countries of South America and uses 1km cells as the spatial unit of analysis.

Given the large number of 1km cells in South America, this dataset is segmented: it is further divided into 47 "subdatasets" that are documented in the FCTT Metadata. When the user selects the South America 1km dataset, a subdataset pull-down menu appears, allowing the user to select a subdataset. For the smaller countries in South America, subdatasets are entire countries or aggregations of countries (e.g., Ecuador, Paraguay, Guyana+Uruguay). For larger countries, subdatasets are parts of countries (e.g., Colombia, Brazil, Chile, Peru).



⚠ South America 1km subdatasets are separate data files, and cannot be combined in the same analysis for targeting or visualizing Targeting Data. To combine 1km data from across multiple subdatasets, users can download the datasets from the User Console, combine then using GIS software, and upload them to the FCTT.

C.3.1.3. Central America administrative units

This dataset includes the eight countries of Central America and the D.R. and uses second-level administrative units as the spatial unit of analysis.

C.3.1.4. Central America 10km

This dataset includes the eight countries of Central America and the D.R. and uses 10km cells as the spatial unit of analysis.

C.3.1.5. Central America 1km

This dataset includes the eight countries of Central America and the D.R. and uses 1km cells as the spatial unit of analysis.

C.3.1.6. Mexico predios

This dataset includes Mexico only and uses predios—forest management units defines by cadastral boundaries—as the spatial unit of analysis.

C.3.1.7. MREDD AATRs

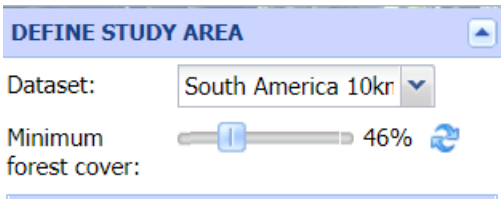
This dataset includes the six pilot sites defined by the USAID Mexico Reducing Emissions from Deforestation and Degradation (MREDD+) project and uses predios—forest management units defines by cadastral boundaries—as the spatial unit of analysis.

⚠ Selecting one of the datasets will load it into the FCTT and allow the user to visualize it in the Map Interface.

⚠ When a dataset is selected, the Map Interface automatically displays the relevant country, countries, or region.

C3.2. Minimum forest cover slider

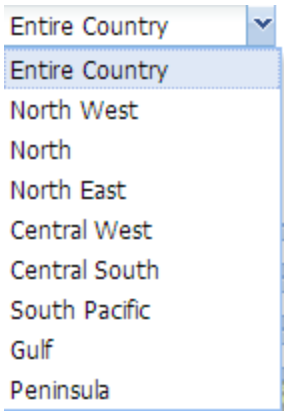
The minimum forest cover slider allows the user to limit the set of spatial units (10km cells, 1km cells, predios, or second-level administrative units) to those that had a certain percentage of forest cover in year 2000. For example, when10 km cells are the spatial unit of analysis, setting the slider to 46% would limit the spatial units used in the analysis to those with more than 46% forest cover. The default (and minimum) value is 25% forest cover. Two actions are required to change that default. The first is to move the slider, and the second is to click on the double arrows to the right of the slider.



C.3.3. By administrative boundary

This pull-down menu allows the user to use pre-existing administrative boundaries to select the area where the FCTT will be applied within the country, set of countries, or regions within countries selected using “Dataset” menu.

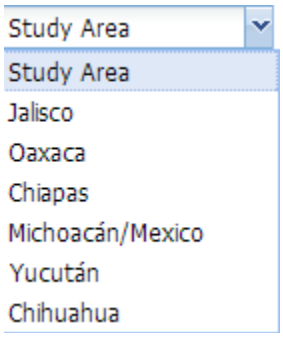
When the Mexico predios dataset is selected, the “by administrative boundary” pull-down menu contains the following choices



⚠ This menu allows the user to define a single region within Mexico as the Study Area.

⚠ When a region is selected, the Map Interface automatically zooms to it.

When the MREDD AATR dataset is selected , the "by administrative boundary" pull-down menu contains the following choices



⚠ This menu allows the user to define a single AATR within Mexico as the Study Area.

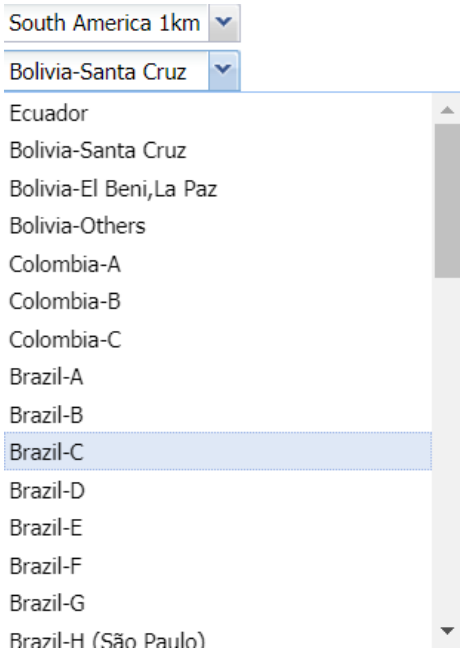
⚠ When an AATR is selected, the Map Interface automatically zooms to it.

When the Central America Administrative Boundaries, Central America 1km or the Central America 10km dataset is chosen, the "by administrative boundary" pull-down menu contains the following choices.

⚠ This menu allows the user to define a single country within Central America as the Study Area.

⚠ When a country is selected, the Map Interface automatically zooms to it.

When the South America 10km dataset is chosen, the "by administrative boundary" pull-down menu contains the following choices.



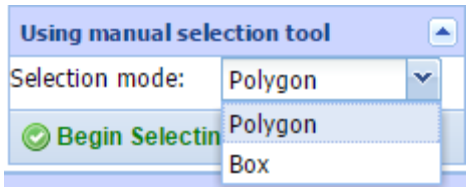
⚠ This menu allows the user to define a single country within South America as the Study Area.

As for the South America 1km dataset, and user defined layers:

⚠ The "by administrative boundary" tool does not work for the South America 1km dataset. To select subsets of the South America 1k dataset, users must use the "Subdatasets" pull-down menu which appears when South America 1km dataset option is chosen. The "by administrative boundary" tool also will not work for user-created datasets imported from the User Console.

C.3.4. Using manual selection tool

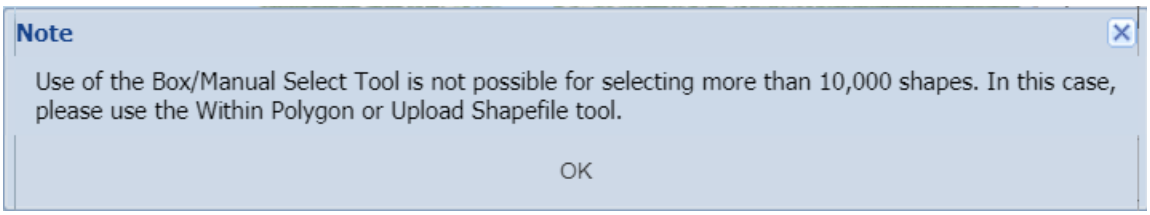
This tool allows the user to manually define a set of units of analysis that comprise the Study Area. FCCT allows users to do this in one of two ways, by selecting either the option "Polygon" or "Box" from the pull down menu in the "Define Study Area manually" tool.



⚠ The "Polygon" option defines a polygon that includes all units of analysis that intersect that polygon. The Study Area can be any size.

⚠ The "Box" option is used to define a Study Area that includes some contiguous units and excludes others. The Study Area must be smaller than 10,000 units. Therefore, it cannot be used to define relatively large Study Areas comprised of small units of analysis (e.g., more than 1000 1km cells)

⚠ For the 1km layers, either the manual selection tool or the "by administrative boundary" option must be utilized to limit the amount of data in memory. Otherwise, users will receive the below message:



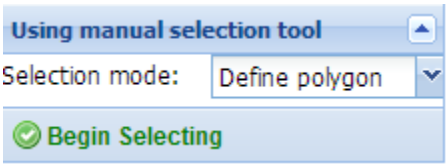
C.3.4.1. Polygon

This tool allows users to define a polygon that includes all units of analysis that intersect that polygon. The Study Area can be any size. The user defines the Study Area by sequentially selecting the vertices of the polygon. To use the tool:

1. In the Map Interface, pan and zoom to desired area.

2. In the "Selection mode" pull-down menu, select "Polygon."

3. Click on the "Begin Selecting" button. The pointer will change to a small circle icon. Position this icon over the first vertex of the polygon and click once. Repeat for each vertex except the final one. For the final vertex, double click. An orange polygon will appear that maps out the Study Area defined by the polygon.



4. In the "Study area manual select tool", a button will appear that reads "Submit to server"

   Clicking this button will define all units that intersect the polygon as the Study Area. As noted above, only units of analysis with more than 10% forest cover (displayed in green) are eligible.

5. To clear the manually created Study Area and define a new one, click "Clear/Cancel" in the "Define Study Area manually."

C.3.4.2. Box

As noted above, this option allows the user to define a Study Area that includes some contiguous units and excludes others. The Study Area must be smaller than 10,000 shapes. Therefore, this tool cannot be used to define large Study Areas using the 1km dataset. The user begins by selecting a box shaped area and then clicking on units of analysis to include or exclude them. To use the tool:

1. In the Map Interface, pan and zoom to desired area.

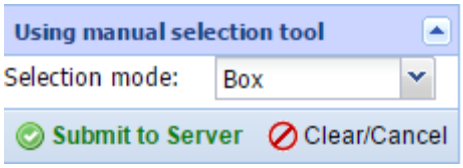
2. In the "Selection mode" pull-down menu, select "Box."

3. Click on the "Begin Selecting" button. The pointer will change to a small hand icon. Use it to draw a box by positioning it over the first corner of the box, and then click and drag to define the other corners. An orange polygon will appear that that maps out the Study Area defined by the box.

4. To add additional units to the orange Study Area (i.e., to turn green units orange), shift-click on them. They will turn orange. To add a new box of green units to the orange Study Area, shift-click and then drag.

5. To exclude orange units from the Study Area (i.e., to turn orange units green) control-click on them. They will turn green. To exclude a box of orange units from the Study Area, control-click and drag. The units in the box will turn green.

6. In the "Study area manual select tool", a button will appear that reads "Submit to server"



   Clicking on this button will define all units that intersect the orange area as Study Area. As noted above, only units of analysis with more than 10% forest cover (displayed in green) are eligible.

7. To clear the manually created Study Area and define a new one, click "Clear/Cancel" in the "Define Study Area manually."

C.4. TARGETING DATA

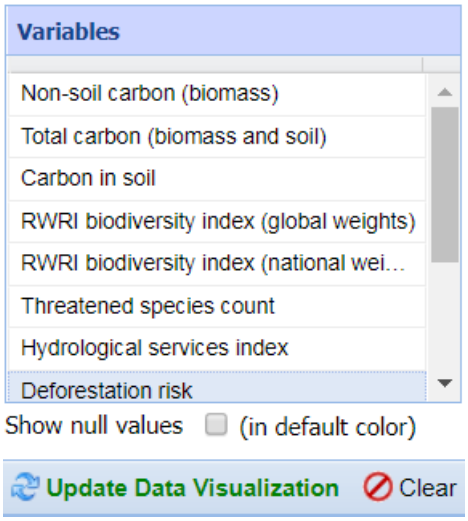
This tool displays the various types of data for each spatial unit of analysis that determine the bang-for-the-buck of forest conservation in that unit. We will refer to these data types as "variables."

C.4.1. Variables

⚠ The composition of the set of variables depends on the Study Area because data availability differs across Study Areas. The set of variables displayed in the pop-up box pictured below will adjust depending on the Study area. The largest set is for Central America (13 variables) and the smallest for Mexico (9 variables). The set of variables for Central America includes three forest carbon variables (above ground biomass, belowground biomass and total biomass) whereas the set of variables for Mexico and South America only include one such variable (total biomass). In addition, the set of variables for Central America includes two biodiversity variables (RWRI with global weights and RWRI with local national weights) whereas the other data sets only include one (RWRI with global weights).

This tool allows the user to select the variable displayed in the Map Interface. Two actions are required to display the data for a variable: first, click on a variable, and then click on the double arrow next to "Update Data Visualization."

C.4.1.1. Central America and the D.R. (13 variables)



These data are described in more detail in the metadata, available for download from the FCTT dashboard. Brief definitions follow.

Non-soil carbon (biomass) is the non-soil (biomass) carbon content of forests.

Total carbon (biomass and soil) is the non-soil *and* soil carbon content of forests.

Carbon in soil is the soil carbon content of forests.

RWRI biodiversity index (global weights) is the rarity weighted richness index of threatened species in a given spatial unit of analysis (cell, predio, administrative unit) where weights assigned to each species are the proportion of the total area of the species range globally in the unit.

RWRI biodiversity index (national weights) is the rarity weighted richness index of threatened species in a given spatial unit of analysis (cell, predio, administrative unit) where weights assigned to each species are the proportion of the total area of the species range nationally in the unit.

Threatened species count is a simple unweighted count of the number of threatened species.

Hydrological services index is an index of hydrological services provided by forests.

Deforestation risk is the average annual risk of forest loss.

Cost is the opportunity cost of conserving forests.

Percentage forest coverage is the percent of each spatial unit that was forested in year 2000.

Carbon (non-soil) expected benefit per cost is the expected benefit per dollar in each unit when the only forest ecosystem benefit is carbon.

Biodiversity (global RWRI) expected benefit per cost is the expected benefit per dollar in each unit when the only forest ecosystem benefit is biodiversity.

Hydro expected benefit per cost is the expected benefit per dollar in each unit when the only forest ecosystem benefit is biodiversity.

⚠ Selecting a variable from this menu and then clicking on the double arrow next to "Update Data Visualization" displays the variation in that variable across all units in the user-defined Study Area.

⚠ The "Clear" button at the bottom of the pull-down menu clears the variable display and returns the units in Study Area to green.

⚠ The "Show null values" check box at the bottom of the pull-down menu allow the user to identify spatial units of analysis for which underlying data for a given variable are missing.

⚠ A high level of opacity (see "Display options" tool) is best for visualizing targeting clearly.

C.4.1.2. Mexico (9 variables)

For Mexico, the variable list is shorter than for Central America. These data are described in more detail in the metadata, which is available for download from the FCTT dashboard. Brief definitions follow.

Carbon is the above-ground carbon content of forests.

Biodiversity is the rarity weighted richness index of threatened species in a given spatial unit of analysis (cell, predio, administrative unit) where weights assigned to each species are the proportion of the total area of the species range globally in the unit.

Hydrological services index is an index of hydrological services provided by forests.

Deforestation risk is the average annual risk of forest loss.

Cost is the opportunity cost of conserving forests.

Percentage forest coverage is the percent of each spatial unit that was forested in year 2000.

Carbon expected benefit per cost is the expected benefit per dollar in each unit when the only forest ecosystem benefit is above-ground forest carbon.

Biodiversity expected benefit per cost is the expected benefit per dollar in each unit when the only forest ecosystem benefit is biodiversity measured as a RWRI with global weights.

Hydro expected benefit per cost is the expected benefit per dollar in each unit when the only forest ecosystem benefit is biodiversity.

C.4.1.3. South America (10 variables)

For South America, the variable list is shorter than for Central America.

Carbon is the above-ground carbon content of forests.

RWRI biodiversity index *10^6 (global weights) is the rarity weighted richness index of threatened species in a given spatial unit of analysis (cell, predio, administrative unit) where weights assigned to each species are the proportion of the total area of the species range globally in the unit.

Threatened species count is a simple unweighted count of the number of threatened species.

Hydrological services index is an index of hydrological services provided by forests.

Deforestation risk is the average annual risk of forest loss.

Cost is the opportunity cost of conserving forests.

Percent forest coverage is the percent of each spatial unit that was forested in year 2000.

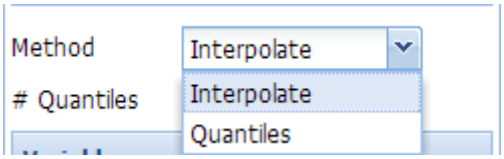
Carbon (non-soil) expected benefit per cost is the expected benefit per dollar in each unit when the only forest ecosystem benefit is carbon.

Biodiversity (global RWRI) expected benefit per cost is the expected benefit per dollar in each unit when the only forest ecosystem benefit is biodiversity.

Hydro expected benefit per cost is the expected benefit per dollar in each unit when the only forest ecosystem benefit is biodiversity.

C.4.2. Method

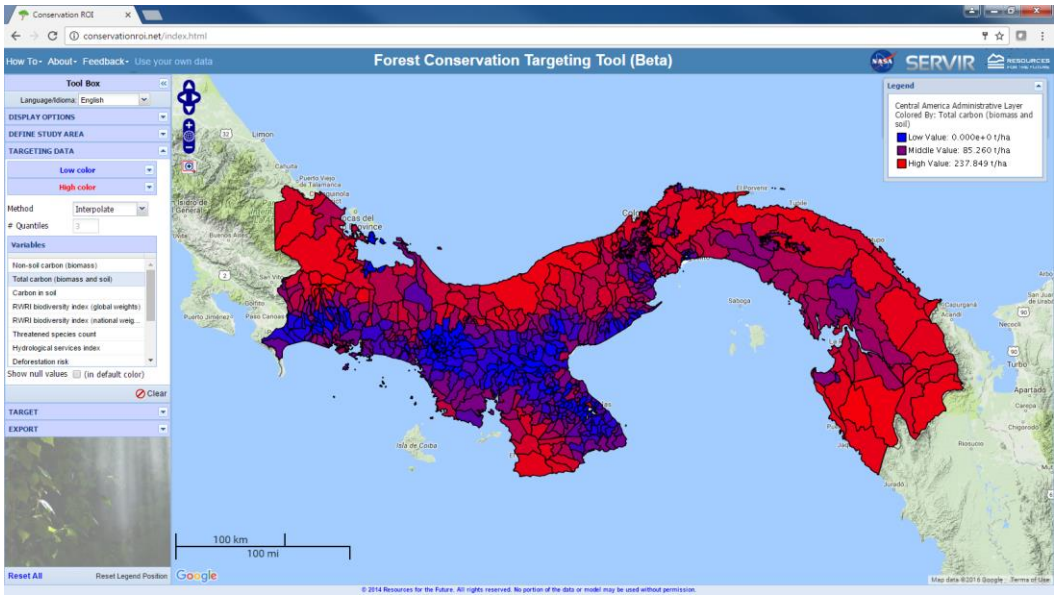
This pull down menu allows the user to control how variables are displayed in the Map Interface. There are two options:



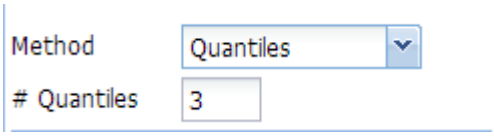
C.4.2.1. Interpolate

The Interpolate option displays minimum values in deep blue and maximum values in bright red and generates a range of colors in-between that correspond to values in-between the minimum and maximum. The legend displays the maximum and minimum values.

The screenshot below displays Total Carbon (biomass and soil) data for a Study Area comprised of all second-level administrative units in Panama using the interpolate option.



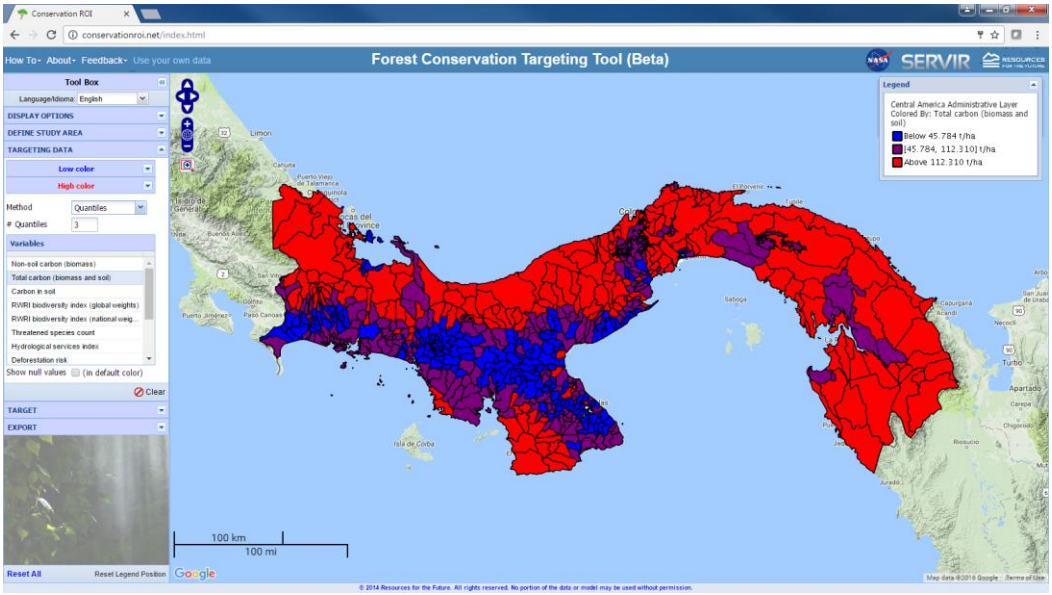
C.4.2.2. Quantiles



The Quantiles option displays values of the variable in quantiles, so that each quantile is assigned a different color. The user chooses the number of quantiles using the "# Quantiles" box. For example, when three quantiles are specified, the units with values in the lowest quantile are deep blue, units with values in the middle are in purple, and units with values in the highest quantile are in red.

The legend displays the ranges for each quantile.

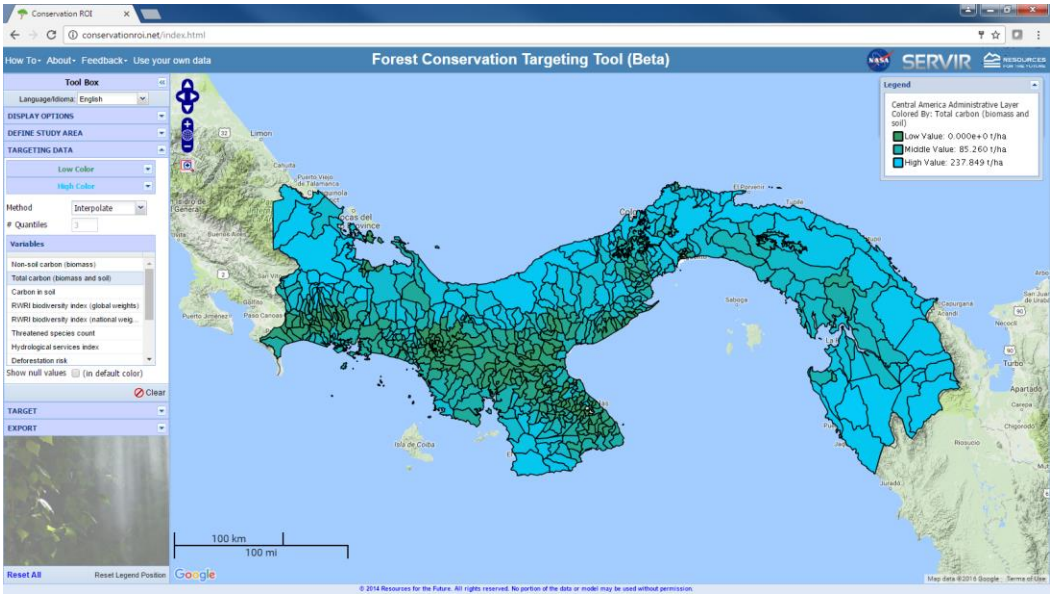
The screenshot below displays Total Carbon (biomass and soil) data for a Study Area comprised of all second-level administrative units in Panama using the three quantiles option.



C.4.3. Low color/High color

The low color and high color pull down menus all users to adjust the colors that represent low and high values

The following screenshot displays Total Carbon (biomass and soil) data for a Study Area comprised of all second-level administrative units in Panama using the interpolate option, when the low color is green and the high color is aqua.



C.4.4. Displaying detailed information for each unit of analysis

In addition to displaying spatial variation in targeting data in the manner described above, the user can display data by simply clicking on any unit in the Study Area. That unit is highlighted in orange and a pop up box appears with the value of each variable for that unit of analysis.

Feature Attributes

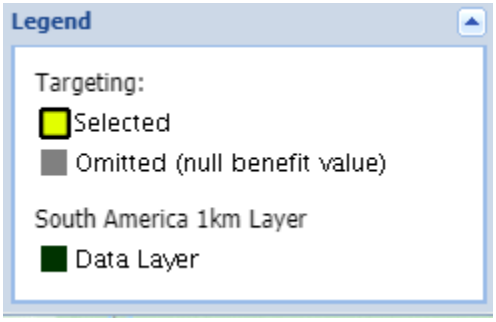
fctt_id: 1085

Name	Value
RWRI biodiversity index (global weights) (RWRI)	1.978
Threatened species count (#)	15.088
RWRI biodiversity index (national weights) (RWRI)	4.191
Non-soil carbon (biomass) (t/ha)	142.806
Carbon in soil (t/ha)	57.248
Total carbon (biomass and soil) (t/ha)	200.054
Cost (($ or pes)/ha)	275.660
Percent forest coverage (%)	93.945
Hydrological services index	1.062
Identifying information for unit	Country ISO code: 591, Administrati...
Deforestation risk (%)	0.001
Carbon (non-soil) expected benefit per cost	0.001
Biodiversity (glboal RWRI) expected benefit per cost	7.745e-6
Hydro expected benefit per cost	4.159e-6

C.5. TARGET

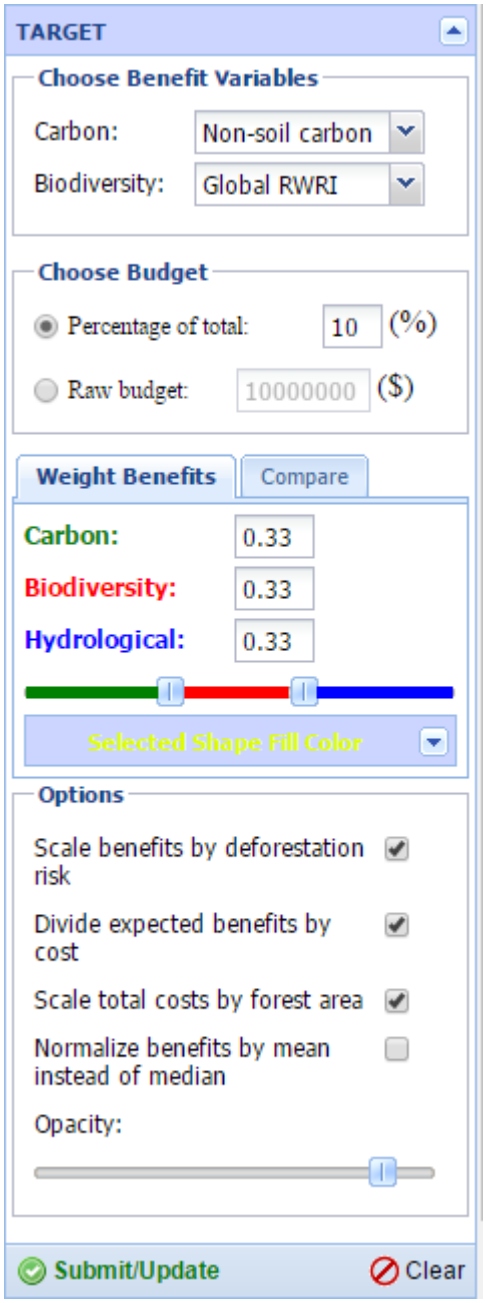
This is the FCTT's most important tool. It identifies those units in the Study Area that generate the greatest conservation bang-for-the-buck, and it compares the sets of units identified as generating the greatest bang-for-the-buck given different assumptions about the importance of the three forest ecosystem services (biodiversity, carbon and hydrological services).

⚠ Under the default choice of "Weight Benefits", the highest bang-for-the-buck units within the specified budget will be illuminated yellow, and indicated as "Selected" in the legend.



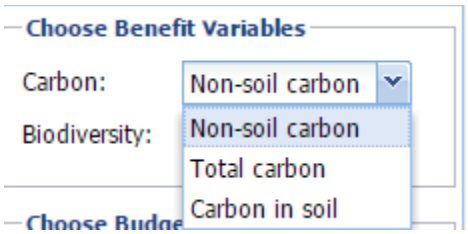
To display the highest-bang-for-the-buck units, the user must input four types of information about (i) which variants of carbon and biodiversity variables to use (ii) the conservation budget and (iii) the weights assigned to each forest eco-system service, and (iv) how to calculate the expected benefit per cost (EBC) index used to select spatial units of analysis. Each of these choices corresponds to a submenu in the Target tool. Below, we discuss each in turn.

⚠ Two of these choices are only available for Study Areas in Central America: (i) which variants of carbon and biodiversity variables to use; and (iv) how to calculate the expected benefit per cost (EBC) index used to select spatial units of analysis. For Mexico and South America, the carbon and biodiversity variables are those listed above, and the (EBC) index is calculated as per the metadata, which is available for download in the dashboard. Therefore, for Mexico and South America, the submenus corresponding to choices (i) and (iv) do not appear.

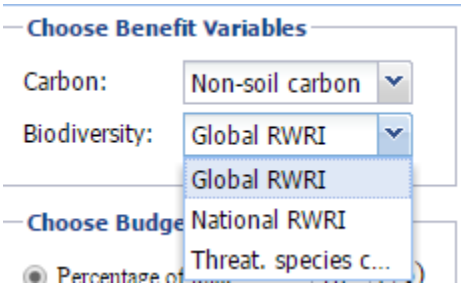


C.5.1. Choose Benefit Variables (⚠ Only available for Central America)

This submenu allows user to select the variant of carbon and biodiversity variable used to calculate the expected benefit per unit cost (EBC) variable. Users can choose from between three variants of the carbon variable: Non-soil carbon, Carbon in soil, and Total carbon.



Users can also choose between three variants of the biodiversity variable: Global RWRI, National RWRI, and Threatened species count.



C.5.2. Choose Budget

This tool allows the user to specify the forest conservation budget. This can be done in two ways: (i) by specifying a percentage of the grand total of the conservation costs for all units in the Study Area, or (ii) by inputting a raw budget.

C.5.2.1. Percentage of total

This option allows the user to specify the budget as a percentage of the grand total of the conservation costs for all units in the Study Area (defined by the variable Cost, discussed above). The default is 10%.

C.5.2.2. Raw budget

This option allows the user to input a budget. In Mexico, this monetary unit is pesos. In all other countries, it is US dollars.

C.5.3. Weight benefits

This tool allows the user to determine how much weight is assigned to each of three forest ecosystem services (carbon, biodiversity, and hydrological services) in calculating bang-for-the-buck. The user can do this in two ways.

C.5.3.1. Entering weights

The user can enter weights into the boxes next to each forest ecosystem service. The weights must be proportions (expressed using decimals) that sum to unity.

C.5.3.2. Using the slider

Alternatively, the user may use a slider tool. The horizontal extent of the slider represents unity. Each color represents the weight assigned to each forest ecosystem service: green represents carbon, red represents biodiversity, and blue represents hydrological services. Moving the buttons on slider changes weights assigned to each service. The numerical weights displayed above the slider are adjusted automatically.

The defaults weights are equal to one another, that is, 0.33 is assigned to each service.

C.5.4. Options

This tool allows users to adjust the formula for the expected benefit per cost (EBC) index used to select spatial units of analysis. As discussed in the Metadata, which are available for download from the FCTT dashboard, the formulae for EBC is,

$$EBC_p = R_p * \frac{B_p}{C_p}$$

where

p	indexes units
EBC	is expected benefit per dollar (or peso)
R	is deforestation risk
B	is total conservation benefit
C	is conservation cost.

and

$$B_p = \sum_j w^j \frac{B_p^j}{\boldsymbol{B^j}}$$

where

j	= (c, b, h) indexes the type of ecological benefits: carbon storage (c), provision of biodiversity habitat (b), and provision of hydrological services (h)
w^j	is a weight for benefit type
B_p^j	is benefit type j in unit p
$\boldsymbol{B}^j$	is the median values of the benefit j across all units within an study area.

The four check boxes allow users to adjust this specification as follows:

C.5.4.1. Scale benefits by deforestation risk

When the box is *not* checked, FCTT does not use deforestation risk to calculate EBC, so that it depends only on forest ecosystem benefits and conservation costs. EBC becomes

$$EBC_p = \frac{B_p}{C_p}$$

By default, this box is checked.

C.5.4.2. Divide expected benefits by cost

When the box is *not* checked, FCTT does not use conservation cost to calculate EBC, so that it depends only on deforestation risk and forest ecosystem benefits.. EBC becomes

$$EBC_p = R_p * B_p$$

By default, this box is checked.

C.5.4.3. Scale costs by forest area

When the box is *not* checked, FCTT calculates cost in a given spatial unit as the total opportunity cost (gross agricultural revenues) instead of total opportunity cost per hectare of forest, which is the default. By default, this box is checked.

C.5.4.4. Normalize benefits by mean instead of median

When this box is checked, FCTT uses mean, instead of the median to normalize each type of benefit. That is,

$$B_p = \sum_j w^j \frac{B_p^j}{\boldsymbol{B^j}}$$

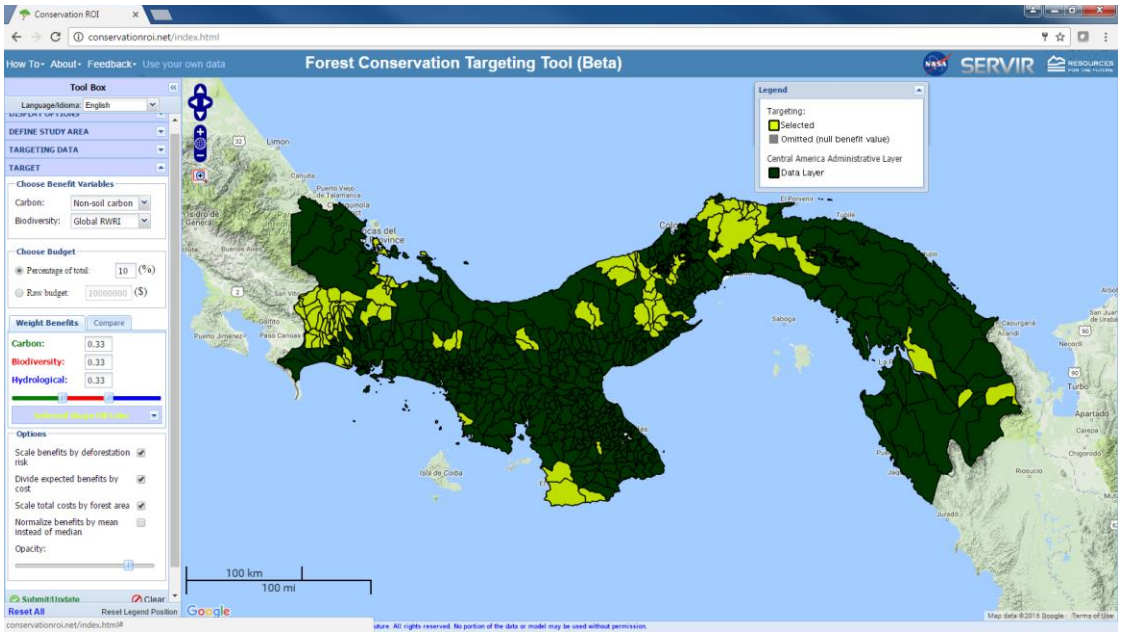
where

j	= (c, b, h) indexes the type of ecological benefits: carbon storage (c), provision of biodiversity habitat (b), and provision of hydrological services (h)
w^j	is a weight for benefit type
B_p^j	is benefit type j in unit p
$\boldsymbol{B^j}$	is the **mean** values of the benefit j across all units within an study area

C.5.5. Submit/Update

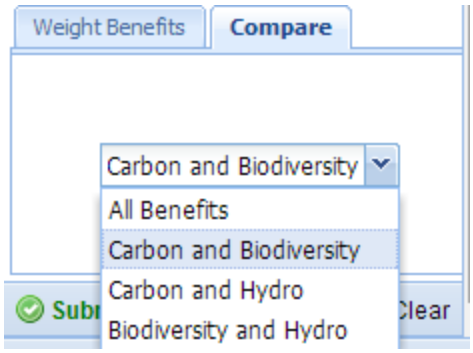
Once the user has chosen benefit variables (Central America only), a budget, benefits weights, and options for specifying EBC, clicking the "Submit/Update" button will identify those units in the Study Area where forest conservation will generate the greatest bang-for-the-buck. These units will be displayed in yellow and labeled in the Legend as "Selected."

The screenshot below identifies those second-level administrative units in Panama that generate the greatest bang-for-the-buck given default settings for benefit variables (non-soil carbon, global RWRI), a budget (10% of total opportunity cost), benefits weights (equal), and options for specifying EBC (scale benefits by deforestation risk, divide expected benefits by cost, scale total costs by forest area, and normalize benefits by median)



C.5.6. Compare

Clicking on the Compare option (in the Weight Benefits tool) allows the user to compare results generated when different weights are assigned to the three forest ecosystem services. FCCT generates maps that identify units selected under more than one weighting scenario, and those only selected under a single scenario.

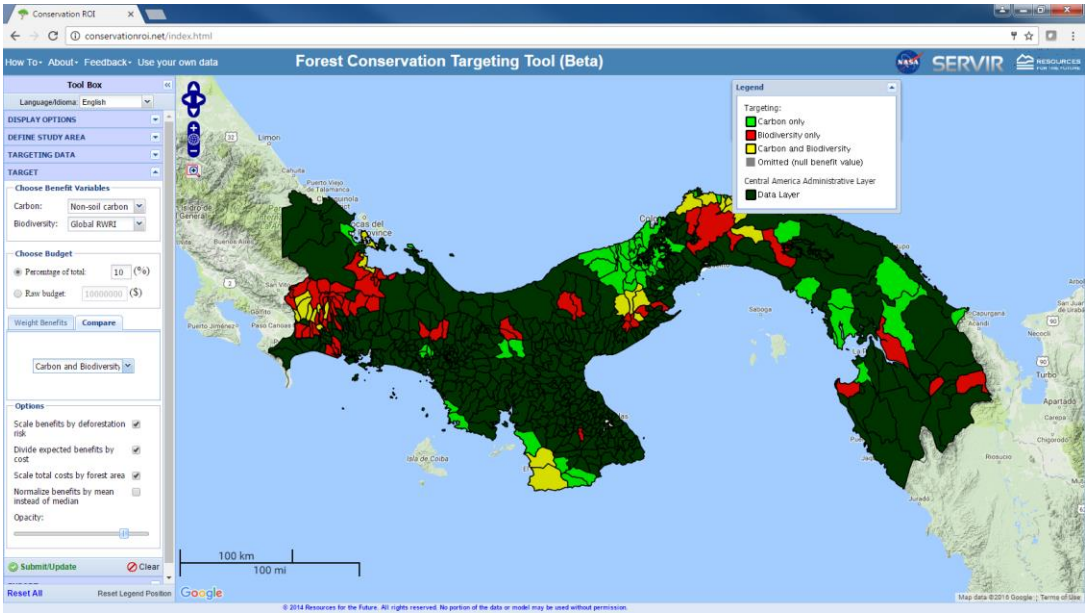


C.5.6.1. Carbon and biodiversity

This option compares units selected when (i) all weight is assigned to carbon versus (ii) when all weight is assigned to biodiversity. The legend explains the display:

- yellow units are selected regardless of whether all weight is assigned to carbon or to biodiversity;
- red units are selected only when all weight is assigned to biodiversity, but not when all weight is assigned to carbon; and
- orange units selected only when all weight is assigned to carbon, but not when all weight is assigned to biodiversity.

The screenshot below shows those second-level administrative units in Panama that generate the greatest bang-for-the-buck given various assumptions about weights.



C.5.6.2. Carbon and hydro

This option compares units selected when (i) all weight is assigned to carbon versus (ii) when all weight is assigned to hydrological services. The legend explains the display.

C.5.6.3. Biodiversity and hydro

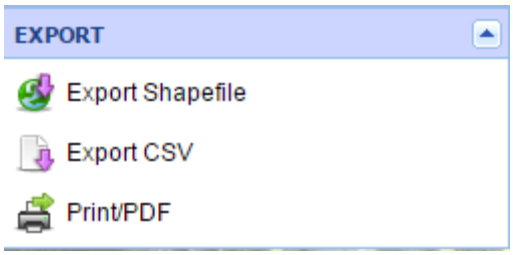
This option compares units selected when (i) all weight is assigned to biodiversity versus (ii) when all weight is assigned to hydrological services. The legend explains the display.

C.5.6.4. All benefits

This option compares units selected (i) when all weight is assigned to biodiversity versus (ii) when all weight is assigned to hydrological services, versus (iii) when all weight is assigned to carbon. The Legend explains the display.

C6. EXPORT

This tool allows users to export FCTT results in three different formats: (i) shapefiles, (ii) CSV, and (iii) pdf.



C6.1. Export shapefile

Clicking this option exports shapefiles for all spatial units in the defined Study Area. The attribute table for each shape includes the following data

Variable	Description
FID	spatial unit unique identifier code
fctt_id	spatial unit unique identifier code
carbon	value of carbon benefit (tons carbon per ha forest)
bio	value of biodiversity benefit (rarity weighted richness index)
hydro	value of hydrological services benefit (index)
risk	deforestation risk (probability)
cost	conservation cost (dollars or pesos per ha forest)
forarea	area spatial unit (ha)
shape_area_ha	spatial unit area (ha)
totalcost	total conservation cost for spatial unit
identifying_info	spatial unit identifying information (country, unit name)

carbon_norm	normalized value of carbon benefit (tons carbon per ha forest)
bio_norm	normalized value of biodiversity benefit (rarity weighted richness index)
hydro_norm	normalized value of hydrological services benefit (index)
scenario1	expected benefit per cost (EBC) when carbon has 100% weight
scenario2	expected benefit per cost (EBC) when biodiversity has 100% weight
scenario3	expected benefit per cost (EBC) when hydro has 100% weight
compositeecb	expected benefit per cost (EBC) given user-assigned weights
selected	TRUE if FCTT selected this unit give user-assigned weights
selected	TRUE if FCTT selected this unit when carbon has 100% weight
selected	TRUE if FCTT selected this unit when biodiversity has 100% weight
selected	TRUE if FCTT selected this unit when hydro has 100% weight
geom	always blank and can be ignored

C6.2. Export CSV

Clicking this option exports a CSV file. Each row corresponds to a spatial unit in the defined Study Area. Column include the same information listed above.

C6.3. Print/PDF

Clicking this option exports in pdf format, a screenshot of the display currently active on the map interface. A pop-up box appears that represents the pdf. Clicking “Create PDF” in the lower left-hand corner exports the pdf.

For example, clicking this option while displaying the map displayed in the figure above generates the pop-up box pictured below.