United States Agency for International Development
Cooperative Agreement No. EEM-A-00-06-00024-00

Global Climate Change:
Carbon Reporting Initiative

The AFOLU Carbon Calculator
User Manual

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WINROCK
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Putting Ideas to Work

USAID AFOLU CARBON CALCULATOR
USER MANUAL

Winrock International

November, 2013

This publication was produced for review by the United States Agency for International Development.
Prepared by Winrock International under the Cooperative Agreement No. EEM-A-00-06-00024-00.

USAID AFOLU CARBON CALCULATOR

USER MANUAL

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Cite report as:

Winrock International. 2013.The AFOLU Carbon Calculator. User Manual. Prepared by Winrock International under the Cooperative Agreement No. EEM-A-00-06-00024-00.

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1.0 BACKGROUND

Throughout the world, USAID land use and land management activities are having direct, significant and positive impacts on the climate. USAID's sustainable landscape programs help to mitigate climate change worldwide by increasing removals or decreasing emissions of greenhouse gases (GHG) from the atmosphere.

In cooperation with the USAID Global Climate Change team, Winrock International has developed a set of simple, user-friendly, web-based calculation tool titled the 'Agriculture, Forestry and other Land Use (AFOLU) Carbon Calculator'. This calculator is meant to give USAID Missions and partners an easy way to comply with USAID's policy of mainstreaming CO_2 as an Agency-wide results indicator. **The calculator produces one-year estimates of sequestration or avoided emissions of CO_2 using sound and transparent science. It also projects these benefits forward through time to assist in setting targets.** The calculator is not designed to provide the level of accuracy needed for carbon financing, but may provide an early indication of areas which have potential for such financing.

This manual is intended as a short reference guide to assist users in navigating through the AFOLU Carbon Calculator (ACC). As the website is currently undergoing major changes in design and several new tools are under development, this manual serves as a simple guidance document for the interim. The enhancements underway will make the ACC more comprehensive and intuitive.

2.0 APPLICABILITY OF THE AFOLU CARBON CALCULATOR

The ACC is designed to estimate emissions reductions and removals from many agriculture/forestry-related USAID project activities that directly impact how land is used or managed. Table 1 identifies activity types that USAID supports which the ACC currently covers. The table also provides examples of specific actions that might be undertaken in the activities and lists the appropriate ACC tool for estimating CO_2 impacts.

In the future, the ACC will include additional tools for calculating CO_2 impacts from supporting policy and capacity building programs, improving fuelwood collection practices, introducing improved cookstoves to reduce pressure on native forests, and even-aged forest management.

Table 1. Examples USAID project activities covered by the ACC

Activity Types Covered in ACC	Examples	Tool
Protecting Forests	- Creating new protected areas - Strengthening existing protected areas - Reducing community timber harvesting inside protected areas - Managing forest fires - Reducing illegal logging activities	Forest Protection
Managing productive forests	- Promoting reduced impact logging (RIL) and reducing the volume of timber harvested. - Extending rotation lengths - Stopping logging	Forest Management
Planting forests	- Reforesting degraded lands - Planting native species - Planting exotic species - Reforesting mangrove wetlands - Implementing agroforestry systems	Afforestation/Reforestation Agroforestry
Managing agricultural lands	- Diversifying agricultural and forestry yields through agroforestry - Improving livelihoods through agroforestry - Reducing or eliminating tillage - Altering type of fertilizer input - Reducing amount of fertilizer input - Modifying the flood regime of rice paddies	Agroforestry Cropland Management
Managing grazing lands	- Improve management of grasslands - Reducing the number of livestock - Altering the type of livestock managed - Rewetting organic soils	Grazing Land Management

3.0 STRUCTURE OF THE CALCULATOR

The ACC is designed for individual users or groups to estimate emissions reductions or removals from certain AFOLU project activities. The calculator uses a tiered approach where data requirements are minimal, but if more detailed information is available, the ACC allows users to override default data to produce more refined estimates.

Required Level A data inputs are minimal allowing users to estimate CO_2 impacts using built-in default data. Under Level A, the generation of CO2 impact estimates generally only requires that users enter the **area of the activity** and the **geographic location** of the project activity.

Advanced Level B data input options allow users to generate more refined estimates by overriding defaults and entering project-specific information. See annex 9.1 for the specific data parameters each tool allows users to override.

It is important to understand the scale at which the calculators function to ensure that the calculators are applied in the proper context. ACC tools for estimating CO_2 impacts of activities work at the resolution of **administrative units**, which could be states, provinces, or regions. Within each tool, default values are derived based on a unique profile of the local ecosystem within an administrative unit. All default parameters supplied in the calculators are the area-weighted average value across each administrative unit. Therefore, these values should not be misinterpreted to represent a specific geographic location for a given project within the administrative unit.

This approach was adopted because carbon benefits of AFOLU activities identical in size and scope may be different depending on geography and biophysical characteristics. By tying the calculators to geographical regions, an attempt has been made to reflect these variables allowing for a great deal of granularity while using commonly recognized organizational units. These organizational units are generally small enough to be meaningful but large enough to be practical for all the ACC tools.

The ACC user management structure is organized in a self-regulating system of users, groups, and projects. Users must register in order to use the ACC calculator, and in doing so, users have the option to request membership to one or more existing groups. If a user does not belong to any group upon registering, users can create a group at any time and become the group owner. Group owners can autonomously control and organize activities and projects reported by multiple users within the group.

Although users are not required to be part of a group to register, they must become part of a group to create projects and calculate CO2 impacts from project activities. Users own any project they create, and all projects must be associated with a specific group. This structure was developed to accommodate projects that involve multiple users and the fact that users may maintain multiple projects in different groups.

This organization allows users to freely access their projects, work together, and to limit access to project data. This system is managed by the users themselves without the need for regular active intervention by administrators. While this system is meant to be largely self-regulating, some

administrative intervention may be required. The AFOLU Carbon Calculator website administrators can help resolve issues by accommodating requests for changes and assisting users where necessary. Users can seek help at: help@afolucarbon.org

All activity related to the creation and modification of users, projects, and groups is logged and kept by ACC administrators. While administrators can perform modifications to groups and projects without requiring special permissions, they are currently limited to read-only access to project data including all database tables, project inputs, benefits, and user data.

4.0 GETTING STARTED

4.1 Register and log in

The ACC is located at www.afolucarbon.org

First-time users must register an account. Once registered, users may log in immediately.

FIRST TIME USERS

To register, first-time users should click on the Log in link in the left side navigation menu, which will direct them to the *Log In* page, shown in Figure 1. Clicking the Register link in the left side navigation menu will then prompt users to enter a first and last name, email address, and create a password. The password can be any combination of letters, numbers and symbols but must be less than 16 characters in total.

Figure 1: Login page

At this point, users also have the option to select a group from the dropdown menu and request membership. Group membership is not mandatory to register and users can create a group at any time.

Registration information is stored in a database of all registered users, and is an important part of how projects and users are organized within the calculator's user management framework.

REGISTERED USERS

Registered users can log in by clicking the Log In link on the home page, and when on the *Log In* page, enter their username, password and click the 'Submit' button.

In cases where users forget their password, passwords can be reset by clicking the Reset Password link in the left side navigation menu. Users will then be directed to page where they can enter their email address and click the 'Reset my password' button. Users will then be emailed instructions for resetting their password.

5.0 CREATE OR MANAGE A GROUP

After logging in, users will be directed to the *Projects* page which displays a dashboard listing their **projects** and **groups.** The left side navigation menu is also divided into these two categories.

5.1 Create a group

To create a group, users should select the Add Group hyperlink in the left side navigation menu under the *Groups* heading. Users will then be prompted to create a group name and fill in a short description.

5.2 Group administration

JOIN A GROUP

Selecting the All Groups hyperlink in the left side navigation redirects users to the *Groups* page which displays a table with all ACC registered groups, their descriptions, the number of projects under them, and the username of the group owner. Users may join a group by clicking the group's 'Join' button.

EDIT GROUPS AND MANAGE MEMBERSHIP

Selecting My Groups lists groups that the user either manages or belongs to. Clicking on the blue pencil icon (Figure 2), allows users to edit the group name, description, manage group membership, and invite new members. Users can delete any group that they own at any time, so long as they are the only member of that group, and if no projects other than projects that are solely associated with the user are contained in the group.

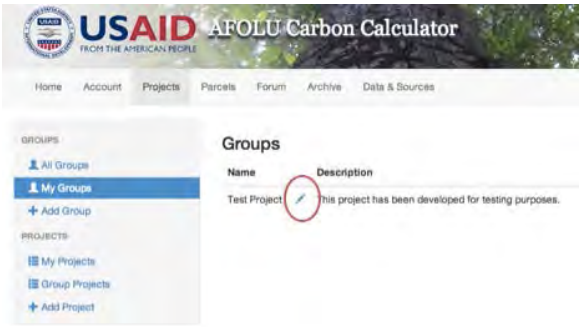

Figure 2 Blue pencil icon used to edit a Group circled in red.

Even if a user does not own a group, all group members may add new members. This is done by clicking the 'Add New Member' button and selecting users from the dropdown list of registered users. Members can be deleted and/or approved by checking the 'Approve' and 'Delete' boxes in the Memberships table. Changes to settings and member modifications must be saved by clicking the 'Save' button at the bottom of the membership table.

6.0 CREATE OR MANAGE A PROJECT

The ACC allows users to create projects with multiple activities. Thus, CO_2 impacts are based on activities within projects. While the ACC calculates CO_2 impacts from individual activities, it also aggregates the CO_2 impacts from all activities within a project to produce a total project CO_2 impact.

Before users use ACC tools to estimate the CO_2 impacts from activities, it may be useful review the Level A and Level B information parameters the different tools use. A summary of this information is located Annex 9.1.

6.1 Create a project

STEP 1: NAME THE PROJECT

To create a new project, users must select Add Project in the left side navigation menu. Users will then be prompted to name the project to give it a unique project identification code (Figure 3). This code will be used to identify the project and allow information to be saved and retrieved at a later date. There are no set rules for naming projects; it can be any combination of letters, numbers and symbols. Users are then asked to cite a corresponding USAID report (if available), select the group the projects are

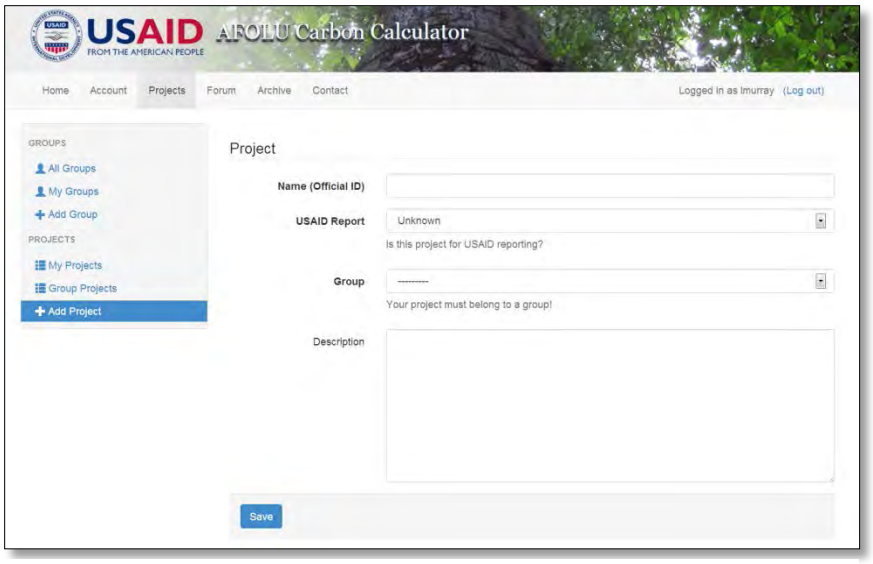

Figure 3: Adding a project activity

associated with, and provide a brief description.

STEP 2: ADD PROJECT ACTIVITIES

Once a project is created, an *Activities* heading will appear in the left side navigation menu. By selecting Add Activity, users can create an activity, name it, and choose the activity type from the dropdown menu that corresponds to the tool that will be used to estimate CO_2 impacts for that activity.

STEP 3: ENTER AREA

Users must enter the total area that their activity covers. In the Grazing Management and Croplands Tools, there are opportunities to further define the area of which specific activities are taking place over (e.g. area of organic soil being rewet). However, for the other tools, this is the only chance to specify the area.

STEP 4: SELECT PROJECT ACTIVITY LOCATION

ACC tools for estimating CO_2 impacts of activities work at the resolution of **administrative units**, which could be states, provinces, or regions.

When selecting the administrative unit an activity is taking place in, users have two options: (1) select from the **dropdown menu** underneath the interactive map; (2) zoom into the area of interest on the **interactive map** and click on the administrative unit (Figure 4). These two options are provided to allow flexibility for users who are operating under various circumstances.

Dropdown menu

The dropdown menu lists countries in alphabetical order, followed by their administrative units (also listed in alphabetical order). This option requires less bandwidth, and thus may be a better option for users with slower internet connection (i.e. dialup). If a user starts typing in the box it will start filtering the list below, based on either the name of the country or admin unit.

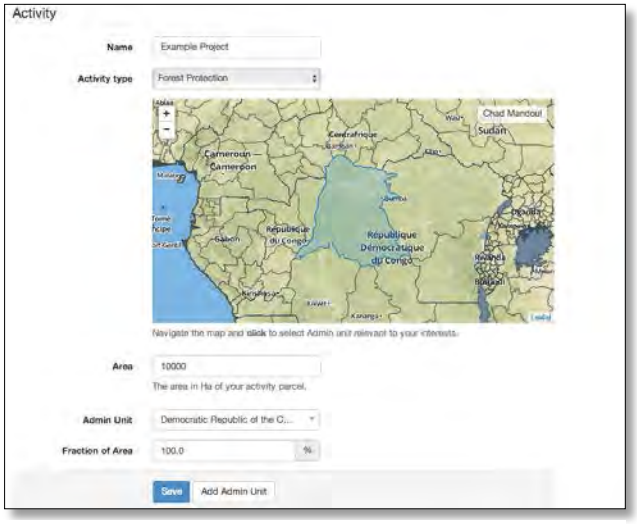

Figure 4 Interactive administration unit selection map.

Interactive Map

While the map requires higher bandwidth, it provides an advantage for users who can identify the location of the activity on a map, but may not know the specific name of the administrative unit. To locate an administrative unit, users can either use their computer mouse to click and hold the map to move it around and zoom in using the scroller on the mouse, or users can click the arrows in the top left side of the menu to move the map and zoom in and out by clicking the plus and minus symbols. Using a computer mouse, users should then hover the cursor or arrow over the administrative unit of interest and click on it. Its border will then be highlighted in blue indicating that the administrative unit has successfully been selected (Figure 4). If a user has selected the incorrect administrative unit, \ simply selecting another administrative unit will deselect the incorrect one.

If activities occur in more than one administrative unit, users can click 'Add Admin Unit' and make another selection following the process described above. The user must then allocate the fraction of area between the selected administrative units, ensuring the total is 100%.

STEP 5: ENTER PROJECT DATA

All tools function on two levels: **Required Level A** and **Advanced Level B**. Level A was designed to derive a CO_2 benefit using minimal user input. Under Level A, the information required to generate a CO_2 impact result is minimal and, in addition to the project area information already provided, often only requires **the selection of an activity**, and in some tools, the **effectiveness rating.**

The **'Effectiveness Rating'** is parameter evaluating how effective the project has been at achieving its stated goals. The effectiveness rating is determined by selecting the 'Guide' button and answering a few simple questions (mostly yes/no answers). If a project is rated as 100% effective, then the calculations will be unaltered. However, if a user rates the project as less than 100% effective, then calculated benefits (at 100% effective) will be adjusted downwards accordingly. For example, if project benefits are 1000 t CO_2 at 100% effectiveness, but a user rates the project's management effectiveness at only 25%, then the adjusted CO_2 benefit of the project for that year becomes 1000 x 0.25 = 250 t CO_2. Users can override the estimated effectiveness rating with their own estimates based upon justification of such modification.

If the user has more detailed activity-specific information, he/she can choose to override default values by clicking on the Advanced Level B box and expand it to view the Advanced Level B data parameters. Clicking the black triangle in the top left side of the box again will compress it to its original state.

If default values are overridden by entering data for Advanced Level B, users are encouraged to enter information about what was changed in the 'Notes' field at the bottom of the Level B box. This text will be saved along with the activity data so that users can keep track of what inputs, input sources, or what default values were not altered.

STEP 6: VIEW RESULTS

After activity information is entered, results can be viewed by clicking the 'Calculate' button at the bottom of the page. The calculated benefit will appear in a blue box on the left side of the page and users may modify inputs and recalculate benefits if they wish. When the 'Save' button is clicked, the calculator will generate a summary page that displays the benefits for the following:

i. Up to current year (if the project has been entered in previous years, or started in the past)
ii. Yearly for the next 4 years
iii. Cumulative up to 5 years
iv. Cumulative up to 10 years
v. Cumulative up to 20 years
vi. Cumulative up to 30 years

Users are allowed to edit any saved project activity and modify data to make corrections. If the user presses the 'report' button on the project page they will no longer be able to edit activities within that project. Although not currently available, an option to 'print PDF' is planned which will allow users to print or save an automatically generated summary of the CO_2 impacts generated by the project and its activities.

6.2 Project administration

Under the 'Projects' category in the left side navigation menu, users can review and manage projects by selecting My Projects. By clicking the blue pencil icon to the right of the table (Figure 5), users can edit project information and assign them to groups.

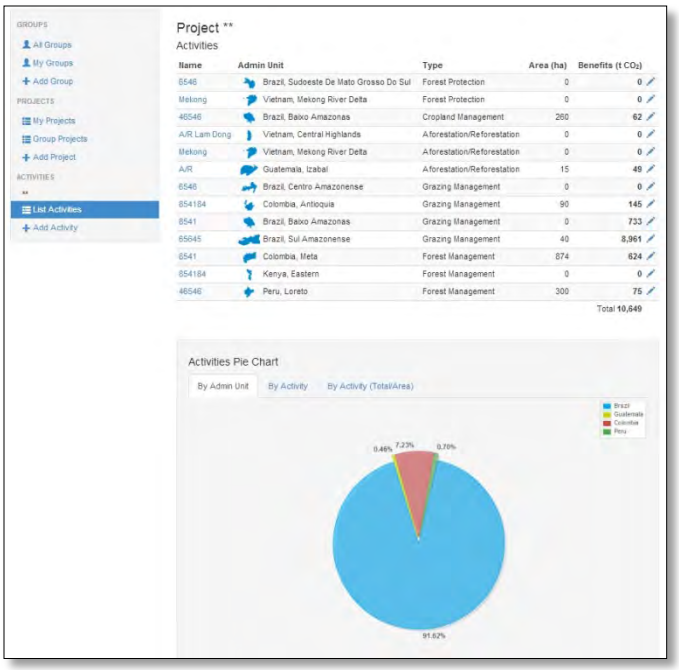

Figure 5 Project summary table and pie chart

To review activities within a project, users can scroll over the project name which appears as a blue hyperlink and select it. A new dashboard will appear listing project activities, their respective admin units, activity types, area, and estimated carbon benefits. Any activity can be edited by selecting its corresponding blue pencil icon on the right side of the dashboard. Below the dashboard, there will be a graphic display summarizing the project activities in the form of a pie charts or stacked bars.

7.0 HOW TO INTERPRET RESULTS

To get an overview of the activities and the CO_2 impacts in a project, users should select My Projects in the left side navigation menu and click on the project name. A summary table will be generated listing activity names, administrative units, activity type, activity area, and CO_2 benefits up to the current year. The total project CO_2 benefit up to the current year will appear at the bottom left side of the table.

There is also an Activities Pie Chart below the summary table. This feature allows users to interpret and demonstrate project benefits graphically (Figure 5).

For questions and comments:

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ANNEX

Summary of input parameters for running the various tools within the AFOLU Carbon Calculator

Forest Protection	Forest Management	Afforestation/ Reforestation	Agroforestry	Cropland Management	Grazing Management
Required Level A:					
Total project area (ha)					
Forest type: (a) Forests (b) Mangrove forests	Project type (a) Reduced impact logging (b) Stop logging	Species type: (a) Natural forest (b) Mangrove (c) plantation		Before and after intervention Tillage: (a) Full (b) reduced (c) no till and inputs before and after project intervention	
Protection against (a) Fire (b) Deforestation (c) illegal logging		Plantation type: (a) Cool Temperate (b) Warm temperate (c) Tropical moist-wet (d) Tropical dry		Before and after intervention inputs: (a) low (b) medium (c) high with-manure (d) high without-manure)	
Effectiveness rating		Effectiveness rating	Effectiveness rating		
Advanced Level B:					
Annual deforestation rate (before and after intervention) (%/yr)	Rotation length (yrs)	Carbon accumulation rate (tC/ha/yr)	Agroforestry type (a) shaded annual (b) shaded perennial (c) multistrata (d)silvopastoral (e)complimentary	Area of fertiliser application (ha)	Activities (a) improve grassland management (b) livestock management (c) rewet organic soils
Forest carbon stock (t C/ha)	Annual harvest area (ha/yr)	Age of plantation (yrs)	Age of plantation (yrs)	Fertilizer type applied before and after intervention (a) urea (b) ammonia (c) ammonium sulphite (d) map (e) dap (f) ammonium nitrate (g) calcium ammonium nitrate	Soil carbon stock in top 30cm (tC /ha)
Annual Forest growth (t C/ha)	Extraction rate before intervention (m3/ha/yr)		Carbon accumulation rate (tC/ha/yr)	Fertiliser amount before and after intervention (kg/ha/yr)	Conditions before and after project intervention (a) unmanaged (b) moderately degraded (c) severely degraded (d) improved
Soil carbon (t C/ha)	Extraction rate after intervention (m3/ha/yr)			Area of rice management (ha)	Inputs before and after project intervention (a) no inputs (b) added fertilizer

Forest Protection	Forest Management	Afforestation/ Reforestation	Agroforestry	Cropland Management	Grazing Management
Community area (ha)	Average wood density (g/cm3)			Rice regime before and after intervention (a) upland (b) irrigation continuous flooding (c) irrigation intermittent flooding single (d) irrigation intermittent flooding multiple (e) irrigation rainfed regular (f) irrigation rainfed droughtprone (g) irrigation rainfed deepwater	Livestock types and number before and after project intervention
Annual community wood extraction rate (m3/ha)	Reduces slashed and burned: Unknown/Yes/No				Organic soil area to rewet (ha)
Peat swamp %	Proportion of reduced skid trail (%)				Emission factor of drained soil (t C/ha)
Bulk peat density (g/cm3)	Proportion of reduced road and decks (%)				
Average depth of peat drained (cm)	Sawnwood fraction				
Average depth of peat burned (m)	Roundwood fraction				
	Woodbased panels fraction			Soil carbon stock data (tC/ha)	
	Pulp and paper fraction				