SHAMBA Tool User Guide

Contents

1. Installing the SHAMBA tool

The Small-Holder Agriculture Monitoring and Baseline Assessment (SHAMBA) tool Version 1.0 allows you to calculate estimates of the mitigation potential for a range of Climate Smart Agriculture activities in the tropics. This user guide describes how the tool can be used.

1.1 Installation

SHAMBA runs from a programme called Python, which must be installed for the tool to work. Python is a free, open source programming language1. Installation of Python varies from platform to platform, but SHAMBA will work on any platform and with any operating system where Python has been installed (This includes MacOS, Windows and Linux). Several additional Python modules are also needed.

This approach allows SHAMBA to work in many different computing environments, and to remain up-to-date even when operating systems are updated. For example if you upgrade your version of Windows, SHAMBA will still work, as long as you have Python on your machine.

1.1.1 Requirements

- Python 2.x (the tool has been tested with Python 2.6)
- Additional Python modules:
    - GDAL (in the osgeo package)
    - Basemap (in the mpl_toolkits package)
    - Matplotlib
    - PyQt4
    - NumPy
    - SciPy
- 3 GB of disk space

1.2. Getting Python

1.2.1 Windows XP/Vista/7/8

The easiest way to install Python on a Windows machine is to use the Pythonxy bundle. This contains Python and several of the additional modules you need to run SHAMBA.

There are two parts to install Python with the modules needed for SHAMBA:

1. Installation of Python(x,y) 2.7
    a. Determine if your operating system is 32- or 64-bit
    b. Download python(x,y) 2.7 installation for 32-bit or 64-bit Windows from http://python-xy.github.io/
    c. Use 'Optimize python modules' in the file ‘python(x,y)’ in the Start menu to install PyQt4, NumPy, SciPy Matplot lib, mpl_toolkits
2. Installation of GDAL
    a. Follow the instructions here http://cartometric.com/blog/2011/10/17/install-gdal-on-windows/
    b. According to this guide, after installing GDAL you need to configure three ‘Environment Variables’ in ‘Advanced System Settings’: Path, GDAL_DATA, GDAL_DRIVER_PATH.

1.2.2 Ubuntu linux (and other Debian-based linux systems)

Python is already installed on all Ubuntu systems. However, some modules may not be installed by default. To see a list of which modules are installed, open a terminal (Ctrl + Alt + t) and type

```
pydoc modules
```

If any of the following modules are not installed, type the corresponding command for the missing module(s) in the terminal:

Module	**Command**
PyQt4	`sudo apt-get install python-qt4`
gdal	`sudo apt-get install python-gdal`
matplotlib	`sudo apt-get install python-matplotlib`
mpl_toolkits	`sudo apt-get install python-mpltoolkits.basemap`
numpy	`sudo apt-get install python-numpy`
scipy	`sudo apt-get install python-scipy`

1.2.3 Other operating systems

Detailed instructions on how to install Python (and the required modules) on other platforms can be found at http://www.python.org/download/. Be sure to install the latest version of Python 2 (2.7.8 at the time of this writing) as SHAMBA is not compatible with Python 3.

1.3 Installing and running SHAMBA

1.3.1 Installing SHAMBA

SHAMBA comes packed up as a zip file. Save this file to your hard drive and then fully unzip the file.

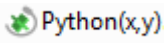
You will then need to create a new folder in your User Profile titled 'shamba_projects'. Within this folder, create a folder called 'sample_project', and within this folder create a folder called 'output'.

E.g. C:\Users\USERNAME\shamba_projects\sample_project\output

You can run SHAMBA through either a user interface, or by using the Python script for a for more advanced users.

1.3.2 Using SHAMBA through the user interface

The user interface can be used to make simple calculations of basic interventions. There are two options to activate it:

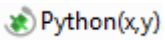
1. Activate with Spyder
    a. Open 

from the 'All programs' menu
    b. Click on the icon  of Spyder to activate Spyder
    c. Navigate to the folder titled 'shamba_stable_v1.1'
    d. Drag the file titled 'shamba.pyw' to the Spyder in window
    e. Press the 'Run' ( or ) to run the script
    f. Follow the instructions in the user interface
2. Activate through the command line:
    a. Open the Windows Command Prompt. Instructions here: https://www.lifewire.com/how-to-open-command-prompt-2618089
    b. Use console commands to navigate to the folder titled 'shamba_stable_v1.1', and open the file called 'shamba.pyw'
        i. Here is a complete list of console commands: https://community.sophos.com/kb/en-us/13195
        ii. . The basic commands are:
            1. 'dir' to view the files in the current directory
            2. 'cd [file name]' to enter a directory

3. 'cd..' move up a level in the directory
4. in the folder, enter 'shampa.pyw' to activate the user interface

1.3.3 Using SHAMBA through with the Python script

By using the Python script you can quickly analyse thousands of plots, or model more complex interventions:

1. Open  from the 'All programs' menu
2. Click on the icon  of Spyder to activate Spyder
3. To see the script, open the 'shamba_cl' file in Spyder (in the folder 'shamba_stable_v1.1\shamba').
4. Here are resources to help with Spyder and Python:
    a. https://software-carpentry.org/
    b. https://www.youtube.com/watch?v=J5GevIHNctM
    c. Searching on the internet also provides a rich source of help and resources for using Python (e.g. Stackoverflow)

1.3.4 Troubleshooting

1. If there are problems installing GDAL, recheck the Environment Variables. Otherwise there are many resources on the internet on how to get GDAL running.
2. If the SHAMBA scripts are not running, it is best to run the script in Spyder. Spyder will display the error in the console. This usually gives an indication which allows you to solve the error.
3. If you have the error 'ImportError: DLL load failed', this is usually because:
    a. You need to recheck the Environment Variables
    b. You need to install or upgrade versions of Microsoft Visual C++ 2008 Redistributable Package (x 86) and/or (x 64):
    c. If the problem persists, you can try uninstalling Python(x,y) 2.7 and its modules, and reinstalling everything using the Anaconda package: https://www.continuum.io/downloads

2. Using the SHAMBA tool

2.1 Starting SHAMBA

When SHAMBA is launched, it will open a window containing a disclaimer about the SHAMBA tool. You must first accept this disclaimer before being able to use the tool. After accepting the terms, you will arrive at the main interface for shamba. There are four tabs: when starting any new SHAMBA project, the information in the "General" tab must first be filled out. Baselines and interventions can then be specified in the "Baselines" and "Interventions" tabs respectively. The "Mitigation Estimates" tab then allows you to plot the yearly greenhouse gas emissions for a baseline-intervention pair and calculates the mitigation estimates for that intervention.

2.2 General Project Information

General project information (such as location and climate) must first be specified before the rest of the SHAMBA tool can be used. In the "General" tab, click the "Enter general project information" button. A new window labelled "General Information" will appear, which contains several screens with information to enter regarding your project.

The screens can be navigated using the "Next" and "Back" buttons at the bottom of the window, and clicking the "Help" button will bring up a pop-up window with more information about the current screen. It is important to note that the screens must all be completed in order for the information to be saved. That is, you will lose all information entered if you close the window via the close button (the x in the top corner) instead of the "Save" button on the last screen. You are also advised to review all entered information before clicking "Save" since, once saved, the information cannot be edited (only overwritten).

Once the information has been saved, the program will return to the main interface. In the "General" tab you will see a text summary of the information that was entered in the other window. If the information was not entered correctly, it can be overwritten by simply pressing the "Enter general project information button" again and going through the process again. Otherwise, you are now free to move on to the "Baselines" and "Interventions" tabs.

Since this general information is used to do calculations on the baseline scenarios and interventions, it cannot be changed after creating any baselines or interventions. It is thus crucial to ensure that this information is accurate before moving on to the steps outlined in Section 2.3.

2.3 Baselines and Interventions

In the “Baselines” and “Interventions” tabs of the main interface, you can add information regarding the baseline scenarios and interventions in your project. To do this, click on the “Add new baseline” or “Add new intervention” button.

After entering the name of the baseline/intervention you wish to create, you will then be taken to a new window similar to the “General information” window. After providing all the required information and saving it, you will then see a text summary of the baseline/intervention in the appropriate tab of the main interface.

Multiple baselines and interventions can be created in the same manner, and the drop-down lists at the top-left of the “Baselines” and “Interventions” tabs allow you to see details about each baseline/intervention that has been created.

2.4 Mitigation Estimates

Once at least one baseline and one intervention have been created, you can then use the “Mitigation Estimates” tab to plot the greenhouse gas emissions/removals associated with each, and see the net impact (mitigation estimates) associated with the intervention. Simply select which baseline and intervention you would like to plot from the drop-down lists, then click the “Plot mitigation estimates” button. This can be repeated for any baseline-intervention combination, and you can also continue to define new baselines and interventions; any new additions will be automatically displayed in the drop-down lists.

2.5 Miscellaneous

2.5.1 Saving the Project

You can save your SHAMBA project (all raw data and calculations) to .csv files by pressing “Save” in the file menu at the top-left of the screen (or with ctrl+s on the keyboard). If this is the first save for the project, you will be prompted to enter a name/location for the save folder. If you have previously saved this project, the tool will automatically add any new information to the folder you selected already - you can specify a new save folder by using the “Save As” option.

2.5.2 Loading an Existing Project

Unfortunately, the SHAMBA tool cannot load an existing project (yet). Saved project data can be imported into Excel, Python, R, and many other tools, however, since it is all in .csv format.