# 🌳 AGB and Carbon Stock Estimation Tool

This repository contains a \*\*Shiny application\*\* for estimating \*\*Above-Ground Biomass (AGB)\*\* and \*\*Carbon Stock\*\* in Miombo woodlands using \*\*Artificial Neural Networks (ANNs)\*\*, \*\*Random Forests (RF)\*\*, and a \*\*stacked meta-learner\*\*.

The app allows users to:

- Upload their own CSV dataset 📂

- Train hybrid models (ANN + RF + meta-learner) ⚙️

- Generate predictions for AGB and Carbon stock 🌱

- Download predicted results 📥

- View model accuracy metrics (MAE, RMSE, R², AIC, BIC) 📊

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## 🚀 Features

- \*\*Interactive Shiny UI\*\*: Upload datasets, run models, and view results in one place.

- \*\*Hybrid Modeling\*\*: Combines ANN and RF with a linear meta-learner.

- \*\*Accuracy Metrics\*\*: Reports MAE, RMSE, R², AIC, and BIC.

- \*\*Carbon Stock Calculation\*\*: Estimated as 50% of predicted AGB.

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## 📦 Requirements

You need \*\*R (≥ 4.0.0)\*\* and the following R packages:

```r

install.packages(c("shiny", "caret", "randomForest", "nnet"))