Package: forestdynR (via r-universe)

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Type Package

Title Calculate Forest Dynamics

Version 0.0.1

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Description Determines the dynamics of tree species communities
(mortality rates, recruitment, loss and gain in basal area, net
changes and turnover). Important notes are a) The 'forest_df'
argument (data) must contain the columns 'plot' (plot
identification), 'spp' (species identification), DBH_1
(Diameter at breast height in first year of measure) and DBH_2
(Diameter at breast height in second year of measure). DBH_1
and DBH_2 must be numeric values; b) example input file in
'data(forest_df_example)'; c) The argument 'inv_time'
represents the time between inventories, in years; d) The
'coord' argument must be of the type 'c(longitude, latitude)',
with decimal degree values; e) Argument 'add_wd' represents a
dataframe with wood density values (g cm-3) format with three
columns ('genus', 'species', 'wd'). This argument is set to
NULL by default, and if isn't provided, the wood density will
be estimated with the getWoodDensity() function from the
'BIOMASS' package.

License GPL (>= 2)

URL https://github.com/higuchip/forestdynR

BugReports https://github.com/higuchip/forestdynR/issues

Depends R (>= 4.3.0)

Imports BIOMASS (>= 2.1.11), tcltk (>= 1.0.0),

Suggests covr, knitr, rmarkdown, spelling, testthat (>= 3.0.0)

VignetteBuilder knitr

Encoding UTF-8

Language en-US

LazyData true

RoxygenNote 7.3.2

Config/testthat/edition 3

Config/pak/sysreqs libgdal-dev gdal-bin libgeos-dev libssl-dev
  libproj-dev libsqlite3-dev libudunits2-dev

Repository https://higuchip.r-universe.dev

RemoteUrl https://github.com/higuchip/forestdynr

RemoteRef HEAD

RemoteSha b4f8395835c4bef558e91053cfc565e7c880b9a3

Contents

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ba_b_metrics   *ba_b_metrics*

Description

Computes basal area (BA) ans Biomass(B) metrics for forest monitoring by category over a specified time interval. This function calculates BA and B metrics for specified groups in a dataset, including gains, losses, recruitment, and mortality.

Usage

```
ba_b_metrics(forest_df, group_var, inv_time)
```

Arguments

forest_df	Data frame containing the forest monitoring data.
group_var	String. The name of the column used to group the data, that could be "plot" or "spp".
inv_time	Numeric. The time interval between the two monitoring periods.

Value

A list containing:

sur_gain	Matrix of basal area gain for surviving trees by group.
sur_loss	Matrix of basal area loss for surviving trees by group.
rec_ba	Matrix of basal area for recruited trees by group.
death_ba	Matrix of basal area for dead trees by group.
BA_gain	Matrix of total basal area gain by group.
BA_loss	Matrix of total basal area loss by group.
ba_n0	Total basal area at time 0 by group.
ba_n1	Total basal area at time 1 by group.
loss_rate_ba	Numeric. The basal area loss rate (percent per year) by group.
gain_rate_ba	Numeric. The basal area gain rate (percent per year) by group.
nc_rate_ba	Numeric. The net change rate of basal area (percent per year) by group.
turn_ba	Numeric. The turnover rate of basal area (average of loss and gain rates) by group.
biomass_n0	Total above-ground biomass at time 0 by group.
biomass_n1	Total above-ground biomass at time 1 by group.

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check_format	*check_format()*

Description

Verify if the database is correctly formatted

Usage

```
check_format(forest_df, verbose = TRUE)
```

Arguments

forest_df	Dataset to be validated
verbose	Logical. If TRUE, messages about errors and warnings will be printed to the console.

Value

A list containing:

status	Logical, TRUE if the format is correct, FALSE if not.
message	A message providing details about any format issues.

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create_dyn_df *create_din_df*

Description

Creates a dynamic data frame by combining a list of data and rounding numeric values to a specified number of digits. This function takes a list of data, rounds the numeric values, and combines them into a single data frame with custom column names.

Usage

```
create_dyn_df(data_list, col_names, round_digits)
```

Arguments

data_list	A list of data frames or vectors to be combined into a single data frame.
col_names	A character vector of column names to assign to the resulting data frame.
round_digits	Numeric. The number of decimal places to round numeric values in the data to.

Value

A data frame with the combined data and rounded numeric values.

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forest_df_example *Data set about forest dynamics*

Description

Data set about forest dynamics

Usage

```
data(forest_df_example)
```

Format

An object of class `"data.frame"`

plot The plot identification number in the field.

n The identification number of the trees.

spp The scientific name of the species

DBH_1 Numeric. The diameter at breast height (DBH) measurement on the first inventory.

DBH_2 Numeric. The diameter at breast height (DBH) measurement on the second inventory.

References

This dataset was created by Pedro Higuchi, based on his filed research.

Examples

```
head(forest_df_example)
```

```
forest_dyn                    forest_dyn
```

Description

Function to calculate forest dynamics, including abundance, mortality and recruitment rates, basal area, and biomass. The function uses diameter at breast height (DBH) data to estimate forest dynamics over time.

Usage

```
forest_dyn(forest_df, inv_time, coord, add_wd = NULL)
```

Arguments

forest_df	A dataframe containing the forest plot data, with columns for species name (spp), and two DBH (Diameter at breast height) values (DBH_1 and DBH_2).
inv_time	The number of years between the two forest measurements (time interval between observations).
coord	A vector of geographic coordinates (longitude and latitude) for biomass calculation.
add_wd	Additional wood density data that can be provided for species not included in the database.

Value

A list containing the forest community dynamics, with abundance metrics, dynamic rates, basal area, and biomass by year.

Examples

```
forest_df <- data(forest_df_example)
coord <- c(-50.17,-27.71)
dyn_object <- forest_dyn(forest_df, inv_time = 5, coord = coord)
```

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save_dyn_files   *save_dyn_files*

Description

This function allows the user to save dynamic forest data to CSV files. It prompts the user to select a directory via a graphical interface (using the 'tcltk' package), and then saves several data frames containing forest dynamics information to predefined file names in that directory.

Usage

```
save_dyn_files(dynamics, verbose = TRUE)
```

Arguments

dynamics	A list containing four data frames with different forest dynamics data: 1) number of plots ('n_plot'), 2) number of species ('n_species'), 3) basal area by species ('basal_area_species'), 4) basal area by plots ('basal_area_plot').
verbose	Logical. If 'TRUE', the function will print messages indicating the status of the saving process. Default is 'TRUE'.

Value

NULL If the user does not select a folder, the function will return NULL and no files will be saved. Otherwise, the function saves four CSV files and returns a confirmation message.

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sdrn_metrics   *sdrn_metrics*

Description

Calculates survival, death, and recruitment metrics for forest monitoring data over time.

Usage

```
sdrn_metrics(forest_df, group_var, inv_time)
```

Arguments

forest_df	Data frame containing the forest monitoring data.
group_var	String. The name of the column used to group the data, that could be "plot" or "spp".
inv_time	Numeric. The time interval between the two monitoring periods.

Value

A list containing the following metrics: - n_sur: Number of surviving trees per group. - n_death: Number of dead trees per group. - n_rec: Number of recruited trees per group. - n_n0: Total number of trees at the start of the interval per group. - n_n1: Total number of trees at the end of the interval per group. - death_rate: Annual death rate per group (- rec_rate: Annual recruitment rate per group (- nc_rate: Net change rate of tree count per group (- turn: Turnover rate, calculated as the mean of death and recruitment rates (

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