

Package ‘vegtable’

July 22, 2025

Version 0.1.8

Encoding UTF-8

Title Handling Vegetation Data Sets

Depends R(>= 3.5.0), taxlist (>= 0.2.4)

Imports foreign, methods, qdapRegex, sp, stats, stringi, utils,
vegdata

Suggests biblio, knitr, rmarkdown, sf, testthat, vegan

Description Import and handling data from vegetation-plot databases, especially
data stored in 'Turboveg 2' (<<https://www.synbiosys.alterra.nl/turboveg/>>).
Also import/export routines for exchange of data with 'Juice'
(<<https://www.sci.muni.cz/botany/juice/>>) are implemented.

LazyData true

License GPL (>= 2)

URL <https://github.com/kamapu/vegtable>,
<http://kamapu.github.io/vegtable/>

BugReports <https://github.com/kamapu/vegtable/issues>

Collate 'imports.R' 'NULLing.R' 'coverconvert-class.R'
'vegtable-class.R' 'shaker-class.R' 'df2coverconvert.R'
'new_relation.R' 'relation2header.R' 'cover_trans.R' 'clean.R'
'coerce-methods.R' 'add_releves.R' 'header.R' 'Extract.R'
'veg_relation.R' 'vegtable_stat.R' 'df2vegtable.R'
'used_synonyms.R' 'taxa2samples.R' 'subset.R' 'names.R'
'tv2vegtable.R' 'crosstable.R' 'veg_aggregate.R'
'write_juice.R' 'layers2samples.R' 'make_cocktail.R'
'summary.R' 'count_taxa.R' 'trait_stats.R' 'update_det.R'
'veg_diversity.R' 'aspect_conv-data.R' 'braun_blanquet-data.R'
'dune_veg-data.R' 'Kenya_veg-data.R' 'Wetlands-data.R'

RoxygenNote 7.2.3

NeedsCompilation no

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Repository CRAN

Date/Publication 2023-03-14 08:30:02 UTC

Contents

add_relevés	3
as	4
aspect_conv-data	5
braun_blanquet-data	5
clean	6
count_taxa	7
coverconvert	8
cover_trans	9
crosstable	10
df2coverconvert	12
df2vegtable	13
dune_veg-data	14
Extract	15
header	16
Kenya_veg-data	17
layers2samples	18
make_cocktail	19
names	22
new_relation	23
relation2header	24
shaker-class	25
subset	26
summary	28
taxa2samples	29
trait_stats	31
tv2vegtable	33
update_det	35
used_synonyms	35
vegtable-class	37
vegtable_stat	37
veg_aggregate	38
veg_diverstiy	39
veg_relation	41
Wetlands-data	42
write_juice	43

Index	45
--------------	-----------

add_relevés	<i>Merge relevés from data frames into vegetable objects</i>
-------------	--

Description

Addition of plot observations into existing data sets may implicate merging data frames with [vegetable](#) objects.

Since this function will only update slots **samples** and **header**, consistency with slots **layers**, **relations** and **species** have to be checked and accordingly updated in advance.

Usage

```
add_relevés(vegetable, relevés, ...)

## S4 method for signature 'vegetable,data.frame'
add_relevés(
  vegetable,
  relevés,
  header,
  abundance,
  split_string,
  usage_ids = FALSE,
  layers = FALSE,
  layers_var,
  format = "crosstable",
  preserve_ids = FALSE,
  ...
)

add_relevés(vegetable, ...) <- value

## S4 replacement method for signature 'vegetable,data.frame'
add_relevés(vegetable, ...) <- value
```

Arguments

vegetable	An object of class vegetable .
relevés	A data frame including plot observations to be added into vegetable.
...	Further arguments passed to function cross2db() (i.e. na_strings).
header	A data frame (optional) including header information for plots.
abundance	A character value (or vector of length 2) indicating the names of abundance variable in vegetable.
split_string	Character value used to split mixed abundance codes.
usage_ids	Logical value indicating whether species are as taxon usage ids (integers) or names in relevés.

layers	Logical value indicating whether layers are included in releves or not.
layers_var	Name of the layer variable in vegetable.
format	Character value indicating input format of releves (either "crosstable" or "databaselist").
preserve_ids	A logical value, whether IDs in input data set should used as ReleveID or not. Those IDs have to be integers and if one of those already exists in vegetable, an error will be retrieved.
value	A data frame containing new plot observations. I is passed to parameter 'releves' by the replace method.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

See Also

[cross2db\(\)](#)

as

Coerce objects to lists

Description

Coerce vegetable objects to a list with every slot as a component of the list. This way allows to explore content and solve problems when validity checks fail.

Coercion is applied for different classes by vegetable.

Usage

```
## S4 method for signature 'vegetable'
as.list(x, ...)

## S4 method for signature 'coverconvert'
as.list(x, ...)
```

Arguments

x	An object to be coerced.
...	further arguments passed from or to other methods.

Value

An object of class list.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
## vegetable as list
veg <- as(Kenya_veg, "list")
names(veg)

## coverconvert as list
as(Kenya_veg@coverconvert, "list")
```

aspect_conv-data	<i>Conversion of aspect classes to azimuth</i>
------------------	--

Description

Conversion table required to transform values of aspect to azimuth in degrees.

Usage

```
aspect_conv
```

Format

A numeric vector of values in degrees for the symbols used as names.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
aspect_conv[c("N", "S", "ENE", "SSW")]
```

braun_blanquet-data	<i>Conversion of Braun-Blanquet codes to cover percentage</i>
---------------------	---

Description

Cover values conversion as [coverconvert](#) object.

Object of class [coverconvert](#) contains conversion tables usually from a categorical variable (a cover scale) to a numerical one (equivalent percentage cover value). Cover values are stored as range for each level in the scale (minimum and maximum cover value).

Usage

```
braun_blanquet
```

Format

An object of class `coverconvert`.

See Also

`coverconvert cover_trans()`

Examples

```
names(braun_blanquet)
summary(braun_blanquet)
summary(braun_blanquet$b_bdds)
```

clean	<i>Clean orphaned records in vegetable object</i>
-------	---

Description

Delete entries in slots header and species orphaned by manipulation of slots.

Orphaned records generated by modifications in some slots may cause a loss on the validity of `vegetable` objects. This function should be applied to optimise the allocated size of a `vegetable` object, as well. Since running cleaning only once does not assure the deletion of all orphaned entries, it is recommended to run it at least twice. This repetition of cleaning is controlled by the argument `times`.

Usage

```
clean_once(object)

## S4 method for signature 'vegetable'
clean(object, times = 2, ...)
```

Arguments

<code>object</code>	A <code>vegetable</code> object.
<code>times</code>	Numeric value indicating how many times should be the cleaning be repeated.
<code>...</code>	Further arguments passed from or to other methods.

Value

A clean `vegetable` object.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
## Create an invalid object
veg <- Kenya_veg
veg@header <- veg@header[1:10, ]

## Resolve invalidity
veg <- clean(veg)
```

count_taxa	<i>Count taxa included in vegetable objects</i>
------------	---

Description

Counting number of taxa within [taxlist](#) objects or character vectors containing taxon names.

This function provides a quick calculation of taxa in [vegetable](#) objects, considering only records in slot samples. Such records can be also merged from lower ranks.

For the formula method, units without any requested taxa will not appear in the output data frame. If no taxa at all is occurring at the requested level in any unit, an error message will be retrieved.

Usage

```
## S4 method for signature 'vegetable,missing'
count_taxa(object, level, include_lower = FALSE, ...)

## S4 method for signature 'formula,vegetable'
count_taxa(
  object,
  data,
  include_lower = FALSE,
  suffix = "_count",
  in_header = TRUE,
  ...
)

count_taxa(data, ...) <- value

## S4 replacement method for signature 'vegetable,formula'
count_taxa(data, ...) <- value
```

Arguments

object	An object of class vegetable or a formula.
level	Character value indicating the taxonomic rank of counted taxa.
include_lower	Logical value, whether lower taxonomic ranks should be included at the requested level.

...	further arguments passed among methods.
data	An object of class vegtable .
suffix	Character value used as suffix on the calculated variable.
in_header	Logical value, whether the result should be included in the slot header of the input vegtable object or not. A warning message is provided if the calculation is not done for every plot observation.
value	A formula passed to parameter 'object' by the replace method.

Value

An data frame with the number of taxa from requested level at requested units for the formula method, or just an integer value.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
## Different alternatives
count_taxa(Kenya_veg)
head(count_taxa(~ReleveID, Kenya_veg, in_header = FALSE))
head(count_taxa(species ~ ReleveID, Kenya_veg, in_header = FALSE))
head(count_taxa(species ~ ReleveID, Kenya_veg, TRUE, in_header = FALSE))
head(count_taxa(family ~ ReleveID, Kenya_veg, TRUE))
```

coverconvert	<i>Cover conversion tables</i>
--------------	--------------------------------

Description

Cover conversion tables for [vegtable](#) objects.

This class implements conversions from different cover scales in percentage cover. For transformations to percentage cover, the function [cover_trans\(\)](#) should be than used.

Slots

value List containing the levels of each scale.
 conversion List with the respective start and end cut levels for the scale levels.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

See Also

[tv2coverconvert\(\)](#) [braun_blanquet](#).

cover_trans	<i>Convert cover scales to percent cover</i>
-------------	--

Description

Convert values of a categorical cover scale to percentage values.

This function requires as input a [coverconvert](#) object which contains the conversion tables.

Usage

```
## S4 method for signature 'character,coverconvert'
cover_trans(x, conversion, from = NULL, rule = "top", zero = 0.1, ...)

## S4 method for signature 'factor,coverconvert'
cover_trans(x, conversion, ...)

## S4 method for signature 'numeric,coverconvert'
cover_trans(x, conversion, ...)

## S4 method for signature 'vegtable,missing'
cover_trans(x, to, replace = FALSE, rule = "top", zero = 0.1, ...)
```

Arguments

x	Either a factor or character vector, or a vegtable object.
conversion	An object of class vegtable .
from	Scale name of values in x as character value.
rule	A character value indicating the rule applied for cover transformation. Three rules are implemented for transformation, either top (values transformed to the top of the range), middle (transformation at the midpoint), and bottom (conversion at the lowest value of the range). In the later case, if the bottom is zero cover, a fictive bottom value can be set by 'zero'
zero	Value set for transformation of classes with bottom at 0% cover.
...	Further arguments passed from or to other methods.
to	Name of the column in slot samples for writing converted values.
replace	Logical value indicating whether existing cover values should be replaced by the new computed values or not.

Value

Either a vector or a [vegtable](#) object.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
## Check the available scales
summary(Kenya_veg@coverconvert)

## Conversion by default 'top' rule
Kenya_veg <- cover_trans(Kenya_veg, to = "percent")
summary(as.factor(Kenya_veg@samples$percent))

## Conversion by 'middle' rule
Kenya_veg <- cover_trans(Kenya_veg, to = "percent", rule = "middle", replace = TRUE)
summary(as.factor(Kenya_veg@samples$percent))

## Conversion by 'bottom' rule
Kenya_veg <- cover_trans(Kenya_veg, to = "percent", rule = "bottom", replace = TRUE)
summary(as.factor(Kenya_veg@samples$percent))
```

crosstable

Generating cross tables from database lists

Description

cross table is the most common format required by statistical packages used to analyse vegetation data (e.g. [vegan](#)).

You may use for convenience a formula as 'abundance ~ plot + species + ...'. Additional variables used for rows (...) can be for instance the layers. For objects of class [vegetable](#), the formula can also include variables from the species list (for example AcceptedName, AuthorName) or even taxon traits.

If required, tables already formatted as cross tables can be converted into column-oriented tables by using the function `cross2db()`.

Usage

```
crosstable(formula, data, ...)

## S4 method for signature 'formula,data.frame'
crosstable(
  formula,
  data,
  FUN,
  na_to_zero = FALSE,
  use_nas = TRUE,
  as_matrix = FALSE,
  ...
)

## S4 method for signature 'formula,vegetable'
crosstable(formula, data, FUN, na_to_zero = FALSE, use_nas = TRUE, ...)
```

```
cross2db(object, layers = FALSE, na_strings)
```

Arguments

formula	A formula indicating the variables used in the cross table. This formula can be represented as 'abundance ~ cols + rows', where 'abundance' is the numeric variable quantified for a row in a column, for instance the abundance of a species in a plot. Further variables can be set as additional rows indices in a cross table.
data	Either a data frame or an object of class vegtable .
...	Further arguments passed to the function stats::aggregate() .
FUN	Function used to aggregate values in the case of a multiple occurrence of a species in a plot, for instance.
na_to_zero	A logical value indicating whether zeros should be inserted into empty cells or not.
use_nas	Logical value indicating whether NAs should be considered as levels for categorical variables or not.
as_matrix	A logical value, whether output should be done as matrix or data frame.
object	A data frame including a cross table.
layers	Logical value, whether the cross table includes a layer column or not.
na_strings	Character vector indicating no records in the cross table.

Value

An object of class [data.frame](#).

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
veg <- subset(Kenya_veg, REFERENCE == 2331, slot = "header")

## transform cover to percentage
veg <- cover_trans(veg, to = "cover_perc", rule = "middle")

## cross table of the first 5 plots
Cross <- crosstable(cover_perc ~ ReleveID + AcceptedName + AuthorName,
  veg[1:5, ], mean,
  na_to_zero = TRUE
)
head(Cross)
```

df2coverconvert *Create coverconvert objects*

Description

The class `coverconvert` contains tables for transforming cover values to percentage using the function `cover_trans()`. These objects can be created from conversion tables imported as data frames.

Usage

```
df2coverconvert(x, ...)

## S3 method for class 'list'
df2coverconvert(x, ...)

## S3 method for class 'data.frame'
df2coverconvert(x, name, ...)
```

Arguments

<code>x</code>	Either a data frame or a list of data frames containing the conversion table. Three columns are mandatory in such data frames, namely value (factor with the symbols for each class in the cover scale, sorted from the lowest to the highest value), bottom (numeric value with the bottom values of each class), and top (numeric value with the top values of each class). The values bottom and top are usually as cover percentage but they may refer to any other numeric abundance.
<code>...</code>	Further arguments passed among methods.
<code>name</code>	A character value used as name of the cover scale in the data frame method. In the list method, this name will be extracted from the names of the elements in the list.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
## Convert object into list
cov <- as(Kenya_veg@coverconvert, "list")

## Convert back to coverconvert
cov <- df2coverconvert(cov)
```

df2vegtable*Convert a data frame into a vegtable object.*

Description

Conversion of a data frame containing a cross table of abundance or cover of species in single plots.

This function coerces a data frame containing a vegetation cross table into a [vegtable](#) object. The input data frame `x` may include information on the layers or not.

Usage

```
df2vegtable(x, species, layer, ...)  
  
## S4 method for signature 'data.frame,numeric,numeric'  
df2vegtable(x, species, layer, ...)  
  
## S4 method for signature 'data.frame,numeric,missing'  
df2vegtable(x, species, layer, ...)
```

Arguments

<code>x</code>	A data frame formatted for a taxlist object.
<code>species</code>	Numeric or integer indicating the position of the column with species names.
<code>layer</code>	Numeric or integer indicating the position of the column with layers.
<code>...</code>	Further arguments passed from or to other methods.

Value

A [vegtable](#) object.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
## Creating data set 'dune_veg'  
library(vegan)  
  
## Load data from vegan  
data(dune)  
data(dune.env)  
  
## Conversion to vegtable  
dune_veg <- data.frame(  
  species = colnames(dune), t(dune),  
  stringsAsFactors = FALSE, check.names = FALSE
```

```
)  
dune_veg <- df2vegtable(dune_veg, species = 1)  
  
summary(dune_veg)  
  
## Adding environmental variables  
dune.env$ReleveID <- as.integer(rownames(dune.env))  
header(dune_veg) <- dune.env  
  
summary(dune_veg)
```

dune_veg-data

Dutch dune meadows as vegtable

Description

Data set from the package [vegan::vegan](#), converted to a [vegtable](#) object.

Usage

```
dune_veg
```

Format

An object of class [vegtable](#).

Source

Original data were imported from [vegan::dune](#).

References

Jongman RHG, ter Braak CJE, van Tongeren OFR (1987). *Data analysis in community and landscape ecology*. Pudoc, Wageningen, NL.

Examples

```
summary(dune_veg)
```

Extract*Select or replace elements in objects*

Description

Methods for quick access to slot header of [vegetable](#) objects or for access to single cover scales in [coverconvert](#) objects. Also replacement methods are implemented.

Usage

```
## S4 method for signature 'vegetable'
x$name

## S4 replacement method for signature 'vegetable,ANY'
x$name <- value

## S4 method for signature 'coverconvert'
x$name

## S4 method for signature 'coverconvert'
x[i]

## S4 replacement method for signature 'coverconvert,coverconvert'
x$name <- value

## S4 method for signature 'vegetable'
x[i, j, ..., drop = FALSE]

## S4 replacement method for signature 'vegetable'
x[i, j] <- value
```

Arguments

x	Object of class vegetable .
name	A name to access.
value	Either a vectors or a list, used as replacement.
i, j	Indices for access.
...	Further arguments passed to or from other methods.
drop	A logical value passed to Extract .

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
## Range of latitude values in database
range(Kenya_veg$LATITUDE)

## Summary of countries
summary(Kenya_veg$COUNTRY)
summary(droplevels(Kenya_veg$COUNTRY))

## First 5 samples
summary(Kenya_veg[1:5, ])
```

header

Retrieve or replace slot header in vegetable objects

Description

Retrieve or replace the content of slot header in [vegetable](#) objects.

Usage

```
header(x, ...)
```

S4 method for signature 'vegetable'

```
header(x, ...)
```

```
header(x) <- value
```

S4 replacement method for signature 'vegetable,data.frame'

```
header(x) <- value
```

Arguments

x	Object of class vegetable .
...	Further arguments passed to or from other methods.
value	Data frame to be set as slot header.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
head(header(Kenya_veg))
```

Kenya_veg-dataVegetation-plots from Kenya

Description

A subset of <http://www.givd.info/ID/AF-00-006SWEA-Dataveg> including five references providing plots collected in Kenya.

Usage

Kenya_veg

Format

An object of class [vegetable](#).

Author(s)

Miguel Alvarez <kamapu78@gmail.com> and Michael Curran <currmi01@gmail.com>

Source

<http://www.givd.info/ID/AF-00-006>

References

Bronner G (1990). *Vegetation and land use in the Mathews Range area, Samburu-District, Kenya*. J. Cramer, Berlin.

Bussmann RW (1994). *The forests of Mount Kenya – vegetation, ecology, destruction and management of a tropical mountain forest ecosystem*. Universität Bayreuth.

Bussmann RW (2002). Islands in the desert – forest vegetation of Kenya’s smaller mountains and highland areas. *Journal of East African Natural History* 91: 27–79.

Fujiwara K, Furukawa T, Kiboi SK, Mathenge S, Mutiso P, Hayashi H, Meguro S (2014). Forest types and biodiversity around the Great Rift Valley in Kenya. *Contributii Botanice* 49: 143–178.

Schmitt K (1991). *The vegetation of the Aberdare National Park Kenya*. Universitätsverlag Wagner, Innsbruck.

Examples

summary(Kenya_veg)

layers2samples	<i>Add information from slot 'layers' into slot 'samples'</i>
----------------	---

Description

Slot layers may include additional information that should be moved to samples in order to use it by `subset()`, `aggregate()` or `crosstable()` methods.

If names of variables are not provided, all variables from the respective layer table will be inserted in slot samples.

Usage

```
layers2samples(object, layer, variable, ...)

## S4 method for signature 'vegtable,character,character'
layers2samples(object, layer, variable, ...)

## S4 method for signature 'vegtable,character,missing'
layers2samples(object, layer, variable, ...)
```

Arguments

object	An object of class <code>vegtable</code> .
layer	Character value indicating a target layer.
variable	Character vector with the names of variables to be inserted in slot samples.
...	Further arguments to be passed among methods.

Value

An object of class `vegtable` with variables added to samples.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>.

make_cocktail	<i>Produce a Cocktail classification</i>
---------------	--

Description

Classification of [vegetable](#) objects according to **Cocktail** algorithms.

Cocktail algorithms are logical functions selecting plots according to either occurrence of species groups and cover values of single species. A group will be declared as occurring in a plot when at least a half of its members is present in the plot.

This function inserts single columns with logical values indicating whether a plot is classified in the vegetation unit or not. An additional column (name provided in argument syntax) compile all vegetation units, indicating with a + symbol those plots classified in more than one vegetation unit. When only a part of the formulas will be used, it should be specified by the argument *which*.

These functions are implemented for constructing or complementing [shaker](#) objects. Note that construction of those objects will always require a companion object, which is either an object of class [taxlist](#) or [vegetable](#).

Usage

```
set_group(shaker, companion, group, ...)

## S4 method for signature 'shaker,taxlist,character'
set_group(
  shaker,
  companion,
  group,
  group_id,
  authority = FALSE,
  enc_cont = "latin1",
  enc_gr = "utf8",
  ...
)

## S4 method for signature 'shaker,vegetable,character'
set_group(shaker, companion, group, ...)

set_pseudo(shaker, companion, pseudo, ...)

## S4 method for signature 'shaker,taxlist,character'
set_pseudo(
  shaker,
  companion,
  pseudo,
  pseudo_id,
  authority = FALSE,
  enc_cont = "latin1",
```

```

    enc_gr = "utf8",
    ...
)

## S4 method for signature 'shaker,vegetable,character'
set_pseudo(shaker, companion, pseudo, ...)

set_formula(shaker, companion, formula, ...)

## S4 method for signature 'shaker,taxlist,character'
set_formula(
  shaker,
  companion,
  formula,
  formula_id,
  authority = FALSE,
  enc_cont = "latin1",
  enc_gr = "utf8",
  ...
)

## S4 method for signature 'shaker,vegetable,character'
set_formula(shaker, companion, formula, ...)

make_cocktail(shaker, vegetable, ...)

## S4 method for signature 'shaker,vegetable'
make_cocktail(
  shaker,
  vegetable,
  which,
  cover,
  syntax = "Syntax",
  FUN = sum,
  in_header = TRUE,
  ...
)

```

Arguments

shaker	An object of class shaker containing the respective cocktail definitions.
companion	Either a taxlist or a vegetable object.
...	Further arguments passes from or to other methods.
authority	Logical value indicating whether author names should be included in the taxon name or not.
enc_cont, enc_gr	Encodings used for special characters.

pseudo, group	Character vector with names of taxa included in a pseudo-species or a species group.
pseudo_id, group_id, formula_id	Character value as name of the pseudo-species, species group or defined vegetation unit.
formula	Character vector including a formula as definition of a vegetation unit.
vegetable	An object of class vegetable containing the vegetation observations to be classified.
which	Integer or character indicating the definition to be applied for classification.
cover	Name of the cover variable in vegetable.
syntax	Character value indicating the name of the retrieved variable including the final classification of plots.
FUN	Function used for merging multiple occurrence of species in a single plot.
in_header	Logical value indicating whether results of Cocktail classification should be inserted to the header of the input vegetable or not. In the second case, a data frame is provided as output.

Value

A data frame corresponding to the slot header of input object vegetable, including the results of Cocktail classification for the respective plots.

A [shaker](#) object.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

References

- Alvarez M (2017).** Classification of aquatic and semi-aquatic vegetation in two East African sites: Cocktail definitions and syntaxonomy. *Phytocoenologia*.
- Bruelheide H (2000).** A new measure of fidelity and its application to defining species groups. *Journal of Vegetation Science* 11: 167–178.
- Kočí M, Chytrý M, Tichý L (2003).** Formalized reproduction of an expert-based phytosociological classification: a case study of subalpine tall-forb vegetation. *Journal of Vegetation Science* 14: 601–610.

See Also

[shaker](#) [vegetable](#) [Wetlands](#)

Examples

```
## Example from Alvarez (2017)
Wetlands_veg <- make_cocktail(Wetlands, Wetlands_veg, cover = "percen")
summary(as.factor(Wetlands_veg@header$Syntax))

## Same but only for two vegetation units
Wetlands_veg <- make_cocktail(Wetlands, Wetlands_veg,
  which = c("HY1", "HY2"), cover = "percen"
)
summary(as.factor(Wetlands_veg$Syntax))

## Construct the 'shaker' object anew
Wetlands <- new("shaker")

## Set a pseudo-species
Wetlands <- set_pseudo(Wetlands, Wetlands_veg, c(
  "Cyperus latifolius",
  "Cyperus exaltatus"
))

## Set a species group
Wetlands <- set_group(Wetlands, Wetlands_veg,
  group_id = "Cyperus papyrus",
  group = c(
    "Cyperus papyrus",
    "Cyclosorus interruptus",
    "Lepistemon owariense"
  )
)

## Set a formula
Wetlands <- set_formula(Wetlands, Wetlands_veg,
  formula_id = "HE1",
  formula = "groups:'Cyperus papyrus' | species:'Cyperus papyrus > 50'"
)

## Summaries
summary(Wetlands)
summary(Wetlands, Wetlands_veg)
```

names

Retrieve names of vegetable and coverconvert objects

Description

Quick access to column names in slot header and names of conversion codes.

These methods provide a quick display of the contents in [coverconvert](#) and [vegetable](#) objects.

Usage

```
## S4 method for signature 'vegetable'
names(x)

## S4 method for signature 'vegetable'
dimnames(x)

## S4 method for signature 'coverconvert'
names(x)

## S4 replacement method for signature 'coverconvert'
names(x) <- value
```

Arguments

x An object of class `coverconvert` or `vegetable`.

value A character vector used for replacement methods.

Value

A list containing the names from each slot.

Either a vector or a list (in the case of `dimnames()`) with the names of variables.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>.

Examples

```
names(Kenya_veg@coverconvert)
names(Kenya_veg)
dimnames(Kenya_veg)
```

new_relation

Insert a new variable as relation in vegetable object

Description

Insert a new variable in slot **header** with a respective table at slot **relations**. The respective variable in header will be set as factor.

Existing categorical variables can also be set as relations. If such variables are factors, its levels can be preserved (missing argument in 'levels') or reset.

Usage

```

new_relation(object, ...)

## S3 method for class 'vegetable'
new_relation(object, relation, levels, ...)

new_relation(object, levels) <- value

## S4 replacement method for signature 'vegetable,character,character'
new_relation(object, levels) <- value

## S4 replacement method for signature 'vegetable,missing,character'
new_relation(object) <- value

```

Arguments

<code>object</code>	A vegetable object.
<code>...</code>	Further arguments passed among methods.
<code>relation, value</code>	A character value indicating the name of the new relation. The parameter 'value' is used for the replacement method
<code>levels</code>	A character vector with the levels for the inserted factor. This may be missing for variables that already exist in slot header .

Value

A [vegetable](#) object with the inserted new relation.

Examples

```

## A brand new variable
new_relation(Kenya_veg, levels = c("forest", "grassland", "cropland")) <- "land_use"

## Set an existing variable as relation
new_relation(Kenya_veg) <- "REMARKS"

```

relation2header

Insert variables from relations into header

Description

Information associated to categories listed in slot **relations** can be inserted to slot **header** for further statistical comparisons.

Usage

```
relation2header(vegetable, ...)

## S3 method for class 'vegetable'
relation2header(vegetable, relation, vars, ...)
```

Arguments

vegetable	An vegetable object.
...	Further arguments passed among methods
relation	A character value indicating the relation to be used for inserting new variables in slot header.
vars	A selection of variables from the relation to be inserted in header. This function will check the existence of the variables in the respective relation and retrieve an error if none is matching the names. If missing in the arguments, all variables of the respective relation will be inserted.

Value

A [vegetable](#) object.

Author(s)

Miguel Alvarez, kamapu78@gmail.com

Examples

```
## Insert publication year of the source into header
veg <- relation2header(Kenya_veg, "REFERENCE", "YEAR")

## Show the frequency of plots per publication year
summary(as.factor(veg$YEAR))
```

shaker-class

Class containing Cocktail algorithms.

Description

Objects used for collecting Cocktail definitions.

These objects work as **expert systems** for recognition of defined vegetation units among plots of a [vegetable](#) object. A shaker object will be always dependent on a [vegetable](#) object, which is called companion. Since modifications in the companion may affect the functionality of the shaker object, it will be recommended to create the last during a session by a source script instead of recycling them from old R images.

Slots

- pseudos List containing IDs of taxa that will be merged into pseudo-species.
- groups List containing IDs of taxa belonging to the same Cocktail group.
- dominants A data frame including lists of species used as dominant species in Cocktail algorithms, as well as operators and cover values used in the formulas.
- formulas List with formulas that will be used as definitions for vegetation units.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

See Also

[make_cocktail\(\)](#) [set_pseudo\(\)](#) [set_group\(\)](#) [set_formula\(\)](#)

Examples

```
showClass("shaker")
```

subset

Subset functions for vegetable objects

Description

Produce subsets of [vegetable](#) objects.

Logical operations can be applied either to the plots, or the relations, which are the main slots in that class.

This method can be referred to the slot species the same way as [taxlist::subset\(\)](#), then the rest of the data will include only references to the subset of species list.

Usage

```
## S4 method for signature 'vegetable'
subset(
  x,
  subset,
  slot = "header",
  keep_children = FALSE,
  keep_parents = FALSE,
  relation,
  ...
)
```

Arguments

<code>x</code>	A vegetable object for subset.
<code>subset</code>	Logical expression for the subset.
<code>slot</code>	Character value indicating the slot used as reference for subset. At the moment only the values "taxonNames", "taxonRelations", "taxonTraits", "header", "samples", and "relations" are accepted. The three first values will be applied to the respective slots in the contained taxlist object (slot species).
<code>keep_children</code>	Argument passed to taxlist::get_children() .
<code>keep_parents</code>	Argument passed to taxlist::get_parents() .
<code>relation</code>	Character value indicating the relation (slot relations) to be used as reference for subset.
<code>...</code>	Further arguments passed from or to other methods.

Value

A S4 object of class [vegetable](#).

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
## Subset by taxon name
Kenya_sub <- subset(
  x = Kenya_veg, subset = TaxonName == "Tagetes",
  slot = "taxonNames", keep_children = TRUE, keep_parents = TRUE
)
summary(Kenya_sub)
summary(Kenya_sub@species)

## Subset by taxon relations
Kenya_sub <- subset(
  x = Kenya_veg, subset = Level == "species",
  slot = "taxonRelations"
)
summary(Kenya_sub)
summary(Kenya_sub@species)

## Subset by taxon traits
Kenya_sub <- subset(
  x = Kenya_veg, subset = lf_behn_2018 == "obligate_annual",
  slot = "taxonTraits"
)
summary(Kenya_sub)
summary(Kenya_sub@species)

## Subset by header
Kenya_sub <- subset(x = Kenya_veg, subset = ALTITUDE <= 1000, slot = "header")
```

```
summary(Kenya_sub)

## Subset by samples (after converting coverage)
Kenya_veg <- cover_trans(x = Kenya_veg, to = "cover_percentage", rule = "middle")
Kenya_sub <- subset(x = Kenya_veg, subset = cover_percentage >= 50, slot = "samples")
summary(Kenya_sub)

## Subset by relations
Kenya_sub <- subset(
  x = Kenya_veg, subset = as.integer(YEAR) >= 2000,
  slot = "relations", relation = "REFERENCE"
)
summary(Kenya_sub)
```

summary

Summary method for vegetable objects

Description

Display summaries for [vegetable](#) objects.

Those methods are implemented for objects of the classes [vegetable](#), [coverconvert](#) and [shaker](#).

The method for class [vegetable](#) retrieves the metadata, the size of the object, its validity and additional statistics on the content of input object.

For objects of class [shaker](#), the function `summary()` will either retrieve general statistics when companion is missing, or a more detailed display when accompanied by a [taxlist](#) or [vegetable](#) object.

Usage

```
## S4 method for signature 'vegetable'
summary(object, units = "Kb", ...)

## S4 method for signature 'coverconvert'
summary(object, ...)

## S4 method for signature 'shaker'
summary(object, companion, authority = FALSE, ...)

## S4 method for signature 'vegetable'
show(object)

## S4 method for signature 'vegetable'
print(x, ...)

## S4 method for signature 'coverconvert'
show(object)

## S4 method for signature 'coverconvert'
```

```

print(x, ...)

## S4 method for signature 'shaker'
show(object)

## S4 method for signature 'shaker'
print(x, ...)

```

Arguments

object, x	Object to be summarized.
units	Units used for object size (passed to <code>format()</code>).
...	further arguments to be passed to or from other methods.
companion	Companion object (either a taxlist or a vegtable object).
authority	Logical value indicating whether authors should be displayed or not.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```

## Summary for 'vegtable' objects
summary(Wetlands_veg)
## Summary for 'coverconvert' objects
summary(braun_blanquet)
## Summary for 'shaker' objects (alone and with companion)
summary(Wetlands, Wetlands_veg)

```

taxa2samples	<i>Insert taxon information into samples</i>
--------------	--

Description

For statistical purposes it may be necessary to insert information on recorded taxa into the slot `samples`, which contain the records of taxa in sampling plots. This can be also done selectively for specific taxonomic ranks and lower ranks can be aggregated to their parental ones.

If column **TaxonConceptID** is already existing in '`objec@samples`', this column will get overwritten, retrieving a warning message.

Usage

```

taxa2samples(object, ...)

## S3 method for class 'vegtable'
taxa2samples(
  object,

```

```

merge_to,
include_levels,
add_relations = FALSE,
add_traits = FALSE,
...
)

```

Arguments

object	A vegetable object.
...	Further arguments passed among methods.
merge_to	Character value indicating the level (taxonomic rank) to which taxa of lower rank have to be merged.
include_levels	Character vector indicating the levels to be considered in the output object. This will set the values of TaxonConceptID and any respective values inserted from slots taxonRelations and taxonTraits as NA.
add_relations	A logical value indicating whether the content of slot taxonRelations have to be inserted in slot samples or not.
add_traits	A logical value indicating whether the content of slot taxonTraits have to be inserted in slot samples or not.

Value

An object of class [vegetable](#).

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```

## Add only variable TaxonConceptID
veg <- taxa2samples(Kenya_veg)
head(veg@samples)

## Add also information from slots taxonRelations and taxonTraits
veg <- taxa2samples(Kenya_veg, add_relations = TRUE, add_traits = TRUE)
head(veg@samples)

## Different ranks recorded at samples
veg <- taxa2samples(Kenya_veg, add_relations = TRUE)
summary(veg@samples$Level)

## Aggregate taxa to family level
veg <- taxa2samples(Kenya_veg, add_relations = TRUE, merge_to = "family")
summary(veg@samples$Level)

```

trait_stats

Statistics and proportion for taxon traits

Description

Calculation of statistics and proportions of taxon traits for plot observations or groups of observations, considering data relationships, taxonomic ranks and the handling of not available values.

In `trait_stats()` you can use customized functions, which have to be defined as `foo(x, w, ...)`, where 'x' is the (numeric) taxon trait and 'w' is the weight (e.g. the abundance).

With the arguments `taxon_levels` and `merge_to` the used taxonomic ranks can be defined, where the first one indicates which ranks have to be considered in the calculations and the second one determine the aggregation of taxa from a lower level to a parental one.

Usage

```
trait_stats(trait, object, ...)

## S4 method for signature 'character,vegtable'
trait_stats(
  trait,
  object,
  FUN,
  head_var = "ReleveID",
  taxon_levels,
  merge_to,
  weight,
  suffix = "_stats",
  in_header = TRUE,
  na.rm = TRUE,
  ...
)

## S4 method for signature 'formula,vegtable'
trait_stats(trait, object, ...)

trait_proportion(trait, object, ...)

## S4 method for signature 'character,vegtable'
trait_proportion(
  trait,
  object,
  head_var = "ReleveID",
  trait_levels,
  taxon_levels,
  merge_to,
  include_nas = TRUE,
```

```

    weight,
    suffix = "_prop",
    in_header = TRUE,
    ...
)

## S4 method for signature 'formula,vegetable'
trait_proportion(trait, object, ...)

```

Arguments

trait	Either a character value indicating the name of trait variable or a formula as 'trait ~ head_var'. Note that you can add multiple variables in the form trait_1 + ... + trait_n ~ head_var.
object	A vegetable object.
...	Further arguments passed among methods. In the case of the character method, they are passed to 'FUN'.
FUN	A function usually defined as foo(x, ...) or as foo(x, w, ...) for weighted statistics.
head_var	Character value, the name of the variable at slot header to be used as aggregation level for the calculation of statistics or proportions. If not provided, the function will use ReleveID by default.
taxon_levels	Character vector indicating the selected taxonomic ranks to be considered in the output.
merge_to	Character value indicating the taxonomic rank for aggregation of taxa. All ranks lower than the one indicated here will be assigned to the respective parents at the required taxonomic rank.
weight	Character value indicating the name of the variable at slot samples used as weight for the proportions. Usually the numeric abundance.
suffix	A suffix added to the name of the trait variable or to the levels of categorical trait variables. It is meant to avoid homonymous variables within the same object.
in_header	Logical value indicating whether the output should be inserted in the slot header or provided as data frame. In the case that 'head_var' (or the right term in the formula method) is different from ReleveID , the statistics and proportions will be inserted in the respective data frame at slot relations .
na.rm	A logical value indicating whether NAs should be removed for the calculation of statistics or not. It is passed to 'FUN' in trait_stats().
trait_levels	Character vector indicating a selection of levels from a trait, in the case that some levels should be ignored in the output. Trait levels that are skipped at output will be still used for the calculation of proportions. This argument gets only applied for the character method.
include_nas	Logical value indicating whether NAs should be considered for the calculation of proportions or not.

Value

A data frame with the proportions of traits levels or statistics for the trait variable, or an object of class [vegtable](#) including those results at the slot header.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
veg <- cover_trans(Kenya_veg, to = "cover")
veg <- trait_proportion("lf_behn_2018", veg,
  trait_levels = "obligate_annual", weight = "cover", include_nas = FALSE
)
summary(veg$obligate_annual_prop)
```

tv2vegtable

Import of vegetation data from Turboveg databases

Description

Import function for **Turboveg** databases into an object of class [vegtable](#). Most of the contents of **Turboveg** databases are included in DBF files and therefore imported by the function [foreign::read.dbf\(\)](#). The automatic setting of database path will be done by the function [vegdata::tv.home\(\)](#) but it can be customised by the argument `tv_home`.

The species list will be imported by using the function [taxlist::tv2taxlist\(\)](#) and therefore formatted as a [taxlist](#) object. Similarly, conversion tables will be handled as [coverconvert](#) objects.

Empty columns in the header will be deleted in the imported object.

The function `tv2coverconvert()` reads the content of cover conversion tables stored in **Turboveg** and attempts to reformat them in a more comprehensive structure.

This function is used by `tv2vegtable()` to import the respective conversion table from **Turboveg** databases. Note that conversion tables in **Turboveg** have only stored the middle point for each cover class in a scale, thus it will be recommended to rebuild the `coverconvert` slot or use [braun_blanquet](#).

Usage

```
tv2vegtable(
  db,
  tv_home = tv.home(),
  skip_empty_relations = TRUE,
  skip_scale,
  clean = TRUE
)

tv2coverconvert(file, as.is = TRUE)
```

Arguments

db	Name of Turboveg data base as character value.
tv_home	Turboveg installation path as character value.
skip_empty_relations	Logical value indicating whether empty relations may be excluded from imported database or not.
skip_scale	Character value indicating scales to be excluded in slot coverconvert.
clean	Logical value indicating whether output object should be cleaned or not.
file	A connection to a DBF file containing conversion table in Turboveg .
as.is	A logical value passed to <code>read.dbf()</code> .

Value

A **vegtable** object in the case of `tv2vegtable()`. A **coverconvert** object in the case of `tv2coverconvert()`.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

See Also

`taxlist::tv2taxlist()` `foreign::read.dbf()` `vegdata::tv.home()`

Examples

```
## Installed 'Turboveg' version of 'Fujiwara et al. (2014)'
# TV_Home <- file.path(path.package("vegtable"), "tv_data")
# Veg <- tv2vegtable("Fujiwara_2014", TV_Home)
# summary(Veg)

## Installed 'Turboveg' version of "Fujiwara et al. (2014)"
TV_Home <- file.path(path.package("vegtable"), "tv_data", "popup", "Swea")
Table <- tv2coverconvert(file.path(TV_Home, "tvscale.dbf"))

## First scale have to be deleted from conversion table
Table@value <- Table@value[-1]
Table@conversion <- Table@conversion[-1]
summary(Table)

## Compare the 'Turboveg' version with a vegtable version
data(braun_blanquet)
summary(Table$br_bl)
summary(braun_blanquet$br_bl)
```

update_det	<i>Update by determined specimens</i>
------------	---------------------------------------

Description

Reference specimens can be integrated in slot **layers** within a [vegtable](#) object. Updated entries in the specimens can be updated in slot **samples** by using this function. Alternatively expert opinions can be inserted and applied in case of disagreement with the original records.

Usage

```
update_det(x, specimens, ...)

## S4 method for signature 'vegtable,character'
update_det(x, specimens, ...)
```

Arguments

x	A vegtable object to be updated.
specimens	A character vector indicating the names of tables included in slot layers with updates to be applied. Note that they will be applied in the same order of the vector in the case of multiple updates.
...	Further arguments (not yet in use).

used_synonyms	<i>Retrieve synonyms or taxon concepts used in a data set</i>
---------------	---

Description

Plots records are rather linked to plant names than plant taxon concepts and `used_synonyms()` lists all synonyms linked to records in a [vegtable](#) object, including their respective accepted names.

On the other side, the function `used_concepts()` produces a subset of the taxonomic list embedded in the slot **species** including only taxonomic concepts linked to records in the slot **samples**.

Usage

```
used_synonyms(x, ...)

## S3 method for class 'vegtable'
used_synonyms(x, ...)

used_concepts(x, ...)

## S3 method for class 'vegtable'
used_concepts(x, keep_children = FALSE, keep_parents = FALSE, ...)
```

Arguments

<code>x</code>	A vegetable object.
<code>...</code>	Further arguments to be passed from or to another methods.
<code>keep_children</code>	A logical argument indicating whether children of selected taxa should be included in the output or not. This argument passed to get_children() .
<code>keep_parents</code>	A logical argument indicating whether parents of selected taxa should be included in the output or not. This argument passed to get_parents() .

Value

The function `used_synonyms()` returns a data frame including following variables:

SynonymID ID of the taxon usage name applied as synonym.

Synonym The synonym itself.

SynonymAuthor Author of synonym.

TaxonConceptID ID of the respective taxon concept.

AcceptedNameID ID of the taxon usage name set as accepted name of the taxon concept.

AcceptedName The respective accepted name.

AcceptedNameAuthor The author of the accepted name.

The function `used_concepts()` returns a [taxlist](#) object including only taxa occurring in the plot observations of the input [vegetable](#) object.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

See Also

[accepted_name\(\)](#)

Examples

```
## Synonyms used in the Kenya_veg
Synonyms <- used_synonyms(Kenya_veg)
head(Synonyms)

## Subset species list to used concepts
species <- used_concepts(Kenya_veg)
Kenya_veg@species
species
```

vegetable-class	<i>Class vegetable.</i>
-----------------	-------------------------

Description

Class holding vegetation-plot data sets. Designed to content all information stored in **Turboveg** databases in just one object.

This class was designed to include information of relevés, header data and species in just one object. Objects can be created by calls of the form `new("vegetable", ...)`.

Slots

`description` A named character vector containing metadata.
`samples` A data frame with samples list.
`header` A data frame with plots data.
`species` Species list as a [taxlist](#) object.
`layers` A list including strata within samples as data frames.
`relations` A list including popup lists as data frames.
`coverconvert` A scale conversion object of class [coverconvert](#).
`syntax` A list including syntaxonomic lists either as data frames or as [taxlist](#) objects.

See Also

[tv2vegetable\(\)](#)

Examples

```
showClass("vegetable")
```

vegetable_stat	<i>General statistics from vegetable objects</i>
----------------	--

Description

This function calculates general statistics of local **Turboveg** databases as required by GIVD (Global Index of Vegetation-Plot Databases, <https://www.givd.info>).

This function is based on a script delivered by GIVD for summarising statistics required in the descriptions of databases (see meta data in the page of the Global Index for Vegetation-Plot Databases).

Usage

```
vegetable_stat(vegetable, ...)

## S3 method for class 'vegetable'
vegetable_stat(vegetable, ...)
```

Arguments

vegetable An object of class [vegetable](#).
 ... Further arguments passed among methods.

Author(s)

GIVD. Adapted by Miguel Alvarez <kamapu78@gmail.com>

Examples

```
## Statistics for GIVD
vegetable_stat(Kenya_veg)
```

veg_aggregate	<i>Aggregating information into a data frame</i>
---------------	--

Description

Compute summarizing tables from [vegetable](#) objects. This function works in a similar way as [crosstable\(\)](#).

Usage

```
veg_aggregate(object, data, FUN, ...)
```

```
## S4 method for signature 'formula,vegetable,`function`'
```

```
veg_aggregate(object, data, FUN, use_nas = TRUE, ...)
```

Arguments

object A formula indicating the variables used for the summary. As in [crosstable\(\)](#), the keywords "TaxonName" and "AcceptedName" can be used to retrieve taxonomic names, where the second will set the accepted name for names considered as synonyms.

data Either a data frame or an object of class [vegetable](#).

FUN Function used to aggregate values.

... Further arguments passed to the function [stats::aggregate\(\)](#).

use_nas Logical value indicating whether NA's should be included in categorical variables or not.

Value

An object of class [data.frame](#).

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

See Also

[aggregate\(\)](#)

Examples

```
## Transform cover to percentage cover
veg <- cover_trans(x = Kenya_veg, to = "cover")

## Frequency of taxa per publication
atab <- veg_aggregate(object = cover ~ AcceptedName + REFERENCE, data = veg, FUN = length)
head(atab)

## Life form proportions per plot
atab <- veg_aggregate(object = cover ~ lf_behn_2018 + ReleveID, data = veg, FUN = sum)
head(atab)
```

veg_diversty

Calculation of statistics at plot level

Description

Calculation of diversity statistics at the plot level allowing for customized functions defined as `foo(x, ...)`, where `x` is the vector of abundance values.

This function calls [taxa2samples\(\)](#) to derive taxa from taxon usage names in slot **samples** and multiple records of species in a single plot will be merged by [stats::aggregate](#).

The functions `shannon()`, `evenness()`, and `dominance()` calculate the diversity index of Shannon, the evenness, and the dominance ($1 - \text{evenness}$), respectively. Dominance is the complementary value to evenness (i.e. $1 - \text{evenness}$).

The function `simpson()` calculates the Simpson's index using the alternative for vegetation plot observations.

The function `richness()` counts the number of taxa per plot and can be used as alternative to [vegtable::count_taxa](#).

Usage

```
shannon(x, na.rm = TRUE, ...)

evenness(x, ...)

dominance(x, ...)
```

```

simpson(x, na.rm = TRUE, ...)

richness(x, na.rm = TRUE, ...)

veg_diversity(object, ...)

## S3 method for class 'vegtable'
veg_diversity(
  object,
  weight,
  FUN = shannon,
  aggr_fun = mean,
  arg_fun = list(),
  var_name,
  in_header = TRUE,
  ...
)
```

Arguments

<code>x</code>	A numeric vector containing the abundance of single species.
<code>na.rm</code>	A logical value indicating whether NA values should be removed from the abundance vector or not.
<code>...</code>	Further arguments passed among methods. In <code>'evenness()'</code> and <code>'dominance()'</code> , these arguments are passed to <code>'shannon()'</code> . In <code>'veg_diversity()'</code> , these arguments are passed to <code>aggregate()</code> (actually to <code>'FUN'</code>).
<code>object</code>	A vegtable object.
<code>weight</code>	A character value indicating the name of the column at slot samples which will be used as species abundance.
<code>FUN</code>	A function used to calculate the diversity index.
<code>aggr_fun</code>	A function used to aggregate abundance values for multiple records of a taxon in a plot observation. Average value is used by default.
<code>arg_fun</code>	A named list with parameters and arguments passed to <code>taxa2samples()</code> , which will retrieve the respective taxon concept for each taxon usage name and can be used to merge taxa at a determined taxonomic rank, for instance to merge all sub-specific taxa into their respective species (i.e. <code>'merge_to = "species"'</code>).
<code>var_name</code>	A character value used as name for the calculated index. If missing, the name of the function will be used.
<code>in_header</code>	A logical value indicating whether the results should be included as variables in the slot header of the input object. If <code>'in_header = TRUE'</code> , you may assign the result of the function to the input object.

Value

Functions `shannon()`, `evenness()`, `dominance()`, `simpson()`, and `richness()` return a numeric value (the calculated index).

Function `veg_diversity()` produce either a data frame with calculated values per plot observation (option `'in_header = FALSE'`) or a [vegtable](#) object with the calculated values inserted in the slot **header** (option `'in_header = TRUE'`).

Examples

```
## Compare Evenness with Shannon index
Kenya_veg <- cover_trans(x = Kenya_veg, to = "cover")
Kenya_veg <- veg_diversity(object = Kenya_veg, weight = "cover")
Kenya_veg <- veg_diversity(object = Kenya_veg, weight = "cover", FUN = evenness)

with(Kenya_veg@header, plot(shannon, evenness))
```

veg_relation	<i>Retrieve or replace relations in vegtable objects</i>
--------------	--

Description

Tables providing information about levels of categorical variables in the header are called popups in **Turboveg** databases but relations in [vegtable](#) objects. Such variables will be converted into factors in the slot header according to the levels and their sorting in the respective relation.

Usage

```
veg_relation(vegtable, relation, ...)

## S4 method for signature 'vegtable,character'
veg_relation(vegtable, relation, match_header = FALSE, ...)

veg_relation(vegtable) <- value

## S4 replacement method for signature 'vegtable,data.frame'
veg_relation(vegtable) <- value
```

Arguments

vegtable	An object of class vegtable .
relation	A character value indicating the relation table to be retrieved or replaced.
...	Further arguments to be passed among methods.
match_header	A logical vector, whether only levels occurring in slot header should be considered or all.
value	A data frame containing the new <code>veg_relation</code> .

Value

This function retrieves and object of class `data.frame`. In the replacement method, an object of class [vegtable](#), including value in the slot relations.

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
## overview of references
veg_relation(Kenya_veg, "REFERENCE")
```

Wetlands-data

Vegetation-plots from Tanzania

Description

A subset of <http://www.givd.info/ID/AF-00-006SWEA-Dataveg> with plots sampled in Tanzania.

Usage

Wetlands

Format

An object of class `shaker` (Wetlands) and the respective companion as `vegtable` object (Wetlands_veg).

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Source

<http://www.givd.info/ID/AF-00-006>.

References

Alvarez M (2017). Classification of aquatic and semi-aquatic vegetation in two East African sites: Cocktail definitions and syntaxonomy. *Phytocoenologia*.

Examples

```
summary(Wetlands)
summary(Wetlands_veg)
```

write_juice

*Exporting tables for Juice***Description**

This function produce txt files as import formats for **Juice** (<https://www.sci.muni.cz/botany/juice/>).

This function produces two output files to be imported into a **Juice** file: A vegetation table produced by `crosstable()` and a header table. Both tables share the file name plus a suffix (table for the vegetation table and header for the header).

For the import in **Juice**, you go to the menu File -> Import -> Table -> from Spreadsheet File (e.g. EXCEL Table) and then follow the wizard. Do not forget to select the proper settings in the wizard: 1) 'Character delimiting columns: Comma' (for default argument values). 2) 'Use the second column as layer information: Unchecked'. 3) 'Cover values: Percentage Values'.

To further import the header table you need to go to the menu File -> Import -> Header Data -> From Comma Delimited

In the header (see **Value**), the first column (Table number) corresponds to the plot number assigned by **Juice** at import, while the column (Releve number) is the number originally assigned to the plot (e.g. **Turboveg** ID).

Usage

```
write_juice(data, file, formula, ...)
```

```
## S4 method for signature 'vegetable,character,formula'
```

```
write_juice(
  data,
  file,
  formula,
  FUN,
  db_name = "Plot Observations",
  header,
  coords,
  sep = ",",
  ...
)
```

```
read_juice(file, encoding = "LATIN-1", sep = ";", na = "", ...)
```

Arguments

<code>data</code>	An object of class <code>vegetable</code> .
<code>file</code>	Character value indicating the name of output files (without file extension).
<code>formula</code>	A formula passed to <code>crosstable()</code> .
<code>...</code>	Further arguments. While <code>write_juice()</code> passes them to the function <code>crosstable()</code> , <code>read_juice()</code> passes those arguments to <code>readLines()</code> .

<code>FUN</code>	Function passed to <code>crosstable()</code> .
<code>db_name</code>	Name for data set displayed in import wizard.
<code>header</code>	Variables of header to be exported.
<code>coords</code>	Names of coordinate variables in header of data.
<code>sep</code>	Separator used to split rows into columns.
<code>encoding</code>	Argument passed to <code>readLines</code> .
<code>na</code>	Character used as not available values.

Value

For `read_juice()`, a list with two elements: A data frame of species by plot (`cross_table`), and a data frame with header data (`header`).

Author(s)

Miguel Alvarez <kamapu78@gmail.com>

Examples

```
## Subset and transform cover values to percentage
vegetation <- Kenya_veg[1:20, ]
vegetation <- cover_trans(x = vegetation, to = "cover_percent", rule = "middle")

## Write in tempdir
write_juice(data = vegetation, file = file.path(tempdir(), "SWEA"),
            formula = cover_percent ~ RelieveID + AcceptedName, FUN = mean,
            header = c("RelieveID", "COMM_TYPE"))
## Installed 'Juice' version of 'Wetlands_veg'
Veg <- file.path(path.package("vegtable"), "juice", "Wetlands_juice.txt")
Veg <- read_juice(Veg)

summary(Veg)
```

Index

* datasets

- aspect_conv-data, 5
- braun_blanquet-data, 5
- dune_veg-data, 14
- Kenya_veg-data, 17
- Wetlands-data, 42
- [(Extract), 15
- [, coverconvert, ANY, ANY, ANY-method (Extract), 15
- [, coverconvert-method (Extract), 15
- [, vegetable, ANY, ANY, ANY-method (Extract), 15
- [, vegetable-method (Extract), 15
- [<- (Extract), 15
- [<-, vegetable-method (Extract), 15
- \$(Extract), 15
- \$, coverconvert-method (Extract), 15
- \$, vegetable-method (Extract), 15
- \$<- (Extract), 15
- \$<-, coverconvert, coverconvert-method (Extract), 15
- \$<-, vegetable, ANY-method (Extract), 15
- \$<-, vegetable-method (Extract), 15
- accepted_name(), 36
- add_relevés, 3
- add_relevés, vegetable, data.frame-method (add_relevés), 3
- add_relevés<- (add_relevés), 3
- add_relevés<-, vegetable, data.frame-method (add_relevés), 3
- aggregate(), 18, 39, 40
- as, 4
- aspect_conv (aspect_conv-data), 5
- aspect_conv-data, 5
- braun_blanquet, 8, 33
- braun_blanquet (braun_blanquet-data), 5
- braun_blanquet-data, 5

- clean, 6
- clean, vegetable-method (clean), 6
- clean_once (clean), 6
- coerce, coverconvert, list-method (as), 4
- coerce, vegetable, list-method (as), 4
- count_taxa, 7
- count_taxa, formula, vegetable-method (count_taxa), 7
- count_taxa, vegetable, missing-method (count_taxa), 7
- count_taxa<- (count_taxa), 7
- count_taxa<-, vegetable, formula-method (count_taxa), 7
- cover_trans, 9
- cover_trans(), 6, 8, 12
- cover_trans, character, coverconvert-method (cover_trans), 9
- cover_trans, factor, coverconvert-method (cover_trans), 9
- cover_trans, numeric, coverconvert-method (cover_trans), 9
- cover_trans, vegetable, missing-method (cover_trans), 9
- coverconvert, 5, 6, 8, 9, 12, 15, 22, 23, 28, 33, 34, 37
- coverconvert-class (coverconvert), 8
- cross2db (crosstable), 10
- cross2db(), 3, 4
- crosstable, 10
- crosstable(), 18, 38, 43, 44
- crosstable, formula, data.frame-method (crosstable), 10
- crosstable, formula, vegetable-method (crosstable), 10
- data.frame, 11, 38
- df2coverconvert, 12
- df2coverconvert, data.frame-method (df2coverconvert), 12

- df2coverconvert, list-method
 - (df2coverconvert), 12
- df2coverconvert.data.frame
 - (df2coverconvert), 12
- df2coverconvert.list(df2coverconvert), 12
- df2vegtable, 13
- df2vegtable, data.frame, numeric, missing-method
 - (df2vegtable), 13
- df2vegtable, data.frame, numeric, numeric-method
 - (df2vegtable), 13
- dimnames (names), 22
- dimnames, vegtable-method (names), 22
- dominance (veg_diverstiy), 39
- dune_veg (dune_veg-data), 14
- dune_veg-data, 14
- evenness (veg_diverstiy), 39
- Extract, 15, 15
- foreign::read.dbf(), 33, 34
- format(), 29
- get_children(), 36
- get_parents(), 36
- header, 16
- header, vegtable-method (header), 16
- header<- (header), 16
- header<-, vegtable, data.frame-method
 - (header), 16
- Kenya_veg (Kenya_veg-data), 17
- Kenya_veg-data, 17
- layers2samples, 18
- layers2samples, vegtable, character, character-method
 - (layers2samples), 18
- layers2samples, vegtable, character, missing-method
 - (layers2samples), 18
- make_cocktail, 19
- make_cocktail(), 26
- make_cocktail, shaker, vegtable-method
 - (make_cocktail), 19
- names, 22
- names, coverconvert-method (names), 22
- names, vegtable-method (names), 22
- names<-, coverconvert-method (names), 22
- new_relation, 23
- new_relation, vegtable-method
 - (new_relation), 23
- new_relation.vegtable (new_relation), 23
- new_relation<- (new_relation), 23
- new_relation<-, vegtable, character, character-method
 - (new_relation), 23
- new_relation<-, vegtable, missing, character-method
 - (new_relation), 23
- print, coverconvert-method (summary), 28
- print, shaker-method (summary), 28
- print, vegtable-method (summary), 28
- read.dbf(), 34
- read_juice (write_juice), 43
- readLines, 44
- readLines(), 43
- relation2header, 24
- relation2header, vegtable-method
 - (relation2header), 24
- relation2header.vegtable
 - (relation2header), 24
- richness (veg_diverstiy), 39
- set_formula (make_cocktail), 19
- set_formula(), 26
- set_formula, shaker, taxlist, character-method
 - (make_cocktail), 19
- set_formula, shaker, vegtable, character-method
 - (make_cocktail), 19
- set_group (make_cocktail), 19
- set_group(), 26
- set_group, shaker, taxlist, character-method
 - (make_cocktail), 19
- set_group, shaker, vegtable, character-method
 - (make_cocktail), 19
- set_pseudo (make_cocktail), 19
- set_pseudo(), 26
- set_pseudo, shaker, taxlist, character-method
 - (make_cocktail), 19
- set_pseudo, shaker, vegtable, character-method
 - (make_cocktail), 19
- shaker, 19–21, 28, 42
- shaker (shaker-class), 25
- shaker-class, 25
- shannon (veg_diverstiy), 39
- show, coverconvert-method (summary), 28
- show, shaker-method (summary), 28

- show, vegetable-method (summary), 28
- simpson (veg_diverstiy), 39
- stats::aggregate, 39
- stats::aggregate(), 11, 38
- subset, 26
- subset(), 18
- subset, vegetable-method (subset), 26
- summary, 28
- summary, coverconvert-method (summary), 28
- summary, shaker-method (summary), 28
- summary, vegetable-method (summary), 28
- taxa2samples, 29
- taxa2samples(), 39, 40
- taxa2samples, vegetable-method (taxa2samples), 29
- taxa2samples.vegetable (taxa2samples), 29
- taxlist, 7, 19, 20, 27–29, 33, 36, 37
- taxlist::get_children(), 27
- taxlist::get_parents(), 27
- taxlist::subset(), 26
- taxlist::tv2taxlist(), 33, 34
- trait_proportion (trait_stats), 31
- trait_proportion, character, vegetable-method (trait_stats), 31
- trait_proportion, formula, vegetable-method (trait_stats), 31
- trait_stats, 31
- trait_stats, character, vegetable-method (trait_stats), 31
- trait_stats, formula, vegetable-method (trait_stats), 31
- tv2coverconvert (tv2vegetable), 33
- tv2coverconvert(), 8
- tv2vegetable, 33
- tv2vegetable(), 37
- update_det, 35
- update_det, vegetable, character-method (update_det), 35
- update_det, vegetable-method (update_det), 35
- used_concepts (used_synonyms), 35
- used_concepts, vegetable-method (used_synonyms), 35
- used_concepts.vegetable (used_synonyms), 35
- used_synonyms, 35
- used_synonyms, vegetable-method (used_synonyms), 35
- used_synonyms.vegetable (used_synonyms), 35
- veg_aggregate, 38
- veg_aggregate, formula, vegetable, function-method (veg_aggregate), 38
- veg_diversity (veg_diverstiy), 39
- veg_diversity, vegetable-method (veg_diverstiy), 39
- veg_diversity.vegetable (veg_diverstiy), 39
- veg_diverstiy, 39
- veg_relation, 41
- veg_relation, vegetable, character-method (veg_relation), 41
- veg_relation<- (veg_relation), 41
- veg_relation<- , vegetable, data.frame-method (veg_relation), 41
- vegan::dune, 14
- vegan::vegan, 14
- vegdata::tv.home(), 33, 34
- vegetable, 3, 6–11, 13–30, 32–36, 38, 40–43
- vegetable (vegetable-class), 37
- vegetable-class, 37
- vegetable::count_taxa, 39
- vegetable_stat, 37
- vegetable_stat, vegetable-method (vegetable_stat), 37
- vegetable_stat.vegetable (vegetable_stat), 37
- Wetlands, 21
- Wetlands (Wetlands-data), 42
- Wetlands-data, 42
- Wetlands_veg (Wetlands-data), 42
- write_juice, 43
- write_juice, vegetable, character, formula-method (write_juice), 43