

# Package: SoilConservation (via r-universe)

August 26, 2024

**Type** Package

**Title** Soil and Water Conservation

**Version** 1.0.0

**Date** 2024-04-28

**Imports** stats

**Acknowledgements** This work was carried out with support from CNPq, National Council for Scientific and Technological Development (number of the process 152652/2022-1)

**Depends** R (>= 3.5.1)

**Description** Includes four functions: RFactor\_calc(), RFactor\_est(), KFactor() and SoilLoss(). The rainfall erosivity factors can be calculated or estimated, and soil erodibility will be estimated by the equation extracted from the monograph. Soil loss will be estimated by the product of five factors (rainfall erosivity, soil erodibility, length and steepness slope, cover-management factor and support practice factor. In the future, additional functions can be included. This efforts to advance research in soil and water conservation, with fast and accurate results.

**License** GPL-3

**Encoding** UTF-8

**LazyData** true

**NeedsCompilation** no

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**Date/Publication** 2024-05-03 13:50:02 UTC

**Repository** <https://dionecardoso.r-universe.dev>

**RemoteUrl** <https://github.com/cran/SoilConservation>

**RemoteRef** HEAD

**RemoteSha** 586937372fcda00529c6e967e93e6e3ece22a9ad

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SoilConservation-package  
*Soil and Water Conservation.*

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## Description

Includes four functions: RFactor\_calc(), RFactor\_est(), KFactor() and SoilLoss(). The rainfall erosivity factors can be calculated or estimated, and soil erodibility will be estimated by the equation extracted from the monograph. Soil loss will be estimated by the product of five factors (rainfall erosivity, soil erodibility, length and steepness slope, cover-management factor and support practice factor. In the future, additional functions can be included. This efforts to advance research in soil and water conservation, with fast and accurate results.

## Details

Package: SoilConservation  
 Type: Package  
 Version: 1.0.0  
 Date: 2024-04-28  
 License: GPL (>= 3)

## Author(s)

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## References

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Data\_Erodibility

*Erodibility dataset.*

---

## Description

Dataset of physical and chemical attributes used in estimating soil erodibility.

## Usage

data(Data\_Erodibility)

**Format**

Physical and chemical attributes used in estimating soil erodibility.

**Author(s)**

Dione Pereira Cardoso

Paulo Cesar Ossani

Junior Cesar Avanzi

**References**

Denardin, J. E. (1990). “Erodibilidade de solo estimada por meio de parâmetros físicos e químicos”. Piracicaba, ESALQ, 1990. 81p. (Tese de Doutorado). <https:...>

RadamBrasil, P. (1981a). Folha SC. 22 Tocantins, Rio de Janeiro: Ministério das Minas e Energia. 524p. <https:...>

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RadamBrasil, P. (1983). Folha SE. 22 Goiânia, Rio de Janeiro: Ministério das Minas e Energia. 768p. <https:...>

**Examples**

```
data(Data_Erodibility)
head(Data_Erodibility)
```

---

Data\_Rainfall\_minutes *Rainfall dataset.*

---

**Description**

Sub-hourly rainfall data for the municipality of Peixe, TO, for the period January to December 2023.

**Usage**

```
data(Data_Rainfall_minutes)
```

**Format**

Data set with 22,032 observations with 3 variables, referring to precipitation from January to December 2023, in the municipality of Peixe, TO, Brazil. The columns being: date, times and rainfall.

**Author(s)**

Dione Pereira Cardoso

Paulo Cesar Ossani

Junior Cesar Avanzi

**References**

Cemaden (2024). Centro nacional de monitoramento e alertas de desastres naturais - <<http://www.cemaden.gov.br/apresentacao>>

**Examples**

```
data(Data_Rainfall_minutes)
head(Data_Rainfall_minutes)
```

---

`Data_Rainfall_month`    *Rainfall dataset.*

---

**Description**

Monthly rainfall data for the municipality of Peixe, TO, for the period from 2013 to 2023 (Source: BDMEP-INMET, 2024).

**Usage**

```
data(Data_Rainfall_month)
```

**Format**

Dataset monthly referring to rainfall in 2013 and 2023, in the municipality of Peixe, TO, Brazil.

**Author(s)**

Dione Pereira Cardoso

Paulo Cesar Ossani

Junior Cesar Avanzi

**References**

INMET - Instituto Nacional de Meteorologia (2018). “BDMEP - Banco de Dados Meteorológicos para Ensino e Pesquisa - Série Histórica - Dados Mensais – Precipitação (mm)”. Brasília.

**Examples**

```
data(Data_Rainfall_month)
head(Data_Rainfall_month)
```

---

Data_SoilLoss	<i>Water erosion dataset.</i>
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**Description**

Dataset of erosivity, erodibility, topography, LULC, and support conservation practices.

**Usage**

```
data(Data_SoilLoss)
```

**Format**

Dataset of erosivity, erodibility, topography, LULC, and support conservation practices of several years.

**Author(s)**

Dione Pereira Cardoso

Paulo Cesar Ossani

Junior Cesar Avanzi

**Examples**

```
data(Data_SoilLoss)
head(Data_SoilLoss)
```

---

KFactor	<i>Estimates soil erodibility.</i>
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**Description**

The function estimates the soil erodibility factor.

**Usage**

```
KFactor(df_kfactor)
```

**Arguments**

df\_kfactor      Data to be analyzed.

**Value**

kfactor          Tabulated results of the k factor.

**Author(s)**

Dione Pereira Cardoso

Paulo Cesar Ossani

Junior Cesar Avanzi

**References**

Godoi, R. F.; Rodrigues, D. B.; Borrelli, P.; Oliveira, P. T. S. (2021). "High-resolution soil erodibility map of Brazil". *Science of The Total Environment*, v. 781, p. 146673. <doi:10.1016/j.scitotenv.2021.146673>.

Wischmeier, W. and Smith, D. (1978). Predicting rainfall erosion losses: a guide to conservation planning. Agricultural Handbook No. 537. U.S. Department of Agriculture, Washington DC, USA. <https:...>

**Examples**

```
data(Data_Erodibility)
kfactor <- KFactor(Data_Erodibility)
round(kfactor,6) # result K factor
```

---

RFactor\_calc                      *Determination the rainfall erosivity .*

---

**Description**

The function calculates the rainfall erosivity factor.

**Usage**

```
RFactor_calc(data, erosive.precip = 10, equation = "WS")
```

**Arguments**

data                      Data to be analyzed.

erosive.precip      Precipitation considered erosive (default = 10).

equation              "WS" - Wischmeier and Smith (default),  
                          "BF" - Brown and Foster,  
                          "RUSLE2" - USDA-Agriculture Research Service.

**Value**

result	Tabulated results.
record	Record of rainfall relative to 5, 10, 15, 30 or 60 minutes.

**Author(s)**

Dione Pereira Cardoso

Paulo Cesar Ossani

Junior Cesar Avanzi

**References**

Brown, L.C. and Foster, G.R. (1987). Storm erosivity using idealized intensity distributions. Trans. ASAE 30, 2, 379–386. <<https://doi.org/10.2310/30.2.379>>.

USDA-Agricultural Research Service. (2013). Science Documentation Revised Universal Soil Loss Equation Version 2. <[https://www.ars.usda.gov/ARSUserFiles/60600505/RUSLE/RUSLE2\\_Science\\_Doc.pdf](https://www.ars.usda.gov/ARSUserFiles/60600505/RUSLE/RUSLE2_Science_Doc.pdf)>.

Wischmeier, W. and Smith, D. (1978). Predicting rainfall erosion losses: a guide to conservation planning. Agricultural Handbook No. 537. U.S. Department of Agriculture, Washington DC, USA. <<https://doi.org/10.1093/ahrh/537.1>>.

**Examples**

```
data(Data_Rainfall_minutes)
res <- RFactor_calc(Data_Rainfall_minutes, erosive.precip = 10, equation = "WS")
res$result
```

---

RFactor\_est

*Estimation the rainfall erosivity.*


---

**Description**

The function estimates the rainfall erosivity factor.

**Usage**

```
RFactor_est(data, latitude, longitude)
```

**Arguments**

data	Data to be analyzed.
latitude	Latitude
longitude	Longitude



**Value**

RFactor            Estimated rainfall erosivity.  
 equation           Equation used for estimations.

**Author(s)**

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**References**

Arnoldus H. M. J. (1980). An approximation of the rainfall factor in the universal soil loss equation. In: De Boodt M, Gabriels D (eds) Assessment of erosion. JohnWiley & Sons, Chichister, pp 127–132. <<https://doi.org/10.1016/j.catena.2012.08.006>>.

Oliveira, P. T. S. and Wendland, E.; Nearing, M. A. (2013). “Rainfall erosivity in Brazil: A review”. Catena, v. 100, p. 139-147, 2013. <[doi:10.1016/j.catena.2012.08.006](https://doi.org/10.1016/j.catena.2012.08.006)>.

**Examples**

```
data(Data_Rainfall_month)
rfactor <- RFactor_est(Data_Rainfall_month[,2:13],
                       latitude = -12.01527777,
                       longitude = -48.544444440)
rfactor$RFactor
rfactor$equation
```

---

 SoilLoss

---

*Estimation soil losses by water erosion.*


---

**Description**

The function estimates soil losses according to USLE and its revised versions (RUSLE).

**Usage**

```
SoilLoss(df_SoilLoss)
```

**Arguments**

df\_SoilLoss      Data to be analyzed.

**Value**

result.A            Tabulated results of the A (Soil loss).

**Author(s)**

Dione Pereira Cardoso

Paulo Cesar Ossani

Junior Cesar Avanzi

**References**

Wischmeier, W. and Smith, D. (1978). Predicting rainfall erosion losses: a guide to conservation planning. Agricultural Handbook No. 537. U.S. Department of Agriculture, Washington DC, USA. <<https://...>>.

**Examples**

```
data(Data_SoilLoss)
SoilLoss <- SoilLoss(Data_SoilLoss[,2:6])
round(SoilLoss,2) # result Soil loss
```

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\* **Soil Loss; Water Erosion; R Factor; K Factor; LS Factor; C Factor and P Factor**

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