

# Package ‘hillshader’

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**Title** Create Hillshade Relief Maps Using Ray-Tracing

**Version** 0.1.2

**Description** A set of tools to create georeferenced hillshade relief raster maps using ray-tracing and other advanced hill-shading techniques. It includes a wrapper function to create a georeferenced, ray-traced hillshade map from a digital elevation model, and other functions that can be used in a rayshader pipeline.

**License** GPL (>= 3)

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.1

**Imports** methods, raster, rayshader, scales

**Depends** R (>= 2.10)

**Collate** 'add\_shadow\_2d.R' 'matrix\_to\_raster.R' 'write\_raster.R' 'utils.R' 'hillshader.R' 'maungawhau.R' 'maungawhau\_hr.R'

**NeedsCompilation** no

**Author** Pierre Roudier [aut, cre] (<<https://orcid.org/0000-0001-7431-2603>>)

**Maintainer** Pierre Roudier <pierre.roudier@gmail.com>

**Repository** CRAN

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## R topics documented:

add_shadow_2d . . . . .	2
hillshader . . . . .	3
matrix_to_raster . . . . .	3
maungawhau . . . . .	4
maungawhau_hr . . . . .	5
write_raster . . . . .	5

<b>Index</b>	<b>7</b>
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add_shadow_2d	<i>Add shadow</i>
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**Description**

Multiplies a texture array or shadow map by a shadow map.

**Usage**

```
add_shadow_2d(hillshade, shadowmap, max_darken = 0.7, rescale_original = FALSE)
```

**Arguments**

hillshade	A 2D matrix of shadow intensities.
shadowmap	A matrix that indicates the intensity of the shadow at that point. 0 is full darkness, 1 is full light.
max_darken	Default '0.7'. The lower limit for how much the image will be darkened. 0 is completely black, 1 means the shadow map will have no effect.
rescale_original	Ignored.

**Value**

A shaded map.

**Author(s)**

Slight modification from Tyler's code in `rayshader::add_shadow`

**Examples**

```
library(rayshader)

# Create elevation matrix
el_mat <- raster_to_matrix(maungawhau)

el_mat %>%
  # Create hillshade layer using
  # ray-tracing
  ray_shade() %>%
  # Add ambient shading
  add_shadow_2d(
    ambient_shade(
      heightmap = el_mat
    )
  )
```

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hillshader	<i>Hillshader</i>
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**Description**

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**Usage**

```
hillshader(elevation, shader = "ray_shade", filename = NULL, ...)
```

**Arguments**

elevation	Raster, a digital elevation model.
shader	Character. List of rayshader shader(s) to sequentially apply. Defaults to ray_shade.
filename	Character. If set, the result if written as a raster file. Defaults to NULL.
...	Additional parameters to be passed to the either shader functions or to raster::writeRaster.

**Value**

Either a RasterLayer of light intensities (hillshade), or writes the result to disk if filename is set.

**Author(s)**

Pierre Roudier

**Examples**

```
# Simple example
library(raster)

hs <- hillshader(maungawhau)
plot(hs)
```

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matrix_to_raster	<i>Matrix to Raster</i>
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**Description**

Turns a matrix into a Raster

**Usage**

```
matrix_to_raster(matrix, raster, crs = NULL)
```

**Arguments**

matrix	The input matrix, typically the output of a rayshader operation
raster	The original raster from which matrix is derived. Can be an Extent object.
crs	If an Extent object is passed to the raster option, the corresponding coordinate reference system information.

**Value**

a RasterLayer

**Author(s)**

Pierre Roudier

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maungawhau

*Elevation Raster for Maungawhau in Tāmaki Mākaaurau/Auckland*

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**Description**

Elevation data as a raster for Maungawhau, a volcano located in Tāmaki Mākaaurau/Auckland.

**Usage**

maungawhau

**Format**

A RasterLayer with 87 rows, 61 columns, and 1 band with the elevation data at a 10-m resolution. The data is projected in New Zealand Map Grid (NZMG, EPSG:27200).

**Source**

Elevation data from datasets::volcano, georeferencing adapted from <https://waterdata.usgs.gov/blog/inlmiscmaps/>

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maungawhau_hr	<i>LiDAR Elevation Raster for Maungawhau in Tāmaki Mākaurau/Auckland</i>
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**Description**

Elevation data as a raster for Maungawhau, a volcano located in Tāmaki Mākaurau/Auckland.

**Usage**

```
maungawhau_hr
```

**Format**

A RasterLayer with 860 rows, 600 columns, and 1 band with the elevation data at a 1 m resolution. The data is projected in New Zealand Map Grid (NZMG, EPSG:27200).

**Source**

Elevation data from LINZ Data Service: <https://data.linz.govt.nz/layer/53405-auckland-lidar-1m-dem-2013/>

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write_raster	<i>Write hillshade to a file</i>
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**Description**

Write an array from a hillshade procedure to a geospatial raster file.

**Usage**

```
write_raster(hillshade, elevation, filename, format, ...)
```

**Arguments**

hillshade	A 2D matrix of shadow intensities.
elevation	Original elevation raster.
filename	Character. Output filename.
format	Character. Output file type. Passed to raster::writeRaster.
...	Additional arguments passed to raster::writeRaster.

**Value**

This function is used for the side-effect of writing values to a file.

**Author(s)**

Pierre Roudier

**Examples**

```
library(rayshader)

out_fn <- paste0(tempfile(), ".tif")

# Create elevation matrix
el_mat <- maungawhau %>%
  raster_to_matrix()

el_mat %>%
  # Create hillshade layer using
  # ray-tracing
  ray_shade() %>%
  # Add ambient shading
  add_shadow_2d(
    ambient_shade(
      heightmap = el_mat
    )
  ) %>%
  write_raster(
    elevation = maungawhau,
    filename = out_fn
  )
```

# Index

## \* datasets

- maungawhau, 4
- maungawhau\_hr, 5

add\_shadow\_2d, 2

hillshader, 3

matrix\_to\_raster, 3

- maungawhau, 4

- maungawhau\_hr, 5

write\_raster, 5