

R Environment for Environmental Sciences

Many ecological analyses cannot be re-run two years later, or trusted if they can. These four packages fix four reasons why.

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Looking for my next adventure, let's talk

Reproducibility is not one tool, it's a sequence.

01.

renv Locked environments

PROBLEM

Your whole analysis runs today. In two years, after silent package updates and a move to another server, it won't. No record of what it depends on, no versions, no way back.

SOLUTION

renv gives each project its own package library and records every version in **renv.lock**. One call restores the exact environment, anywhere, anytime, including from Zenodo five years on.



KEY FUNCTIONS

init()
snapshot()
restore()

02.

pins Shared, versioned data

PROBLEM

You clean a dataset, need it in four places, email it around, it gets updated, and months later nobody knows which version was used.

SOLUTION

pins keeps one canonical copy on a shared board locally, on the iDiv server or online. One URL, always current, versioned so you can roll back. **pin_read()** is the same call on every machine.



KEY FUNCTIONS

pin_write()
pin_read()
pin_versions()

03.

testthat Verified assumptions

PROBLEM

A function silently renames a column. Your pipeline drops 300 rows, and nothing errors. You find out at submission, three months after the pipeline ran.

SOLUTION

Write expectations in code: column names, value ranges, and no duplicates, checked at every step. **checkmate** adds compact argument checks; **testthat** adds data-frame assertions.



KEY FUNCTIONS

expect_numeric()
expect_identical()
expect_type()

04.

rmarkdown Code and prose, in sync

PROBLEM

The figure came from `analysis_FINAL_v3_USE_THIS.R`. Which parameters? Six months ago, it was obvious.

SOLUTION

rmarkdown keeps code, output, and prose in one document: change the code and every number and figure follows. **Quarto** adds journal templates and cross-references, and turns the same file into a website, book, or talk.



KEY FUNCTIONS

render()
word_document()
pdf_document()

THE WORKFLOW: ALL FOUR, ONCE

```
# 1. locked environment ———— renv

renv::init()

# 2. shared data ———— pins
board <- pins::board_connect()
fish <- pins::pin_read(board, "fish_cleaned")

# 3. validate ———— testthat

testthat::expect_identical(ncol(fish), 8L)
checkmate::assert_data_frame(fish, min.rows = 100L)

# 4. report ———— rmarkdown

rmarkdown::render("fish_report.Rmd") # in sync
```

