GMSE 0.5.0.0 tests: stakeholder variability effects on resource management

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28/04/2020

## Tests of gmse\_apply() scenario simulations: GMSE 0.4.0.13 vs 0.5.0.0

I here aim to run a number of simulations, using gmse\_apply(), varying both user budget and user landownership. I specifically compare the output of simulations run using the current CRAN version of GMSE (0.4.0.13) and the upcoming GMSE 0.5.0.0.

I compare five scenarios, summarised in Table XXX. The first scenario replicates the “default” GMSE parameterisation, where land is distributed evenly among stakeholders, and both user and manager budget are constant and equal. In the second scenario, land distribution remains equal, but the user budget in each time step is a function of yield, and manager budget in turn is a function of users’ budgets (equal to a the sum of a fixed proportion of user budgets). In scenarios 3-5, user and manager budgets are calculated in the same way as scenario 2, but in addition land ownership varies between users, with variability increased from scenario 3-5 (details below).

In the output below, I have repeated the five scenarios three times. The first and second set are run using the current GMSE version (0.4.0.13). The first set uses the default GMSE resource movement, i.e. randomly across the landscape. In the second set, I have implemented an extra function which controls resource movement in between gmse\_apply() calls (details below, but in summary, in each time step, each resource moves to a cell with maximum yield within its movement range). The third and final set of simulations uses the updated GMSE 0.5.0.0, using the newly available parameters consume\_surv, consume\_repr and times\_feeding to link resource reproduction and survival to consumption (setting res\_birth\_type = 0 and res\_death\_type = 0).

As plotted below, each scenario consists of 20 replicates of 100 time steps.