

BASE

Competition and habitat destruction on metapopulations



Does habitat destruction affect in the same way species with different competitive and colonizing capabilities? To explore this question, let's cut out part of the habitat patches from our last simulations.

Using a spotter



Let's start with the [metapopulation coexistence](#) model, and include the habitat loss as a reduction in the available patches. We can think of this as the introduction of an even stronger competitor. Humanity, with its capability of drastically changing the landscape for its own purposes, is never

extinguished from the habitat patches, and cannot be driven away by other species. A true Darwinian devil¹⁴⁵!

To simulate the competition in metapopulations, we had an argument to specify the fraction of patches to be removed. Its default value was zero, so no patch was removed in earlier simulations.

Let's start with a simulation without habitat loss, in which we have coexistence between two species. The inferior competitor has three times the colonization capability as the superior competitor.

```
tmax=100,  
ncol=20,  
nrow=20,  
fi1=0.1,  
fi2=0.1,  
i1=0.3,  
i2=0.9,  
pe=0.15,  
D=0
```

As the D argument controls the fraction of patches to be removed:

1. Try to destroy 5% of the habitat¹⁴⁶.
2. Raise the habitat destruction up to 40%, in 5% intervals.

The graph shown has a dotted horizontal line, that shows the fraction of patches occupied in equilibrium for each species with no habitat loss. Try to investigate the effect that the loss of habitat exerts over the coexistence and the occupancy fraction of each species.

Questions

1. How does habitat destruction affect each species? What is the difference between the two species?
2. Can habitat destruction turn the coexistence possible?
3. What is the biological interpretation for this?

To learn more

- Law, R. (1979) Optimal life-histories under age-specific predation. *Am. Nat.* 114, 399-417.
- Nee, S. and May, R.M. (1992) Dynamics of metapopulations: habitat destruction and competitive coexistence. *Journal of Animal Ecology*, 61:37-40.
- Stevens, M.H.H. (2009) *A primer in ecology with R*. New York, Springer.

in case you are intrigued with the results, see page 261 of the last reference above.

145)

Law (1979)

146)

Only do this in the virtual world! In real life, habitat destruction is a despicable attitude, albeit common

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