

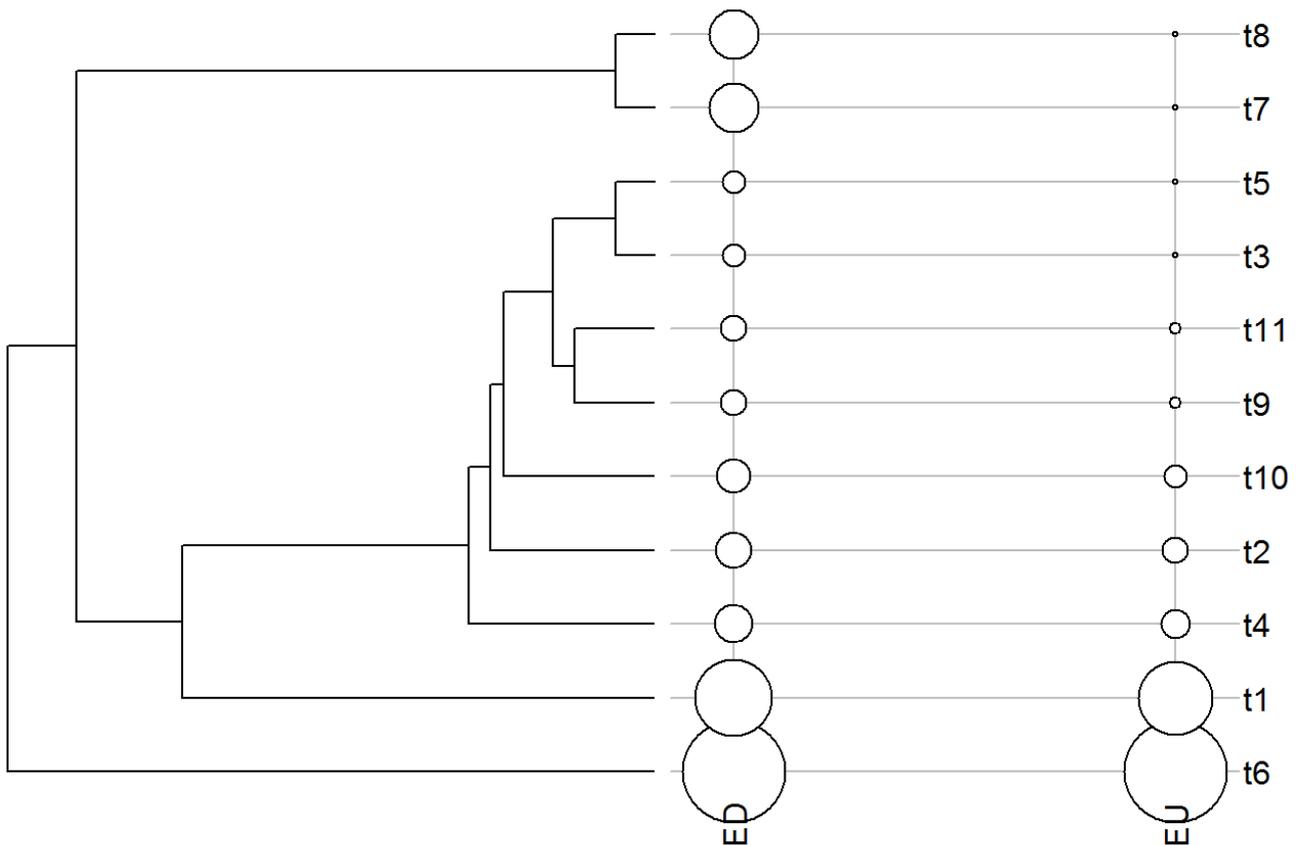
# Appendix S1

## Drivers of phylogenetic diversity loss: species loss and non-random extinction of species

A loss of phylogenetic diversity (PD) with urbanization may result of two processes: species loss and non-random loss of evolutionarily distinctive and unique species. This is an example to illustrate these processes

We start with a phylogeny containing 11 species, which will represent the community before urbanisation. As is easy to see, the species in the phylogeny differ in evolutionary distinctiveness (ED) and uniqueness (EU).

```
tree4 <- as(ctree, "phylo4")  
tree4d <- phylo4d(tree4, tip.data=dat) # We add data  
plot(tree4d)
```



The PD for the entire community is 3.039. Now we investigate how PD changes when the region is urbanised and some species are extirpated. This is depicted with red in the following figure.

We observe that while increasing the number of extinctions decreases PD (cases A-B, C-D, E-F), the loss of PD can be very different depending on the evolutionary distinctiveness and evolutionary uniqueness of the extirpated species. For example, the loss of PD is higher in D than in B because the species that are lost are evolutionarily more distinctive (despite not differing in evolutionary uniqueness).

The comparison between the cases A and E is also interesting. Despite the fact that the species t5 and t8 show similar degree of evolutionarily distinctiveness, the elimination of t9 causes a much higher PD loss. This is because t9 is more evolutionarily unique than t5.

Instead, eliminating t3 (case A) or t7 (case C) makes no difference, despite that they exhibit differences in evolutionary distinctiveness. This highlights the importance of evolutionary uniqueness in PD, which in this case does not differ between species. The situation changes when we compare the cases B and D. Now the extinction of t7 and t8 causes a higher loss of PD because it implies the extinction of an entire highly distinctive lineage. Although our example focuses on extirpations, the addition of new species (exploiters and exotics) would similarly influence PD by equivalent processes.

