

Appendix S5

Model code:

```
model{

#antecedent effects and effects of temperature and soil moisture, current conditions
for(s in 1:4){ #sites
for(y in 5:20){ #years

#current
temp1[s,y]<-temp[s,y,6]*v[1]+temp[s,y,7]*v[2]+temp[s,y,8]*v[3]
temp2[s,y]<-temp[s,y-1,6]*v[1]+temp[s,y-1,7]*v[2]+temp[s,y-1,8]*v[3]
temp3[s,y]<-temp[s,y-2,6]*v[1]+temp[s,y-2,7]*v[2]+temp[s,y-2,8]*v[3]

T[s,y]<-V[1]*temp1[s,y]+V[2]*temp2[s,y]+V[3]*temp3[s,y]

ET[s,y,1]<-exp(-0.5/b[1,1]*pow((T[s,y]-a[1,1]),2)) #effect on control
ET[s,y,2]<-exp(-0.5/b[1,2]*pow((T[s,y]-a[1,2]),2)) #effect on n add

sm1[s,y]<-sm[s,y,6]*w[1]+sm[s,y,7]*w[2]+sm[s,y,8]*w[3]
sm2[s,y]<-sm[s,y-1,6]*w[1]+sm[s,y-1,7]*w[2]+sm[s,y-1,8]*w[3]
sm3[s,y]<-sm[s,y-2,6]*w[1]+sm[s,y-2,7]*w[2]+sm[s,y-2,8]*w[3]

SM[s,y]<-W[1]*sm1[s,y]+W[2]*sm2[s,y]+W[3]*sm3[s,y]
ESM[s,y,1]<-exp(-0.5/b[2,1]*pow((SM[s,y]-a[2,1]),2)) #effect on control
ESM[s,y,2]<-exp(-0.5/b[2,2]*pow((SM[s,y]-a[2,2]),2)) #effect on n add

} #years
} #sites

for(i in 1:1016){ #number of individuals
#missing values
for(t in 1:4){
gr[i,t]~dunif(0.0001,gmax[i]) #for missing values at time 1 to 4
g.h[i,t]~dnorm(gr[i,t],10000)
}

#gmax estimates
gmaxT[i]~dnorm(gmax[i],1)C(0,) # base on individual data, constrained to be positive
```

Appendix S5. Anthropogenic nitrogen deposition ameliorates the decline in tree growth caused by a drier climate. Inés Ibáñez, Donald R. Zak, Andrew J. Burton, and Kurt S. Pregitzer. *Ecology*.

```

for(t in 5:20){ #only 1998 to 2013, to include GROWTH t-1,-2,-3,-4

#effect for previous years growth
A[i,t]<-(ww[1]*gr[i,t-1]+ww[2]*gr[i,t-2]+ww[3]*gr[i,t-3]+ww[4]*gr[i,t-4])
AE[i,t]<-exp(-0.5/b[3,treat[i]]*pow((A[i,t]-a[3,treat[i]]),2))
G[i,t]<-gmaxT[i]*ESM[Site[i],t,treat[i]]*ET[Site[i],t,treat[i]]*AE[i,t]

gr[i,t]~dnorm(G[i,t],tau[treat[i]]) #likelihood
g.h[i,t]~dnorm(G[i,t],tau[treat[i]]) #predictions

}

}

#priors
#antecedent effects

V[1:3]~ddirich(Vm[])
W[1:3]~ddirich(Wm[])
for(j in 1:3){
Vm[j]<-1
Wm[j]<-1
}

w[1:3]~ddirich(wm[])
v[1:3]~ddirich(vm[])
ww[1:4]~ddirich(wwm[])

for(i in 1:3){
wm[i]<-1
vm[i]<-1
}
for(i in 1:4){
wwm[i]<-1
}
for(i in 1:2){#Treatment
for(j in 1:3){
b[j,i]~dunif(0,10000)
}
}
}

```

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```
}  
a[1,i]~dnorm(18,0.001)  
a[2,i]~dnorm(-1,0.0001)  
a[3,i]~dnorm(0.5,0.0001)  
}  
for(i in 1:2){tau[i]<-1/var[i]  
var[i]~dunif(0,100)  
}  
  
}end model
```