PLANNING

Make decisions about:

* What is the purpose of the project
* What is the goal of the project (how the output will look like)?
* What are the inputs that I need for the model?
* Classification of life stages (will use it when I make the model more realistic) (literature search)
* Model
* Assumptions of the model

R-CODING

* Generate a dummy community at year 0 with 4 species and 4 life stages (seed, seedling, sapling, adult)
* Generate matrix of parameters
* Matrix multiplication
* Generate a function that look through the output and report a community structure at a specific time

“BELLS & WHISTLES”

* Make it more realistic
* More detail when I get here

**DETAIL**

PLANNING

Purpose of the project: To develop a model projecting the forest community structure in the future

Output that I am aiming for: an array with matrices of populations structure of different species as components

For example: If the community has s species, the output will be an array with s matrices, each matrix has t rows (t = time (year)) with four columns reporting number of individuals in each stage (seed, seedling, sapling, adult). Below is the first component of the array: the population structure of species 1

[ , , 1]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | seed | seedling | sapling | adult |
| 1 | Ns11 | Nsl11 | Nsa11 | Na11 |
| 2 | Ns12 | Nsl12 | Nsa12 | Na12 |
| … | … | … | … | … |
| T | Ns1t | Nsl1t | Nsa1t | Na1t |

Ns11 = Number of seeds of species 1 at year 1

Nsl12 = Number of seedling of species 1 at year 2

Inputs for the model

1. Matrix of community structure at time 0, columns are life stages and rows are species

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | seed | seedling | sapling | adult |
| 1 | Ns10 | Nsl10 | Nsa10 | Na10 |
| 2 | Ns20 | Nsl20 | Nsa20 | Na20 |
| … | … | … | … | … |
| s | Nss0 | Nsls0 | Nsat0 | Nat0 |

1. Matrix of transition rates for each species

Seed : mortality (Ms), germination rate (Gs) \*\*(Ms +Gs = 1)

Seedling : mortality (Msl), transition rate (Gsl) \*\*

Sapling : mortality (Msa), transition rate (Gsa)

Adult : mortality (Ma), Reproduction rate (Ra), Maximum size

Ns1 = Na0\*Ra

Nsl1 = Nsl0 - Nsl0\*Msl + Ns0\*Gs

Nsa1 = Nsa0 – Nsa0\*Msa – Nsa0\*Gsa + Nsl0\*Gsl

Na1 = Na0 – Na0\*Ma + Nsa\*Gsa

|  |  |  |  |
| --- | --- | --- | --- |
| 0 | Gs | 0 | 0 |
| 0 | 1-Msl | Gsl | 0 |
| 0 | 0 | 1-Msa-Gsa | Gsa |
| Ra | 0 | 0 | 1-Ma |

1. Time (t)

Model

Community at time t+1 = community at time t \* transition matrix

Assumptions

There is no dormancy