## Requirements

The goal of this Simulation is to show how much human action influences the biomass of the Abdoulaye forest.

* 1. One Scenario is consist of following parts
     1. Several forest patches
        1. The amount of patches is variable per simulation run
     2. Villages (Section 4)

## Forest Patch

* 1. The size of the patches is defined by Christian UML- size model
  2. The smallest resolution is a Witthaker patch
  3. Each Forest patch has a vegetation Type. Following types exist in this simulation.

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Type of Vegetation | Type Trees | Bounds when a Type of Vegetation change |
| 1 | Dense Forest | TODO which Trees live in which Vegetation type | TODO import Bounds from Hodabalos model |
| 2 | Dry Forest |  |  |
| 3 | Savanna |  |  |
| 4 | Gallery Forest |  |  |

* 1. The type of vegetation per patch is dependent on the amount, demeter and the height of the trees, in this patch.

## Trees

* 1. The height and Demeter of each tree increase over time to a defend threshold
  2. Each Tree has a species. Following tree species are existing in the simulation.

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Species | Expensive value |  |
| 1 | *Anogeissus leiocarpa* | 5 |  |
| 2 | *Pterocarpus erinaceus* | 4 |  |

*0 = not expensive; 5 = very expensive*

* 1. The amount of trees can decrease by human actions. Following actions can decrease the amount of trees in one patch.

(improved Model)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Type of Action | Cause of Action | Impact on the Forest | Trees Target |
| 1 | Wood cutting | Cut trees to sell the wood(main targets are expensive trees) | Loss of Trees/BioMass | Expensive |
| 2 | Grazing | farm animals Graze small trees and saplings | small Tree and saplings in this patch die | Small Trees |
| 3 | Bushfire | Lay a bushfire for hunting animals | Most of the young trees die and some adult trees are affected as well | All |
| 4 | Make Coal | Cut Trees to make coal | Loss of Trees/Biomass and Soil degradation | All |
| 5 | Honey Production | Cut trees to get the bee hive | Loss of Trees/BioMass | All Trees with Honey |

* + 1. The amount of how many human actions will occure against tree is dependent of the population number.
    2. The location, in which patch the action takes place location of the village, the villager live in.
    3. The number of Trees increase over seed spreading (section 3.3)

### Development of Trees

* + 1. TODO integrate the state model from Hodabalo

### Seed spreading of Trees

* + 1. TODO according to the particle idea?

### Influence of the environmental change

* + 1. The following parameters influence the growth of trees
       1. Temperature
       2. Soil moisture
       3. Soil P.H.
       4. Rain fall

## Villages

* 1. Each village has a position
  2. Each village has a population
  3. The position and the population can be obtained from Mars – Shuttle
  4. Each Village has an influence area, in which it can influence the forest
     1. The influence area of an village is models with an polygon, or heat map
     2. The Data how the polygon is shaped can be obtained from a shape file(MARS - Shuttle)

## Glossary

|  |  |
| --- | --- |
| Term | Description |
| Compact soil | A compact soil is bad for the regeneration of trees |