# Asynchronous effects of vegetation protection on landform evolution

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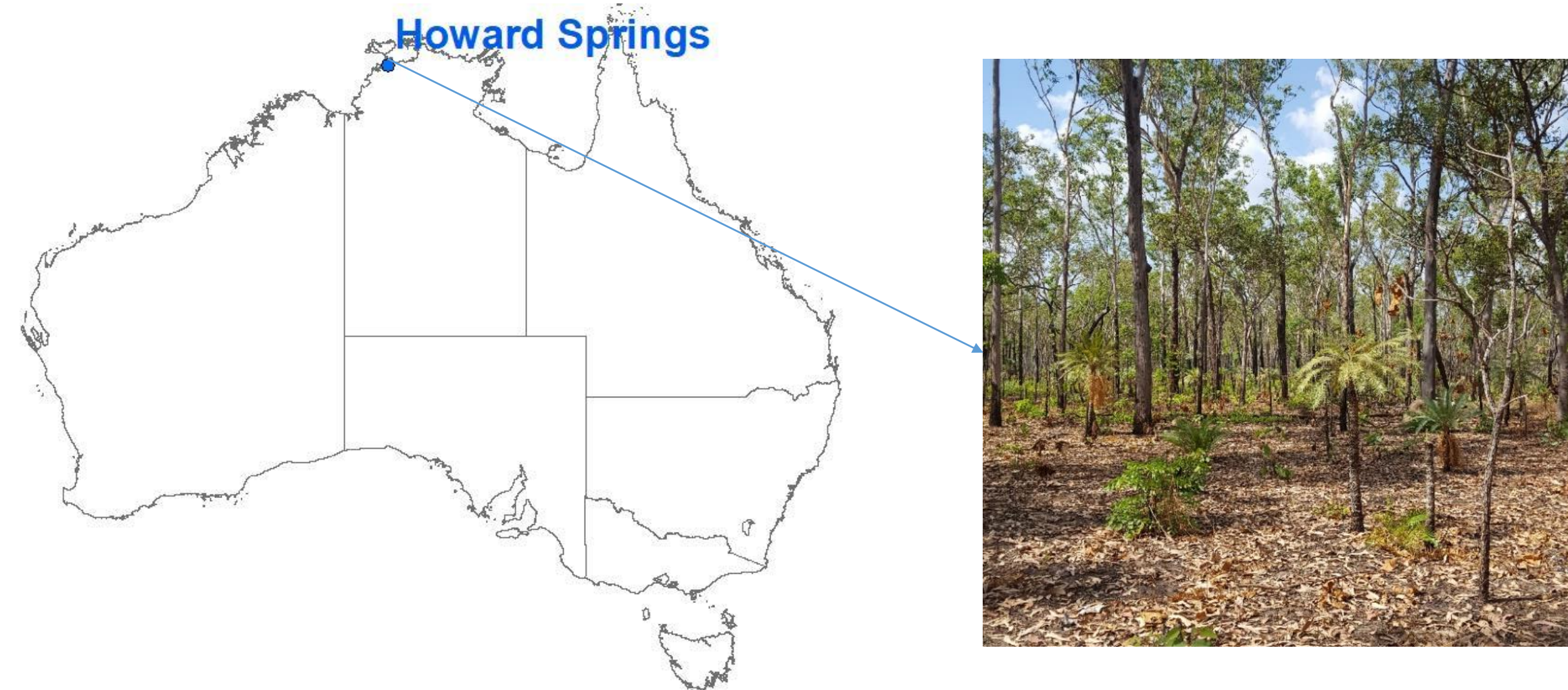
## 1. Introduction

- Vegetation affects soil erosion processes through various mechanisms
- Modelling studies have dedicated little attention to incorporate and capture effects of dynamic biomass/soil pools on erosion rates
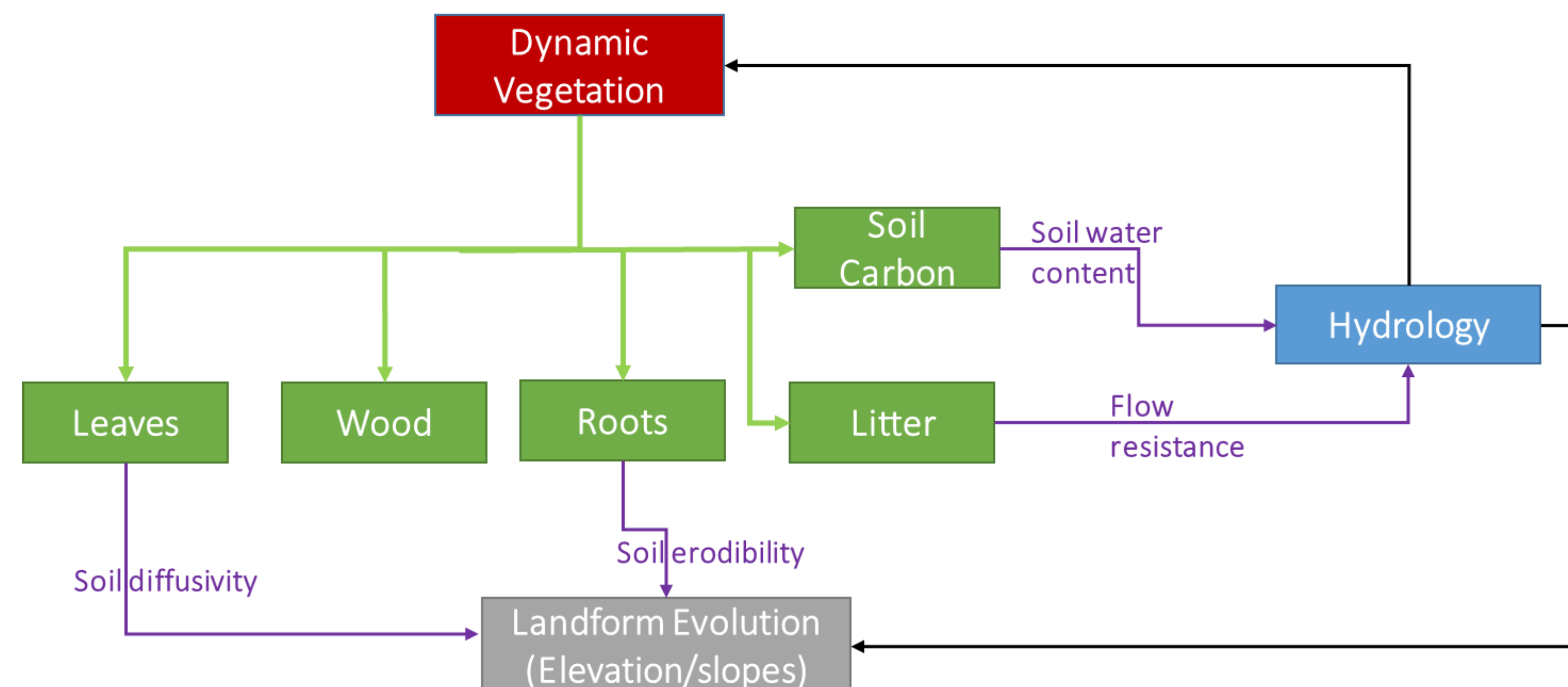


**Study Area:** Howard Springs (Northern Territory, Australia) a tropical open woodland savannah

## 2. Objectives

Analyse the changes in erosion rates by considering the effect of:
(1) Root biomass on soil erodibility
(2) Leaf cover on soil diffusivity
(3) Litter on flow resistance
(4) Soil carbon on soil infiltration
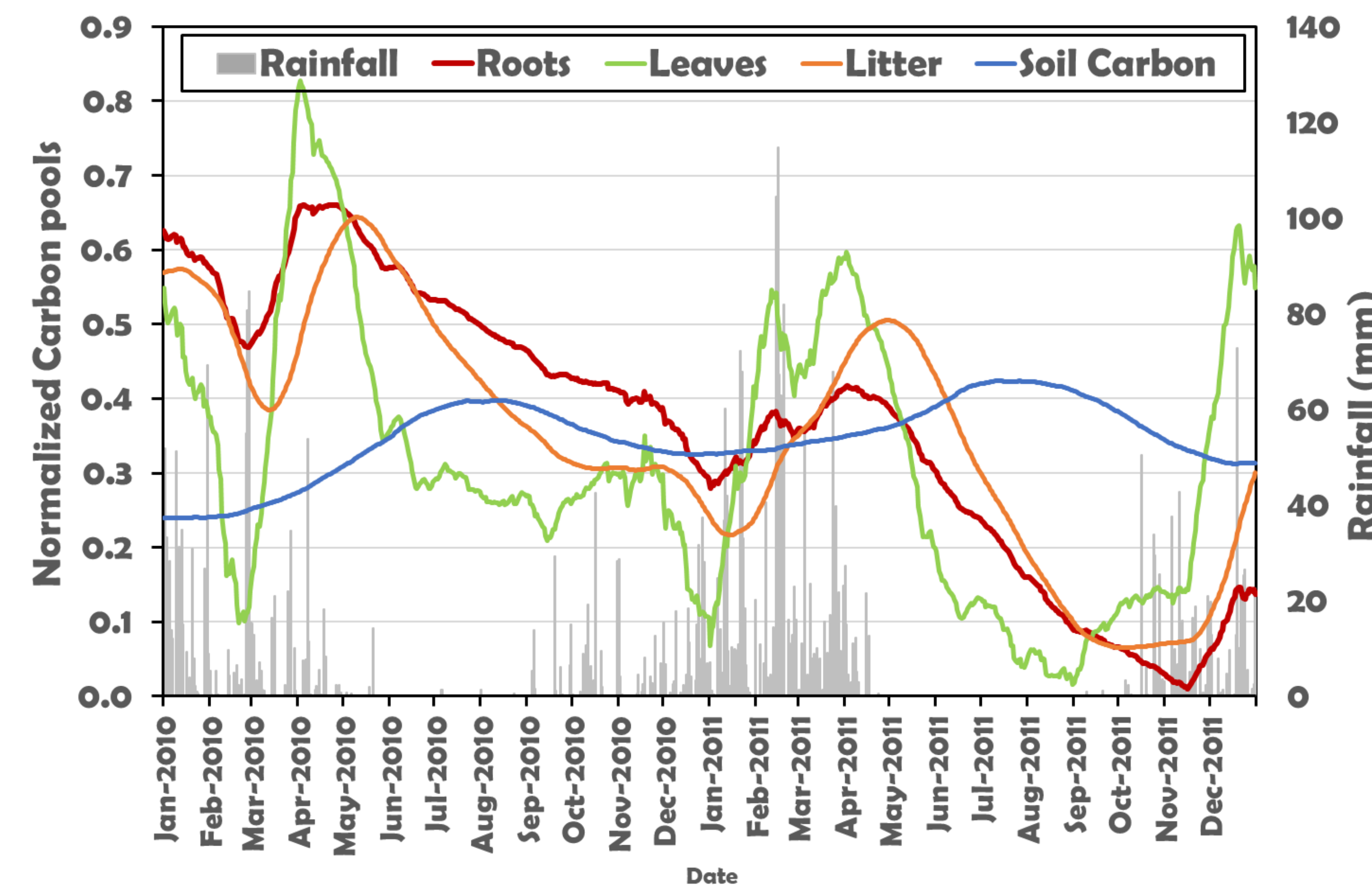
## 3. Modelling framework



## 4. Simulation Scenarios

- Daily time step
- The model was calibrated using data from the OZFLUX Howard Springs station and caesium-137 measurements found in Loughran & Elliott, 1996.
- Analysis when one or two vegetation parts were included in the model as dynamic variables with the remaining vegetation parts included with their constant values.
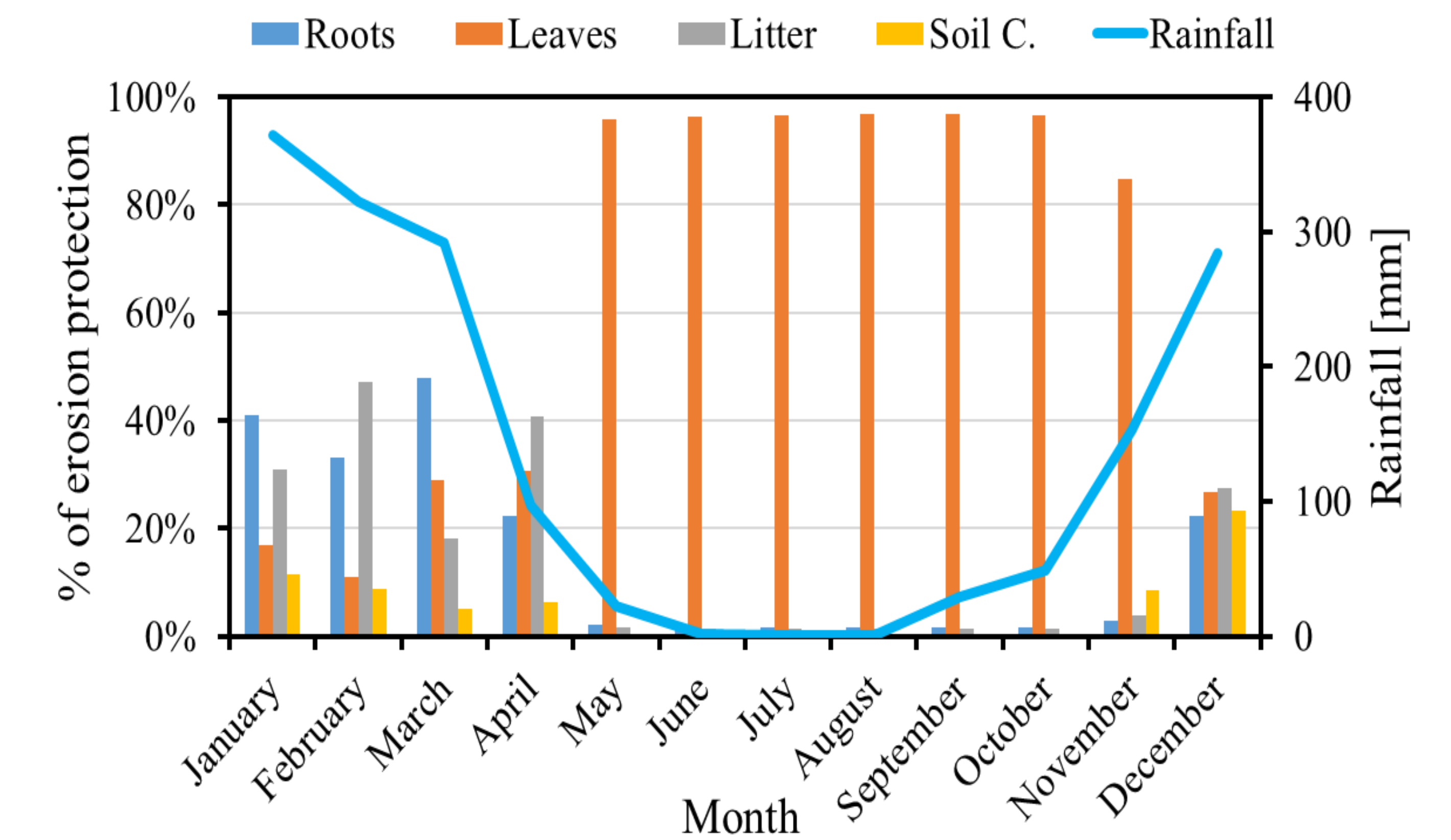
## 5. Results

### 5.1 Vegetation protection and rainfall are asynchronous



- Seasonal and inter annual variations in carbon pools
- Maximum values of protection provided by individual pools against soil erosion do not occur simultaneously
- Substantial vegetation growth typically lagging behind substantial rainfall events

### 5.2 Different relative contribution of biomass/soil pools



- For Howard Springs, roots and litter are the most important factors that control erosion in wet season
- In dry season leaves are important intercepting the rainfall diminishing diffusive erosion processes (splash)

## 6. Conclusions

- Vegetation protection and the rainfall are asynchronous
- Biomass/soil pools provide maximum protection against erosion at different times of the year
- Importance of including biomass pools in order to understand and better predict erosion

## References

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