HOW TO USE THE DSS TOOL C.A.F.E.

Webminar
October 28th, 2020

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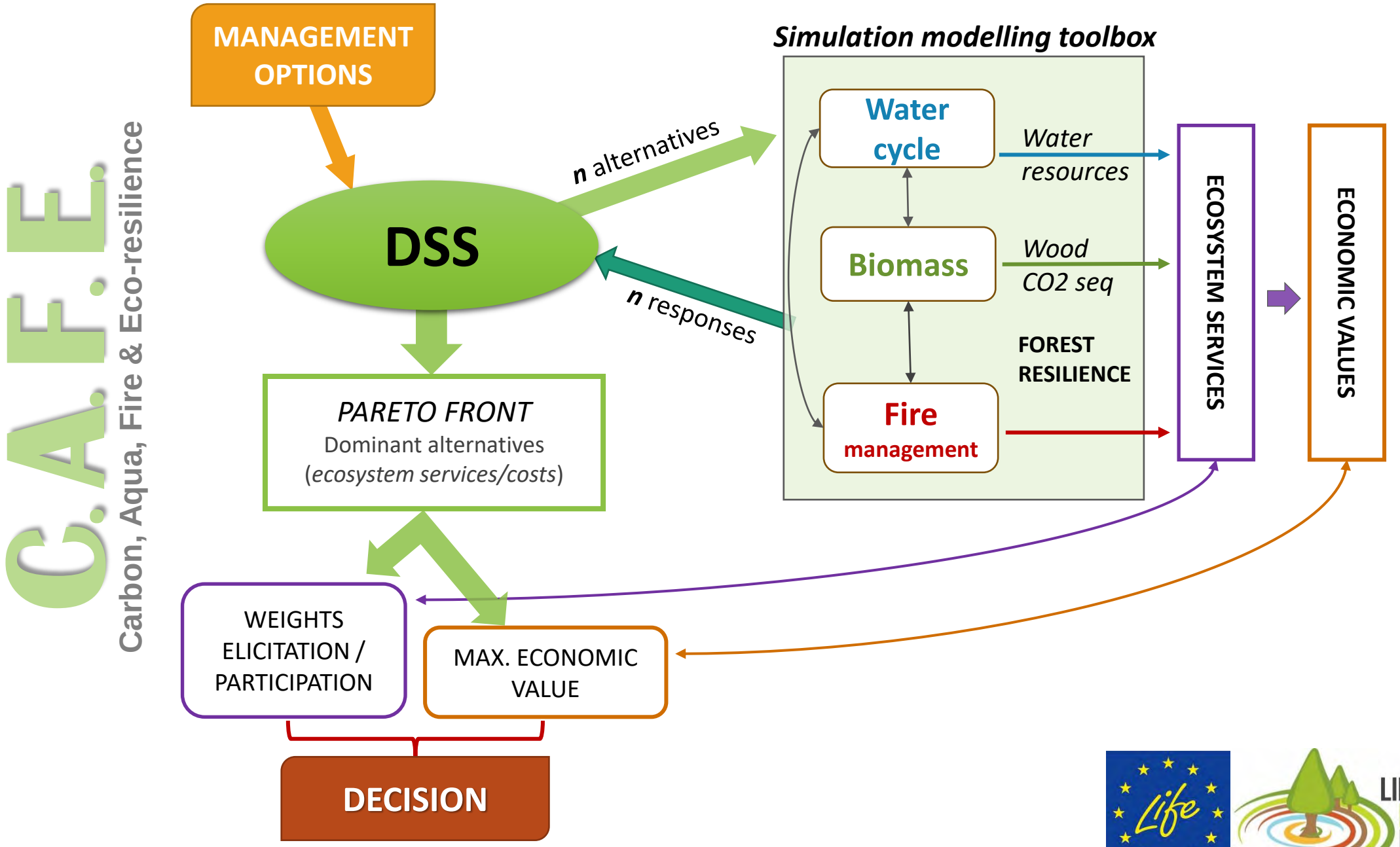
The project *LIFE RESILIENT FORESTS – Coupling water, fire and climate resilience with biomass production from forestry to adapt watersheds to climate change* is co-funded by the LIFE Programme of the European Union under contract number LIFE 17 CCA/ES/000063.


C.A.F.
Carbon, Aqua, Fire & Eco-resilience
MANAGEMENT OPTIONS
DSS
n alternatives
n responses
Simulation modelling toolbox
Water cycle
Biomass
Fire management
Water resources
Wood
CO2 seq
FOREST RESILIENCE
ECOSYSTEM SERVICES
ECONOMIC VALUES
PARETO FRONT
Dominant alternatives
(ecosystem services/costs)
WEIGHTS ELICITATION / PARTICIPATION
MAX. ECONOMIC VALUE
DECISION
LIFE RESILIENT FORESTS

C.A.F.E. Carbon, Aqua, Fire & Eco-resilience

MANAGEMENT OPTIONS

DSS

n ALTERNATIVES

n RESPONSES

PARETO FRONT

ECOSYSTEM SERVICES

ECONOMIC VALUES

DECISION

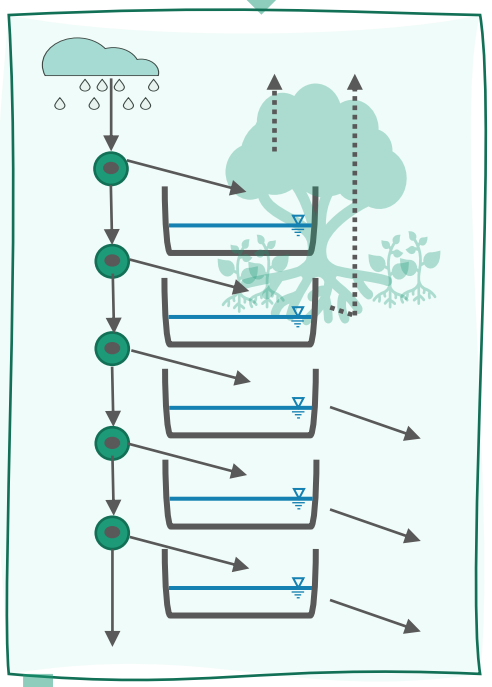
HYDROMETEOROLOGICAL SERIES (P, T, ET_0, RAD)

DEM & DERIVED

LAND COVER & DERIVED

INPUTS

SOIL AND HYDROGEOLOGICAL CHARACTERISTICS



MODELLING WITH ECO-TETIS

OUTPUTS

HYDROLOGICAL FLOW SERIES (*e.g.* RIVER FLOW)

TANKS BALANCES (*e.g.* SOIL MOISTURE)

VEGETATION PERFORMANCE (e.g. LAI)

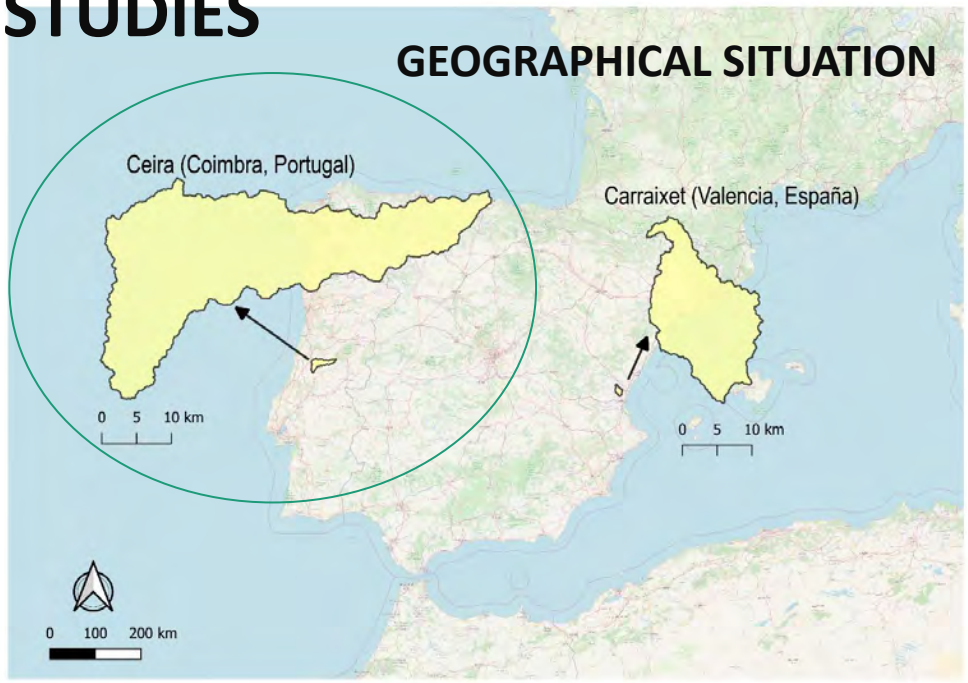
ALTERNATIVES *vs* RESPONSES

KNOWLEDGE OF THE **FOREST RESILIENCE**

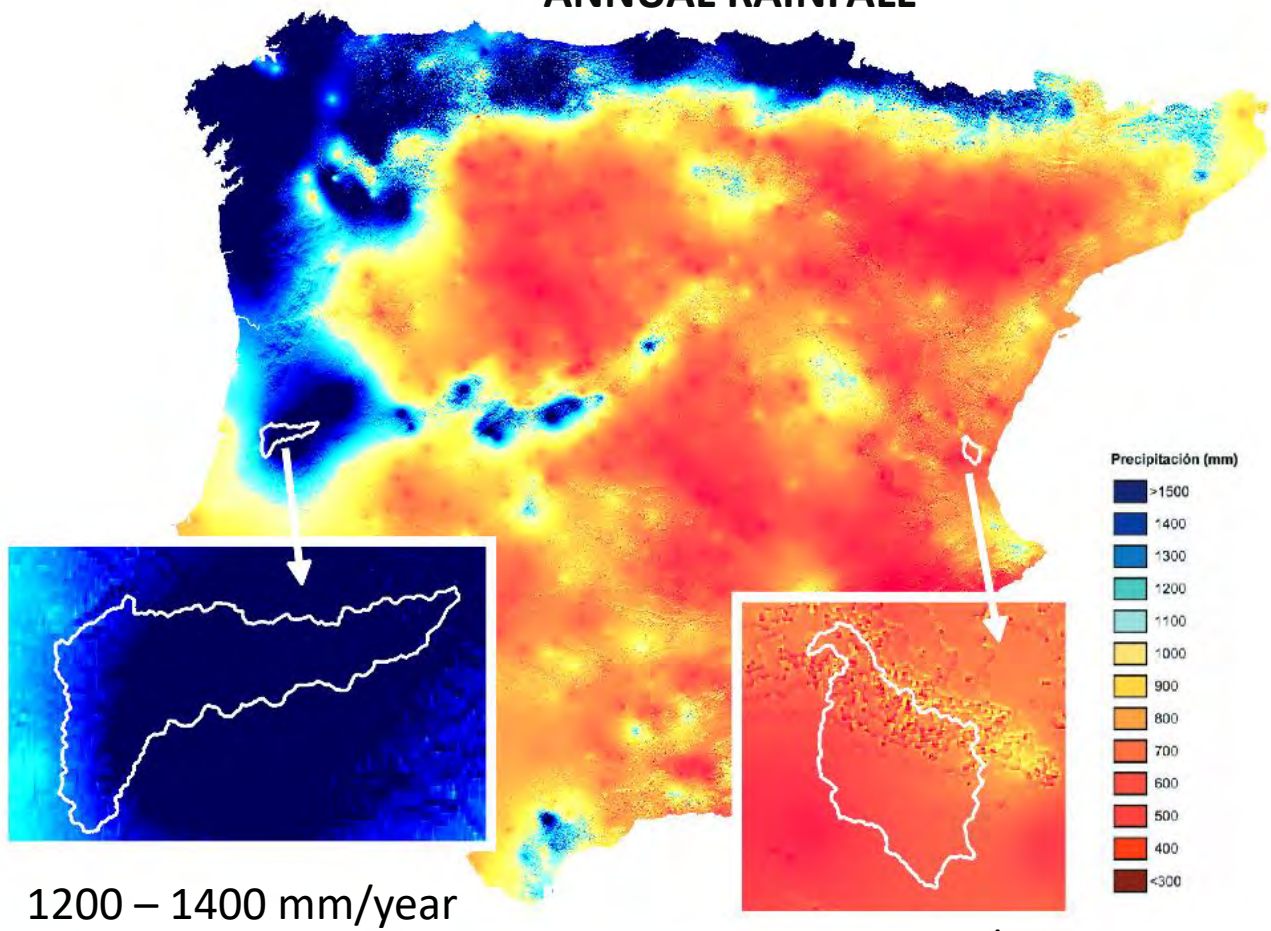
LIFE RESILIENT FORESTS

CASE STUDIES

GEOGRAPHICAL SITUATION

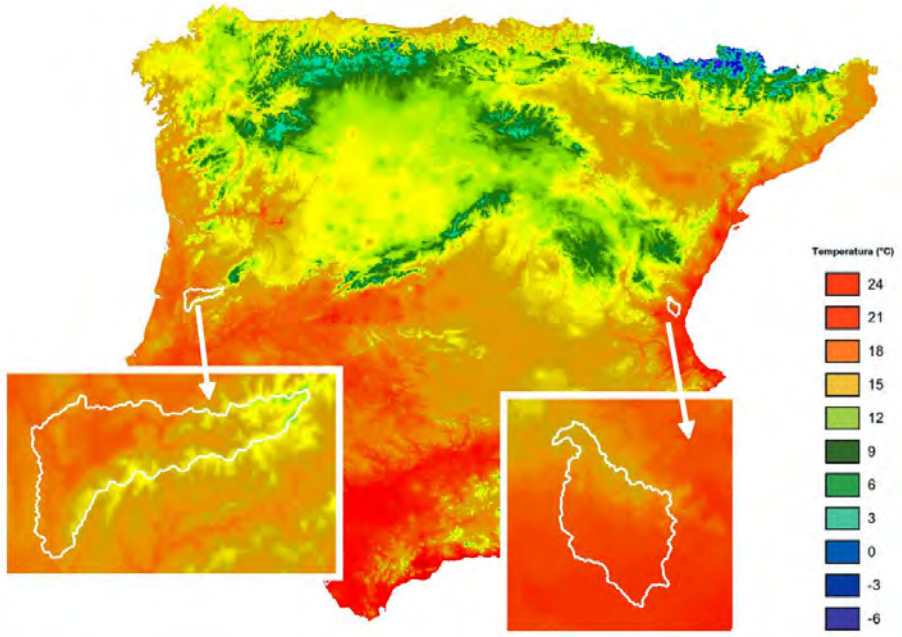


ANNUAL RAINFALL



1200 – 1400 mm/year

400 – 600 mm/year



MEAN TEMPERATURE

Ceira River Basin: 12 - 18 °C (t.a. ± 10 °C)

Carraixet River Basin: 15 - 18 °C (t.a. ± 8 °C)

LIFE RESILIENT FORESTS

CEIRA RIVER BASIN – ECO-HYDROLOGICAL CHARACTERIZATION

SRTM Data FAQ Disclaimer Contact Us CGIAR CSI

Download Manager

- Resampled SRTM data, spatial resolution approximately 250 meter on the line of the equator, for the entire globe are available: (**Click here**)
- **Spatial resolution approximately 30 meter on the line of the equator:**

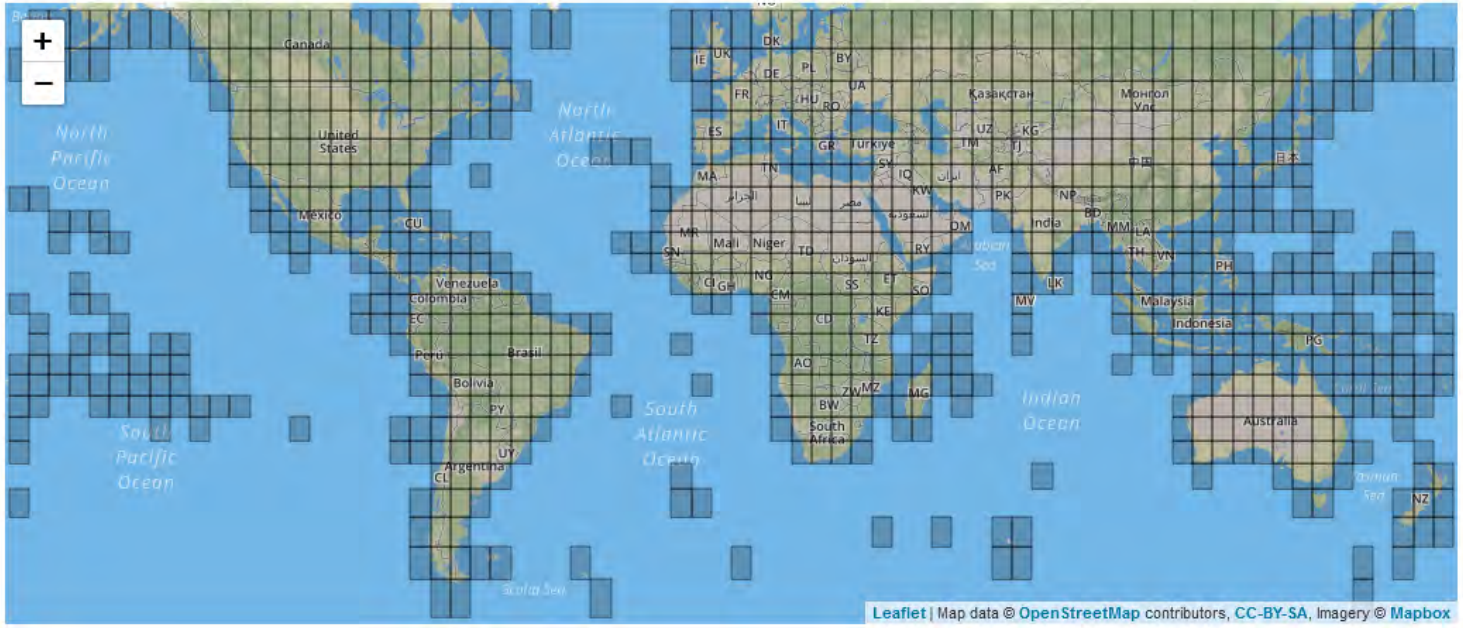
Tile Size

- (•) Tile 5 x 5 degree
- ( ) Tile 30 x 30 degree

Format

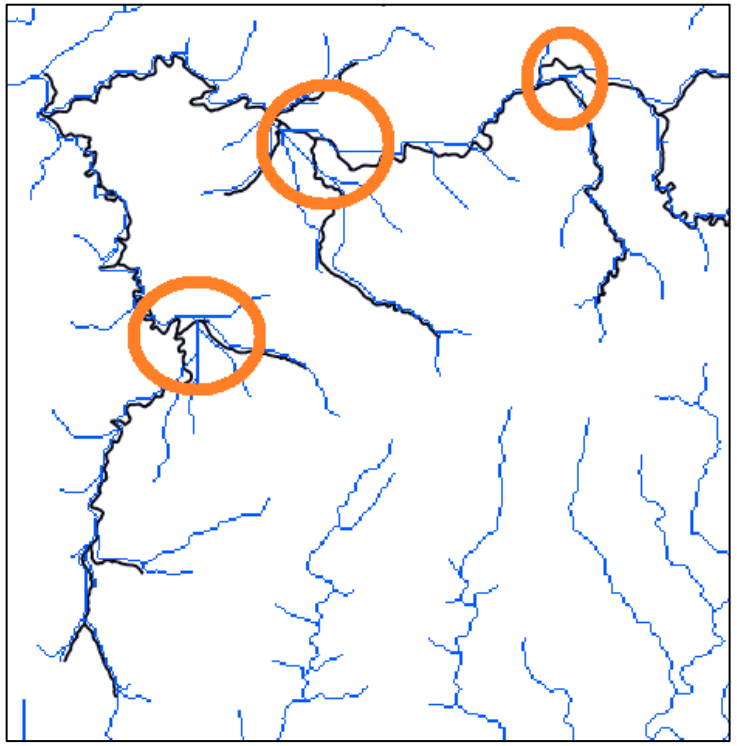
- (•) Geo TIFF
- ( ) Esri ASCII

Search



[SRTM 90m Digital Elevation Data]

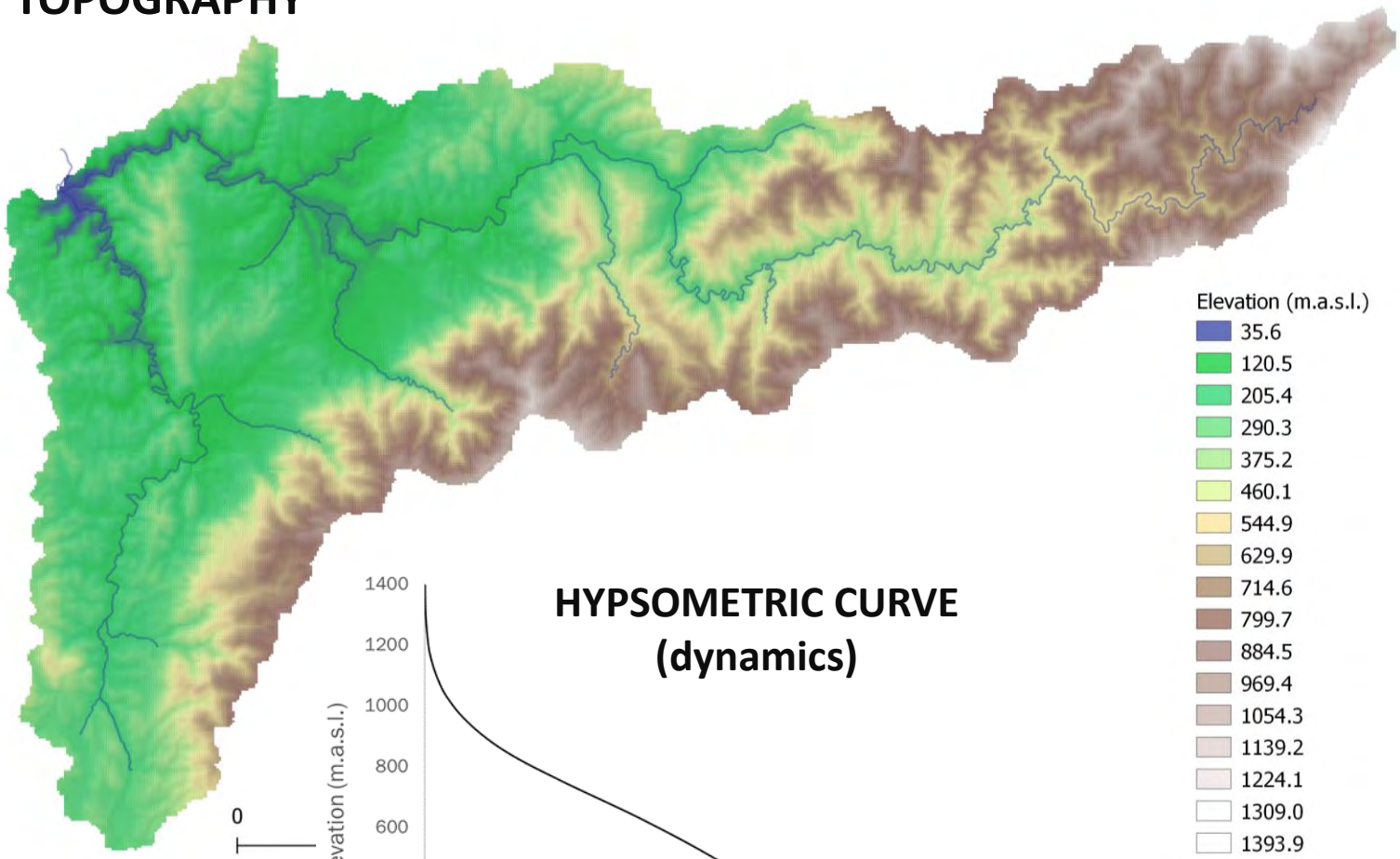
HYDROLOGICAL CORRECTION IS REQUIRED



LIFE RESILIENT FORESTS

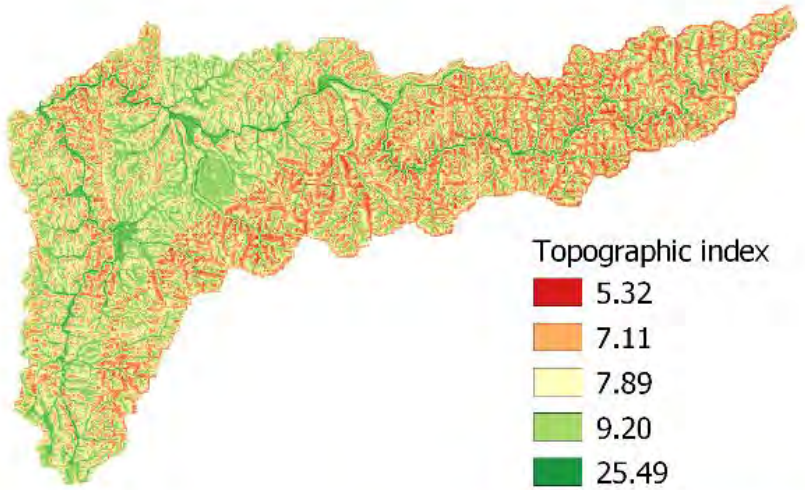
CEIRA RIVER BASIN – ECO-HYDROLOGICAL CHARACTERIZATION

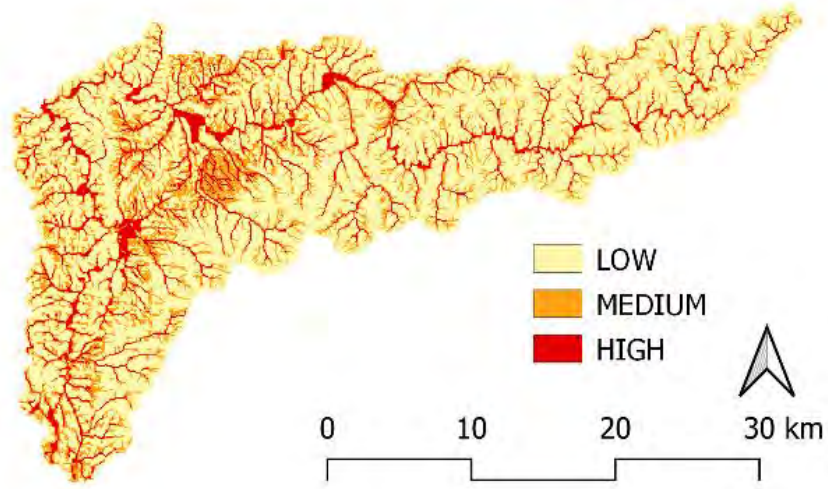
TOPOGRAPHY



HYPSOMETRIC CURVE (dynamics)

TOPOGRAPHIC INDEX (wetness)

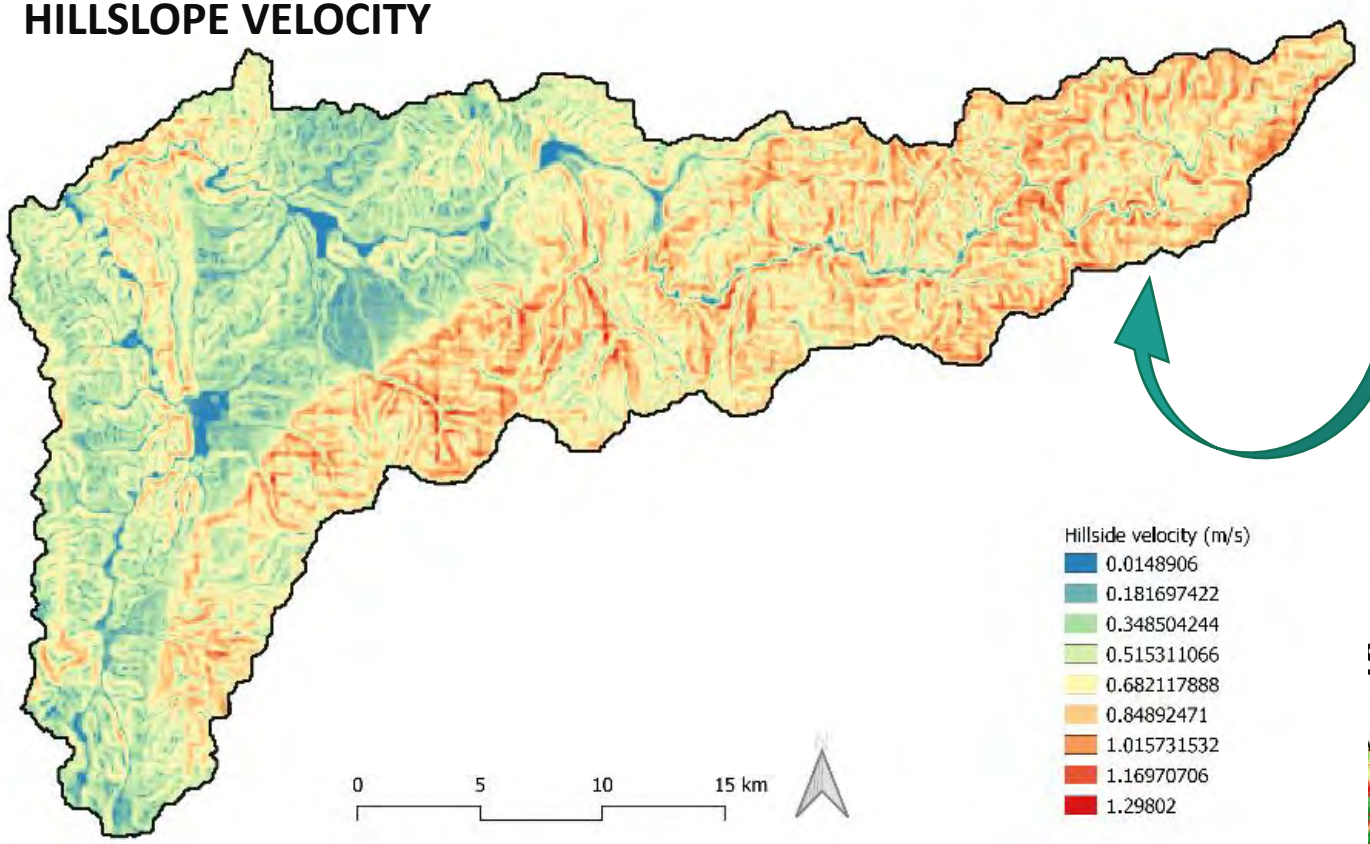




LIFE RESILIENT FORESTS

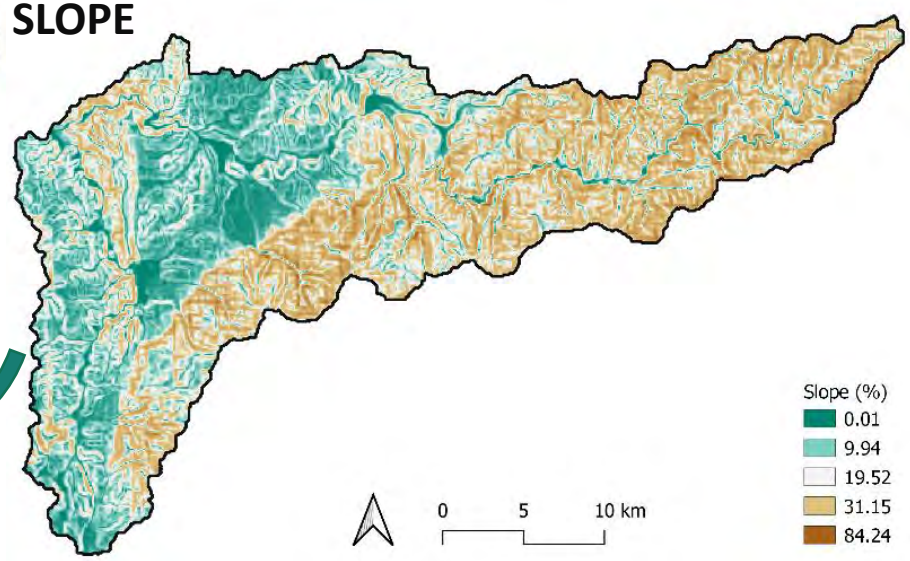
CEIRA RIVER BASIN – ECO-HYDROLOGICAL CHARACTERIZATION

HILLSLOPE VELOCITY

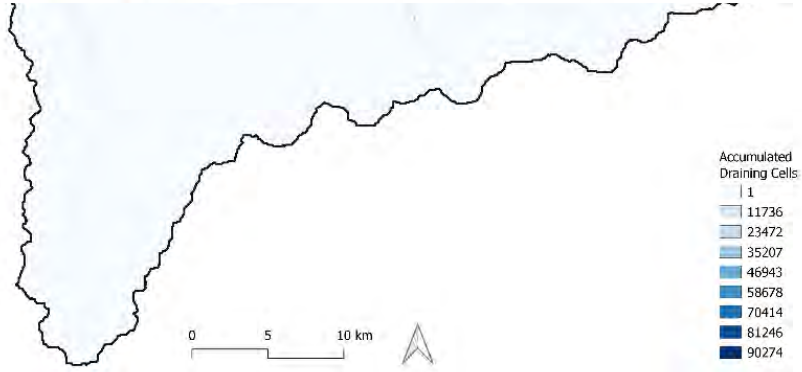


Hillside velocity (m/s)
0.0148906
0.181697422
0.348504244
0.515311066
0.682117888
0.84892471
1.015731532
1.16970706
1.29802

SLOPE

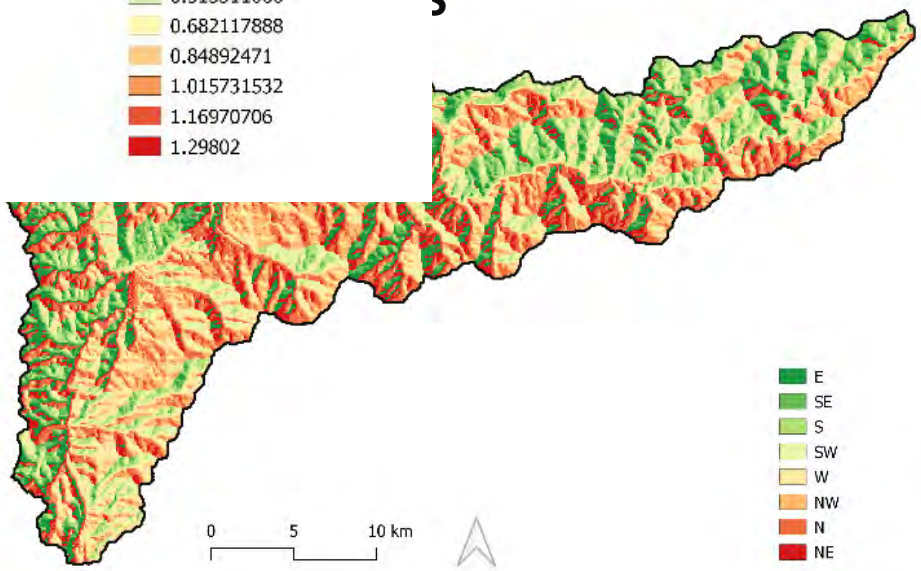


Slope (%)
0.01
9.94
19.52
31.15
84.24



Accumulated Draining Cells
1
11736
23472
35207
46943
58678
70414
81246
90274

S



E
SE
S
SW
W
NW
N
NE

LIFE RESILIENT FORESTS

CEIRA RIVER BASIN – ECO-HYDROLOGICAL CHARACTERIZATION

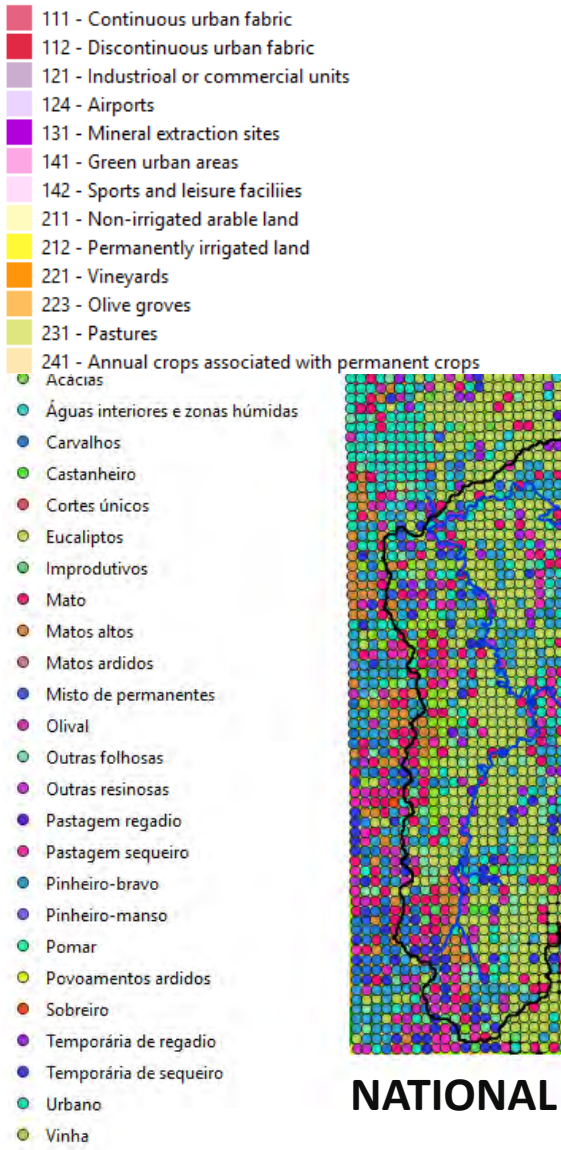
LAND COVER

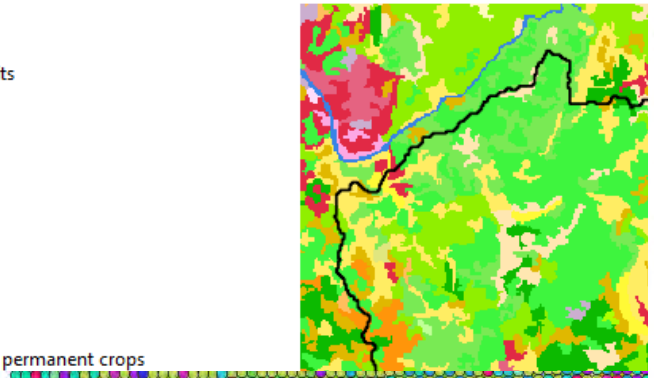
- 111 - Continuous urban fabric
- 112 - Discontinuous urban fabric
- 121 - Industrioal or commercial units
- 124 - Airports
- 131 - Mineral extraction sites
- 141 - Green urban areas
- 142 - Sports and leisure faciliies
- 211 - Non-irrigated arable land
- 212 - Permanently irrigated land
- 221 - Vineyards
- 223 - Olive groves
- 231 - Pastures
- 241 - Annual crops associated with permanent crops
- 242 - Complexcultivation patterns
- 243 - Land principally occupied by agriculture, with signifi
- 311 - Broad-leaved forest
- 312 - Coniferous forest
- 313 - Mixed forest
- 321 - Natural grasslands
- 322 - Moors and heathland
- 323 - Sclerophyllous vegetation
- 324 - Transitional woodland shrub
- 332 - Bare rocks
- 333 - Sparsely vegetated areas
- 334 - Burnt areas
- 511 - Water courses
- 512 - Water bodies

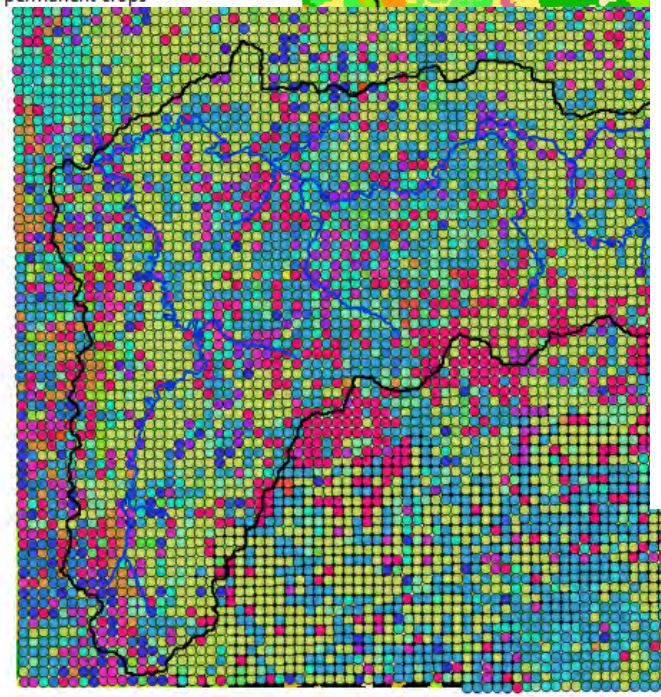
[Corine Land Cover 2018]

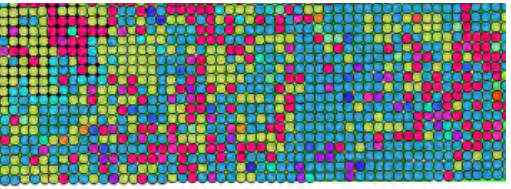
CEIRA RIVER BASIN – ECO-HYDROLOGICAL CHARACTERIZATION

LAND COVER



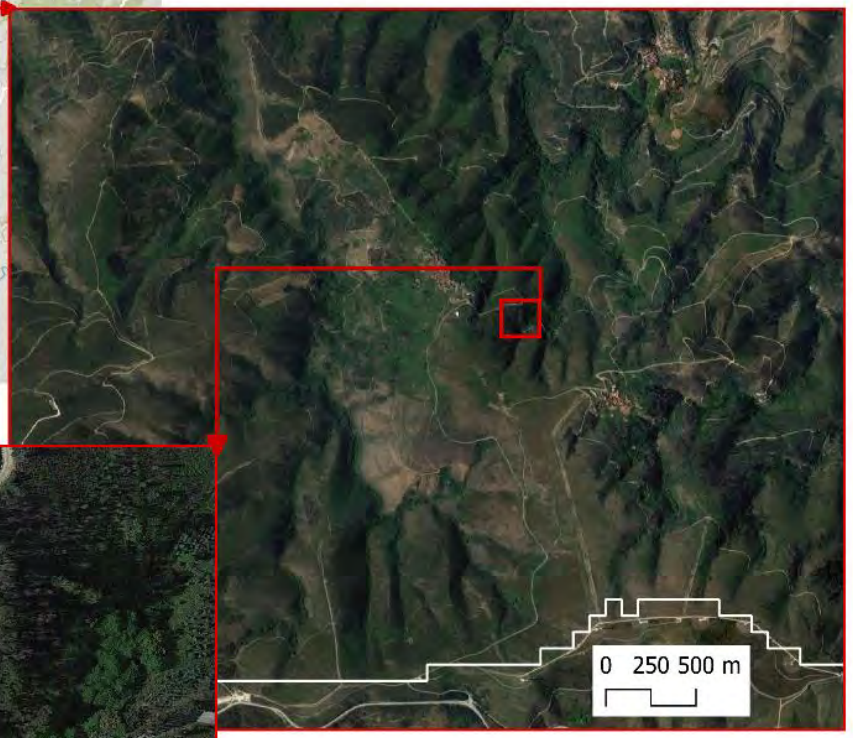






NATIONAL FOREST INVENTORY

BURNT AREAS

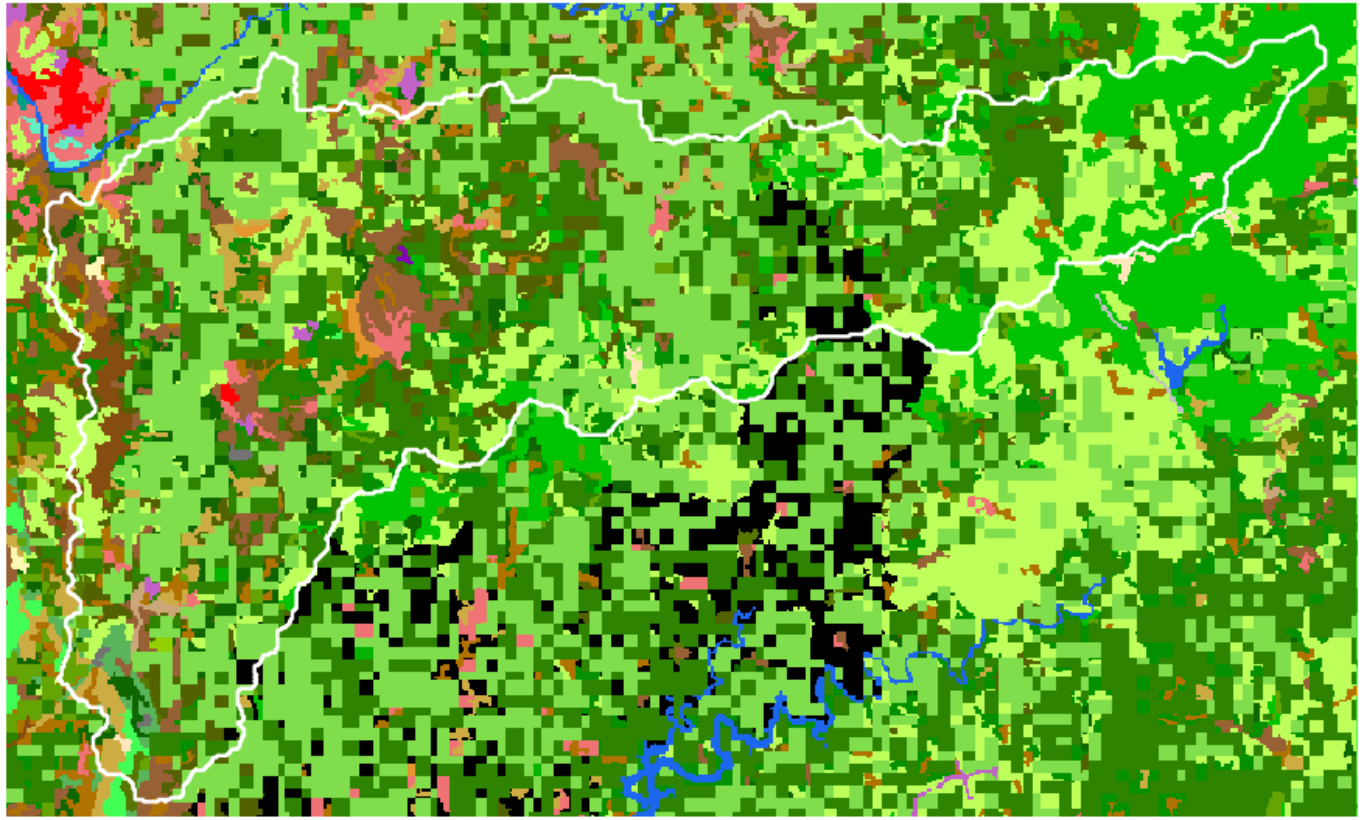


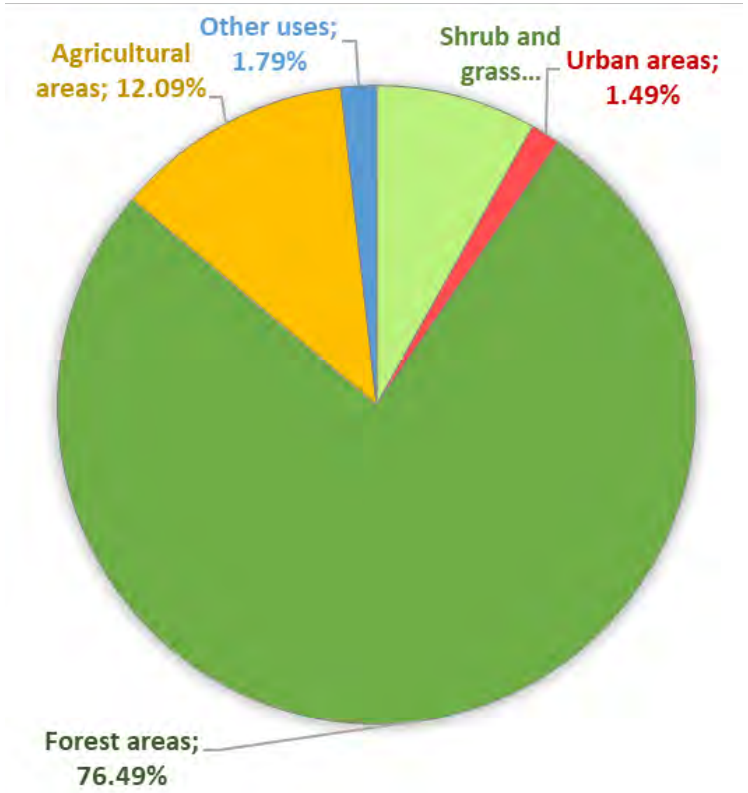
SATELLITE IMAGERY

LIFE RESILIENT FORESTS

CEIRA RIVER BASIN – ECO-HYDROLOGICAL CHARACTERIZATION

LAND COVER





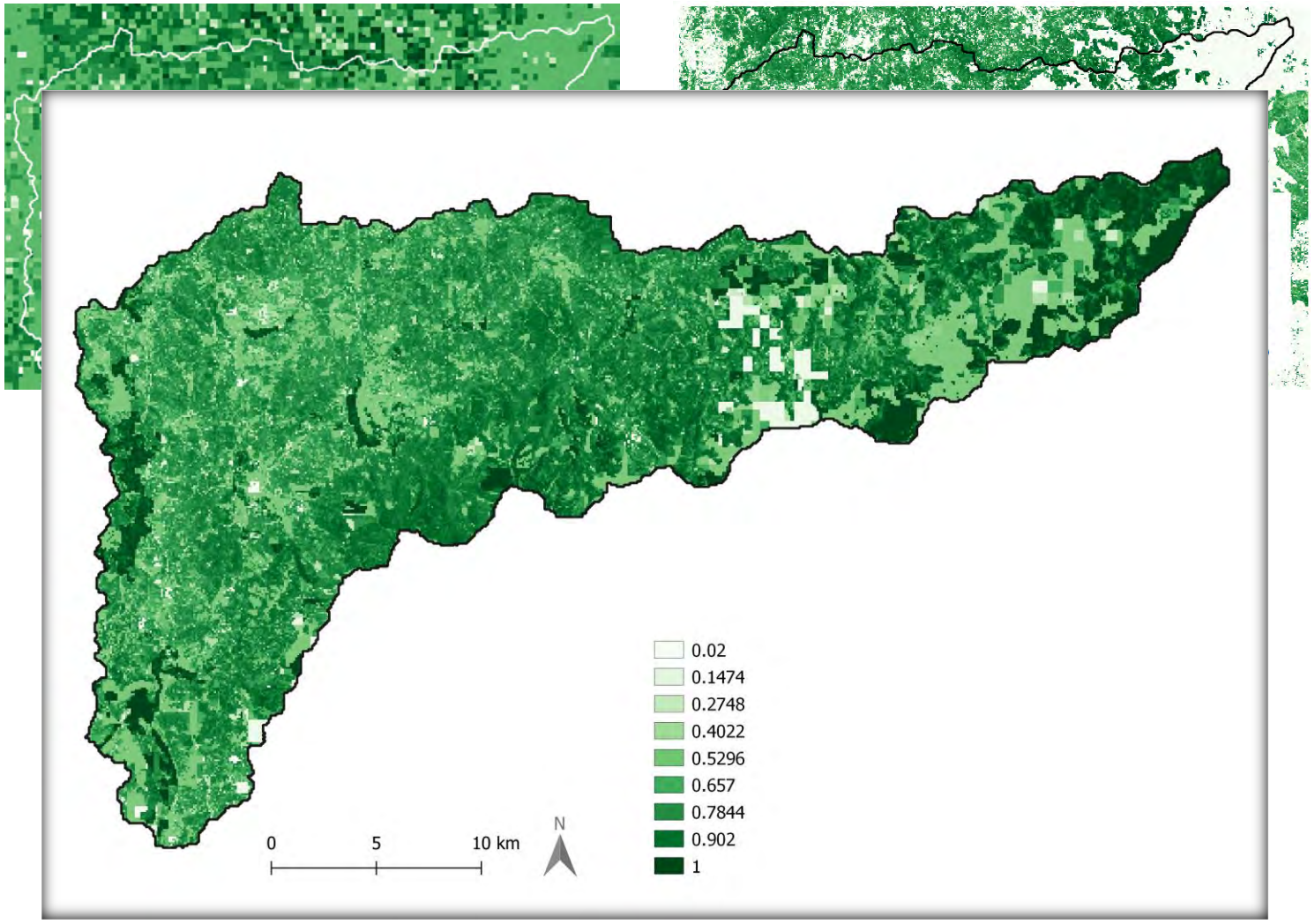
- 2 - Continuous urban fabric
- 3 - Discontinuous urban fabric
- 4 - Industrial or comercial units
- 5 - Airport
- 6 - Mineral extraction sites
- 7 - Green urban areas
- 8 - Sport and leisure facilities
- 9 - Water
- 10 - Bare rocks
- 11 - Non-irrigated arable land
- 12 - Permanently irrigated land
- 13 - Vineyards
- 14 - Olea europea
- 15 - Pastures
- 16 - Eucalyptus globulus
- 17 - Pinus pinaster
- 18 - Quercus robur
- 19 - Acacia dealbata
- 20 - Castanea sativa
- 21 - Pinus pinea
- 22 - Grass
- 23 - Shrub
- 24 - Sclerophyllous vegetation
- 25 - Transitional woodland-shrub
- 26 - Broad-leaved forest
- 27 - Coniferous forest
- 28 - Mixed forest
- 29 - Land principally occupied by agriculture with sig
- 30 - Complex cultivation patterns
- 31 - Annual crops associated with permanent crops
- 32 - Sparsely vegetated areas
- 33 - Burnt areas

LIFE RESILIENT FORESTS

CEIRA RIVER BASIN – ECO-HYDROLOGICAL CHARACTERIZATION

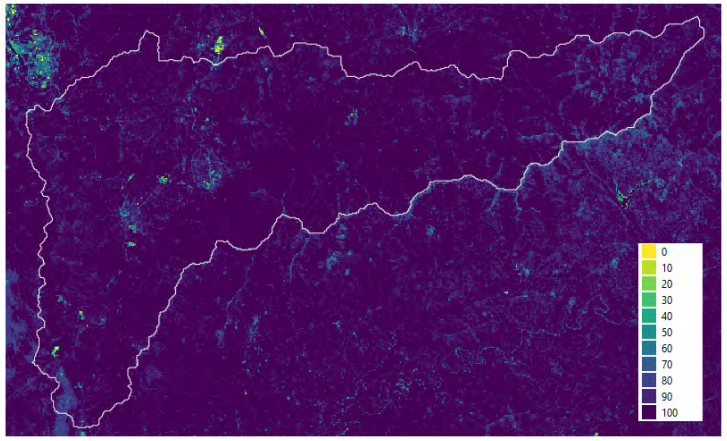
COVERAGE FRACTION

NATIONAL FOREST INVENTORY 2015



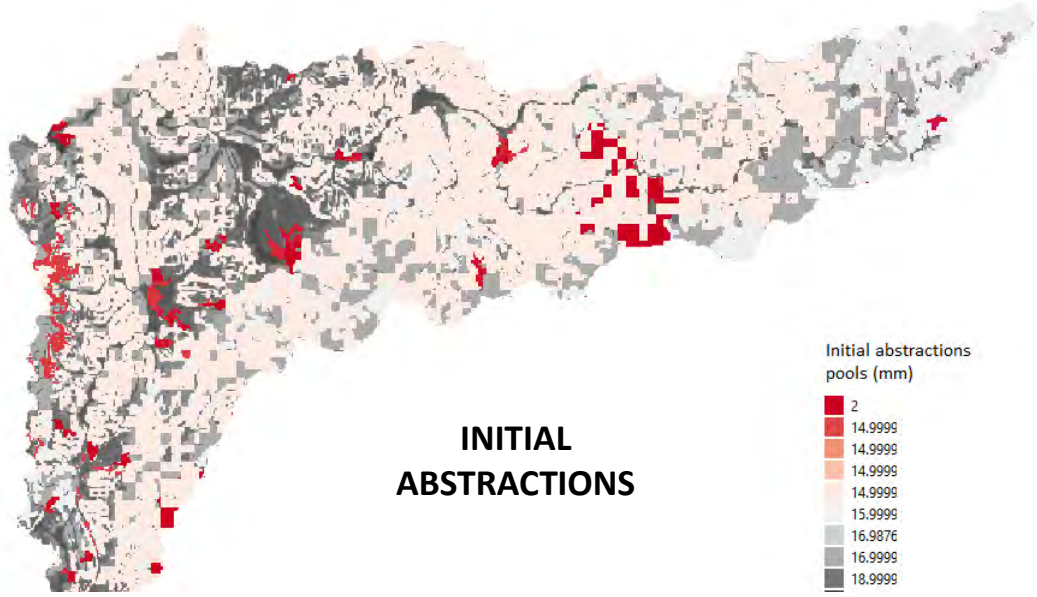
TREE COVER DENSITY 2015 (Copernicus HRL)

GLOBAL BARE SOIL LANDSAT 2015

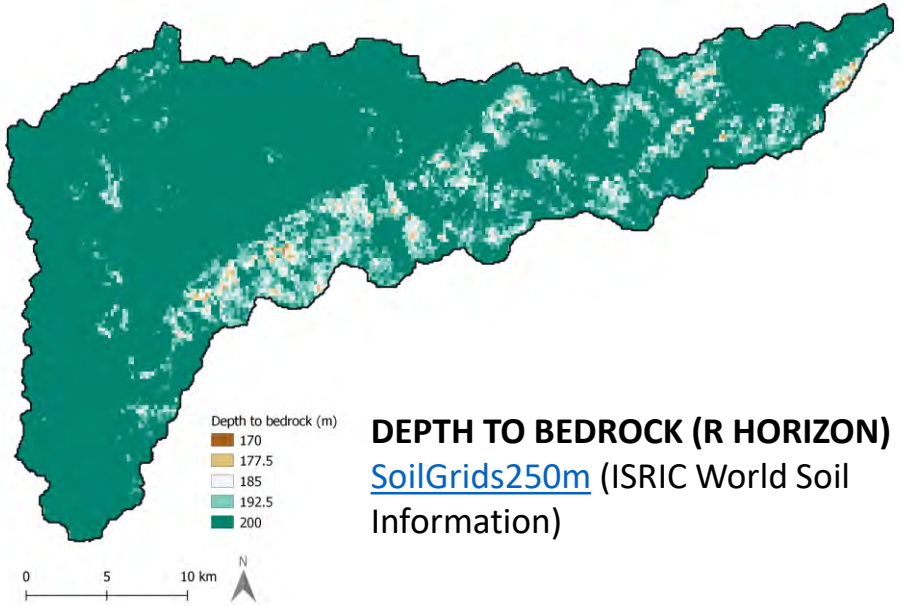


SATELLITE / AERIAL IMAGERY

CEIRA RIVER BASIN – ECO-HYDROLOGICAL CHARACTERIZATION

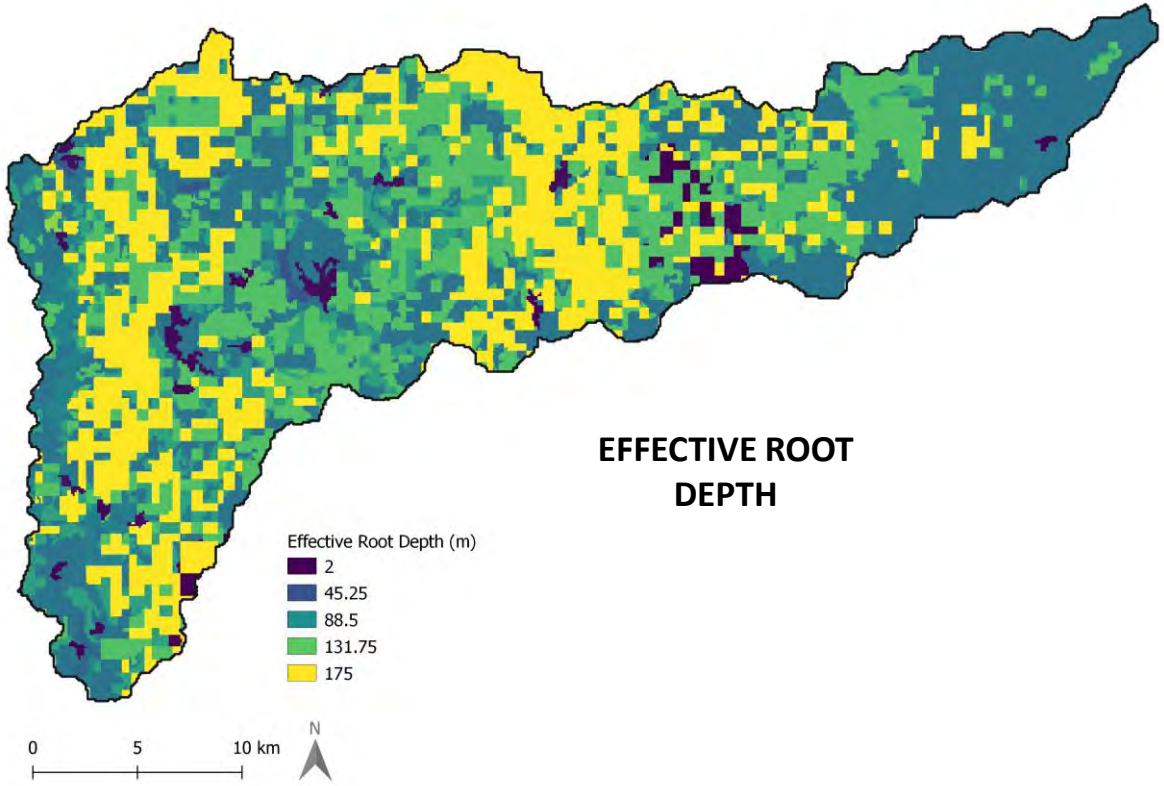


INITIAL ABSTRACTIONS



DEPTH TO BEDROCK (R HORIZON)

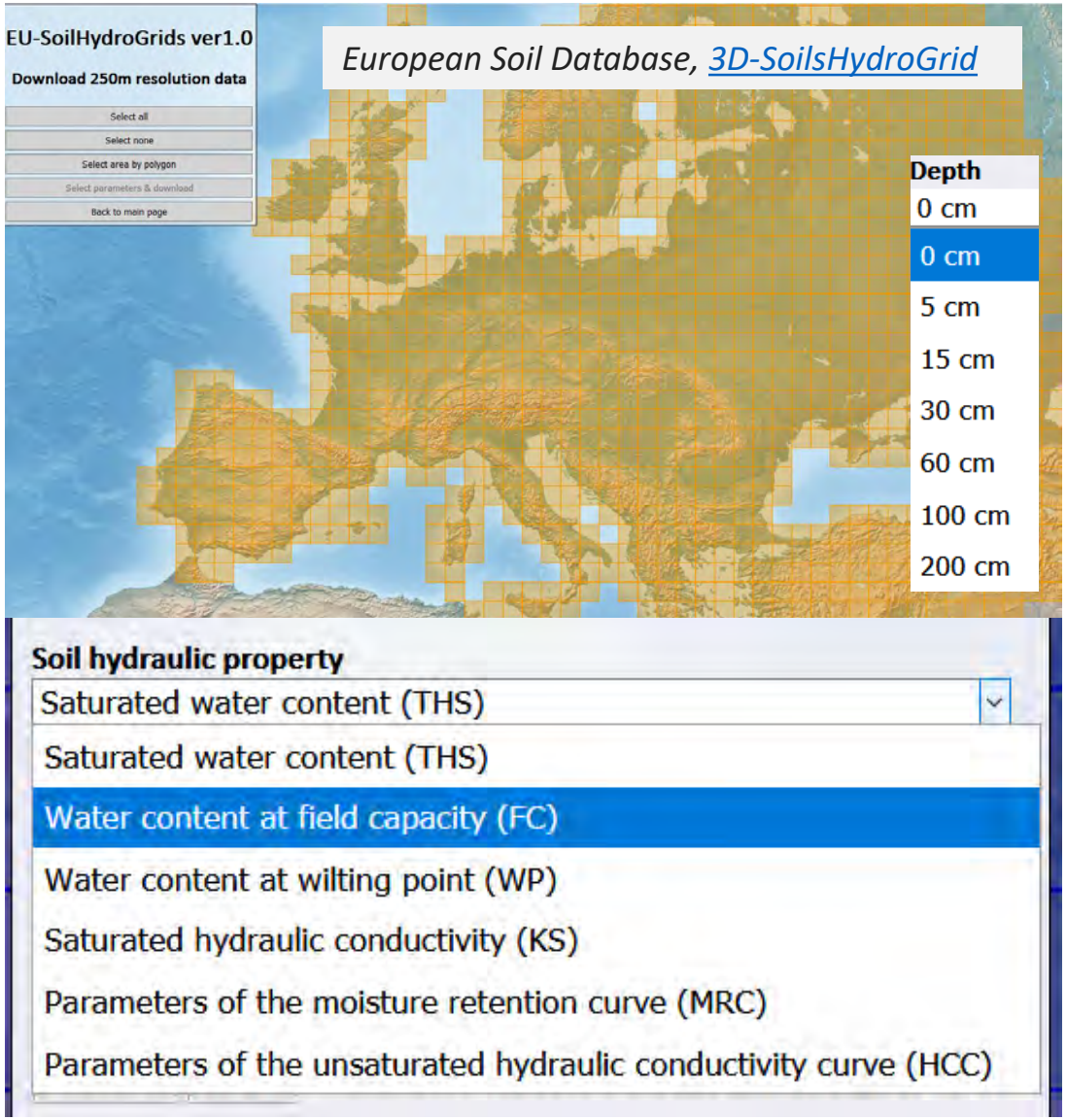
SoilGrids250m (ISRIC World Soil Information)



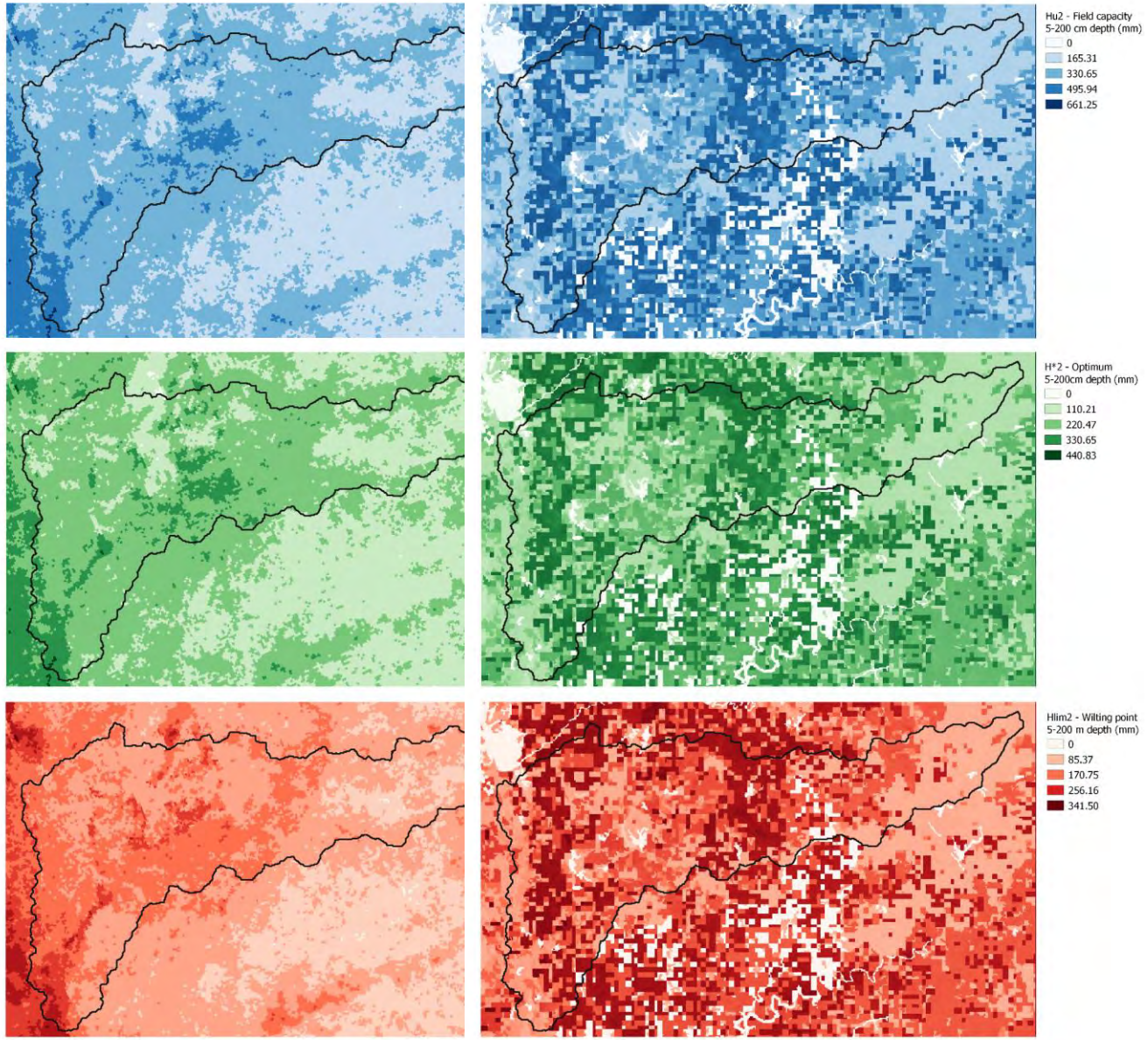
EFFECTIVE ROOT DEPTH

CEIRA RIVER BASIN – ECO-HYDROLOGICAL CHARACTERIZATION

SOIL HYDRAULIC PROPERTIES



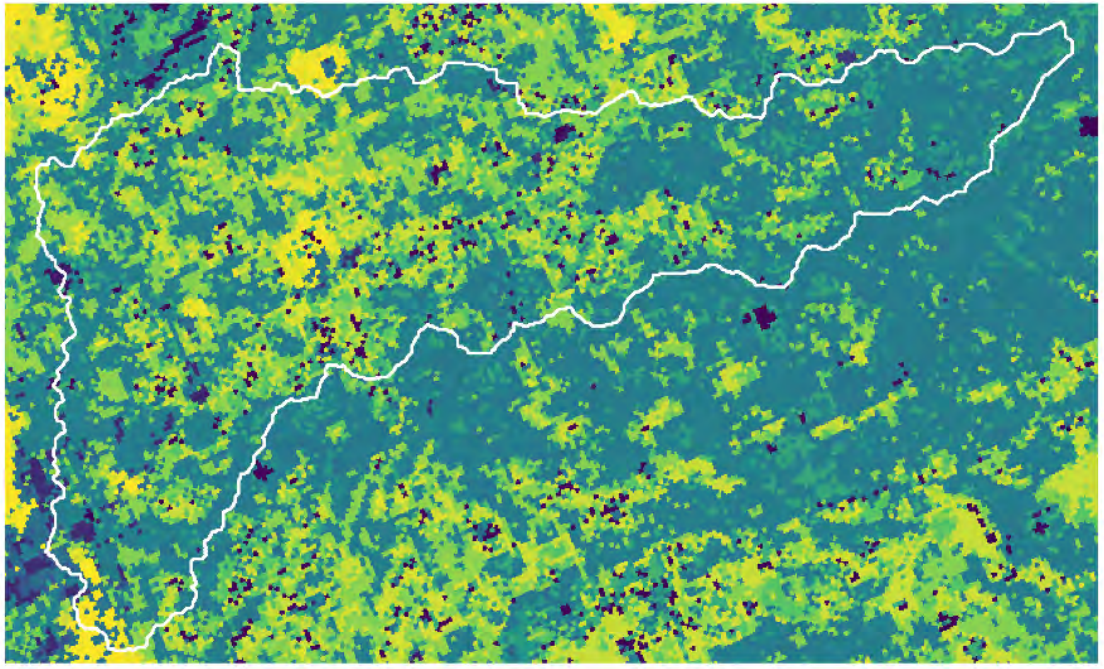
STATIC STORAGE IN SURFACE [0-5CM] AND DEEP [5-200 CM] SOIL LAYERS



CEIRA RIVER BASIN – ECO-HYDROLOGICAL CHARACTERIZATION

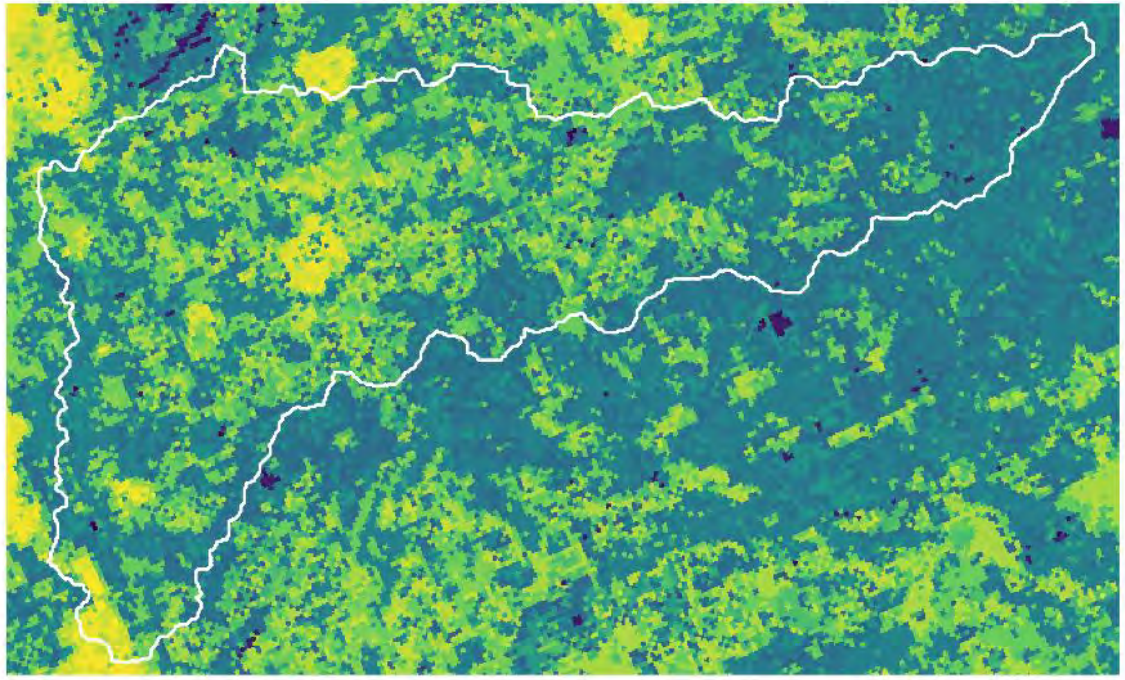
SOIL HYDRAULIC PROPERTIES

SATURATED HYDRAULIC CONDUCTIVITY (*Ks*)



Saturated hydraulic conductivity (mm/h)
- 0.017
- 3.993
- 7.969
- 11.945
- 15.921

SATURATED INTERFLOW CONDUCTIVITY (*Kss*)



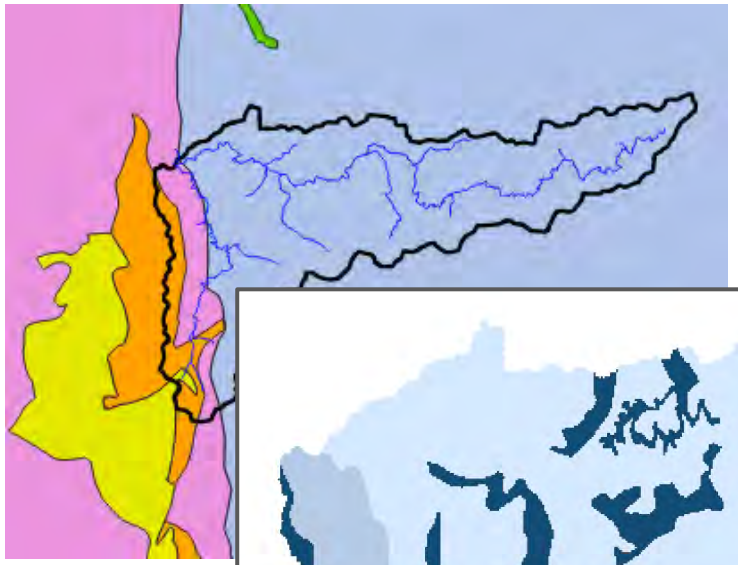
Saturated interflow conductivity (mm/h)
- 1.366
- 5.235
- 9.104
- 12.974
- 16.843

LIFE RESILIENT FORESTS

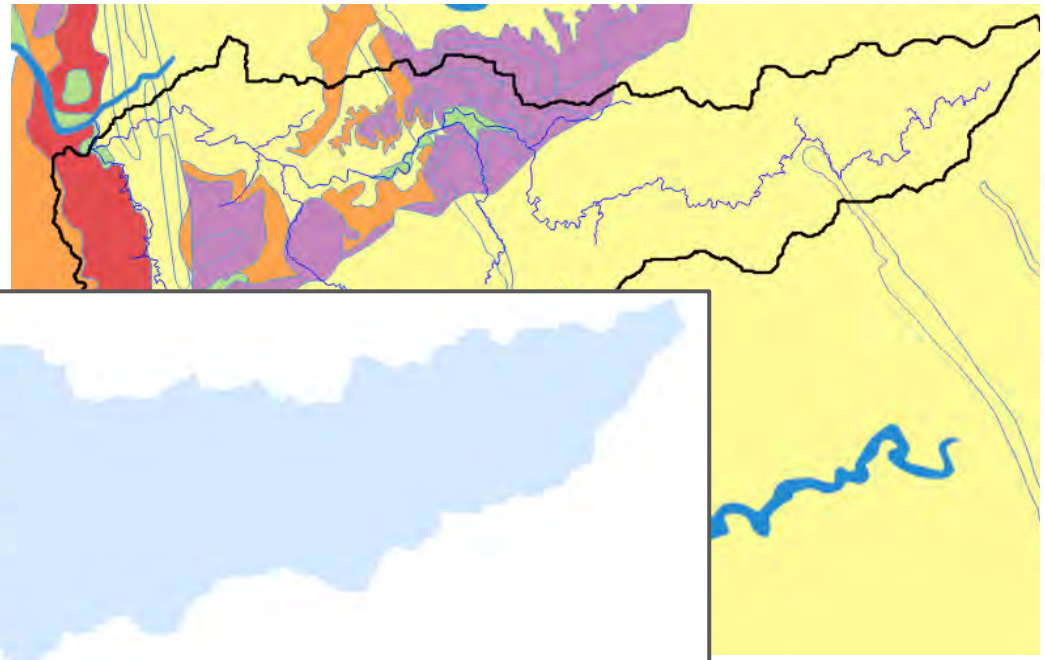
CEIRA RIVER BASIN – ECO-HYDROLOGICAL CHARACTERIZATION

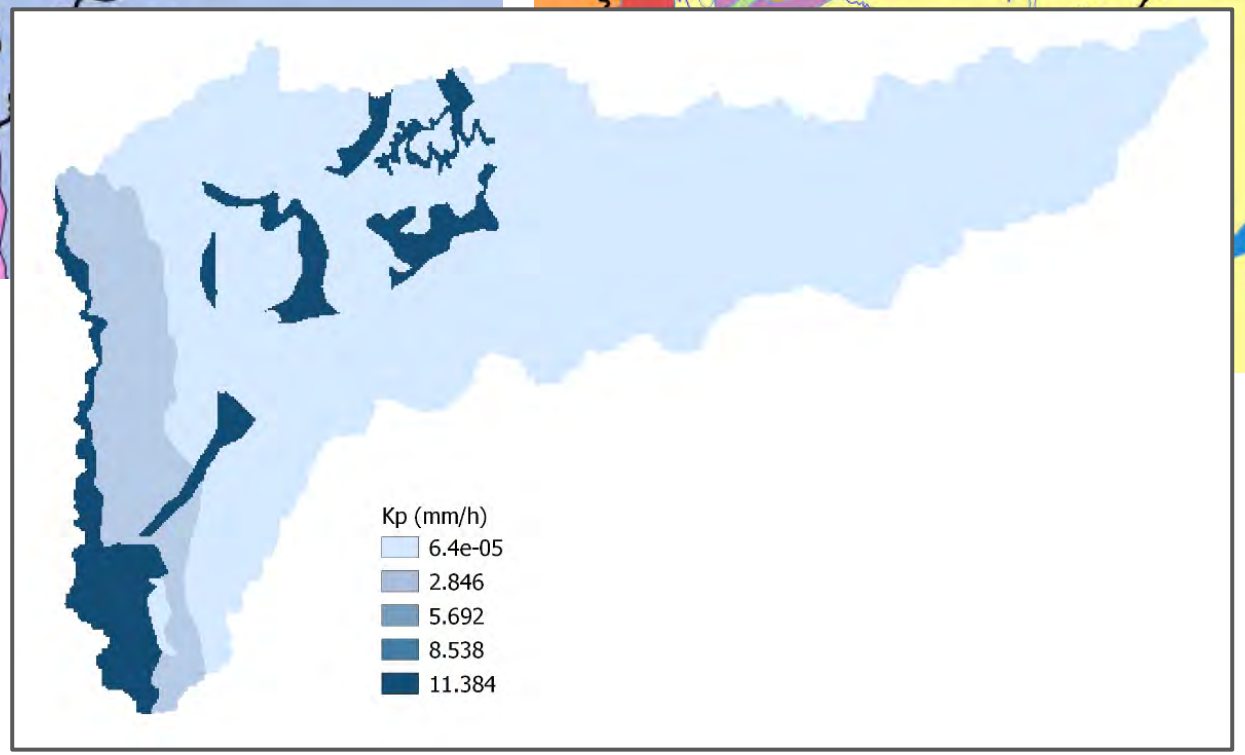
PERMEABILITY AND PERCOLATION CAPACITY (Kp)

HYDROGEOLOGICAL UNITS

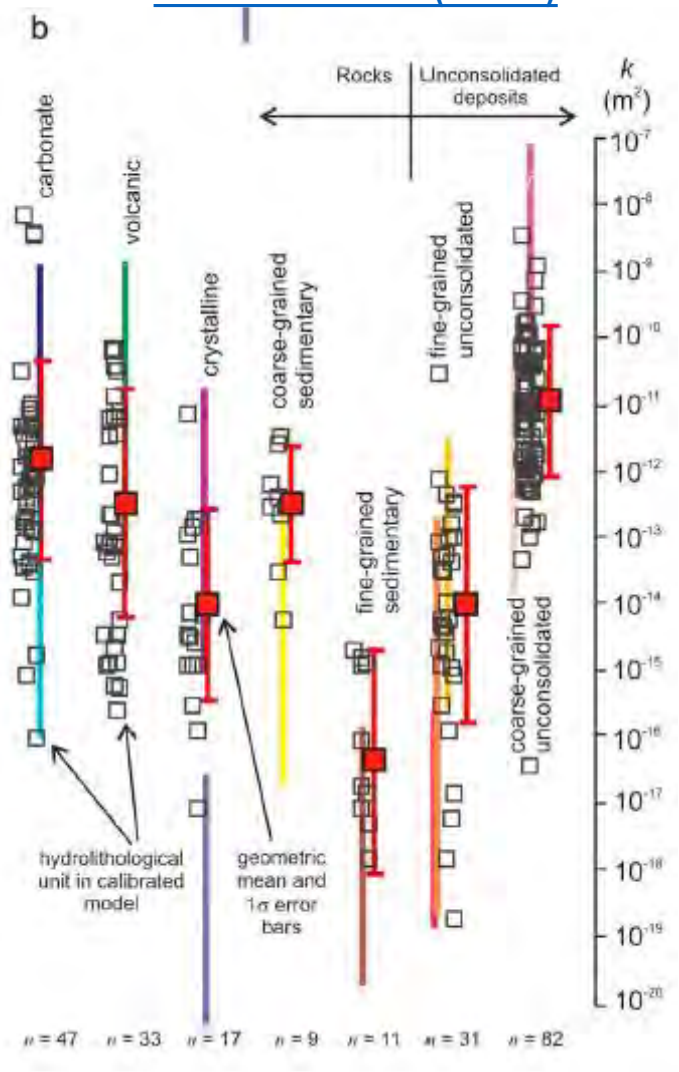


LITHOLOGICAL MAP (GLiM – Global Lithological Map)

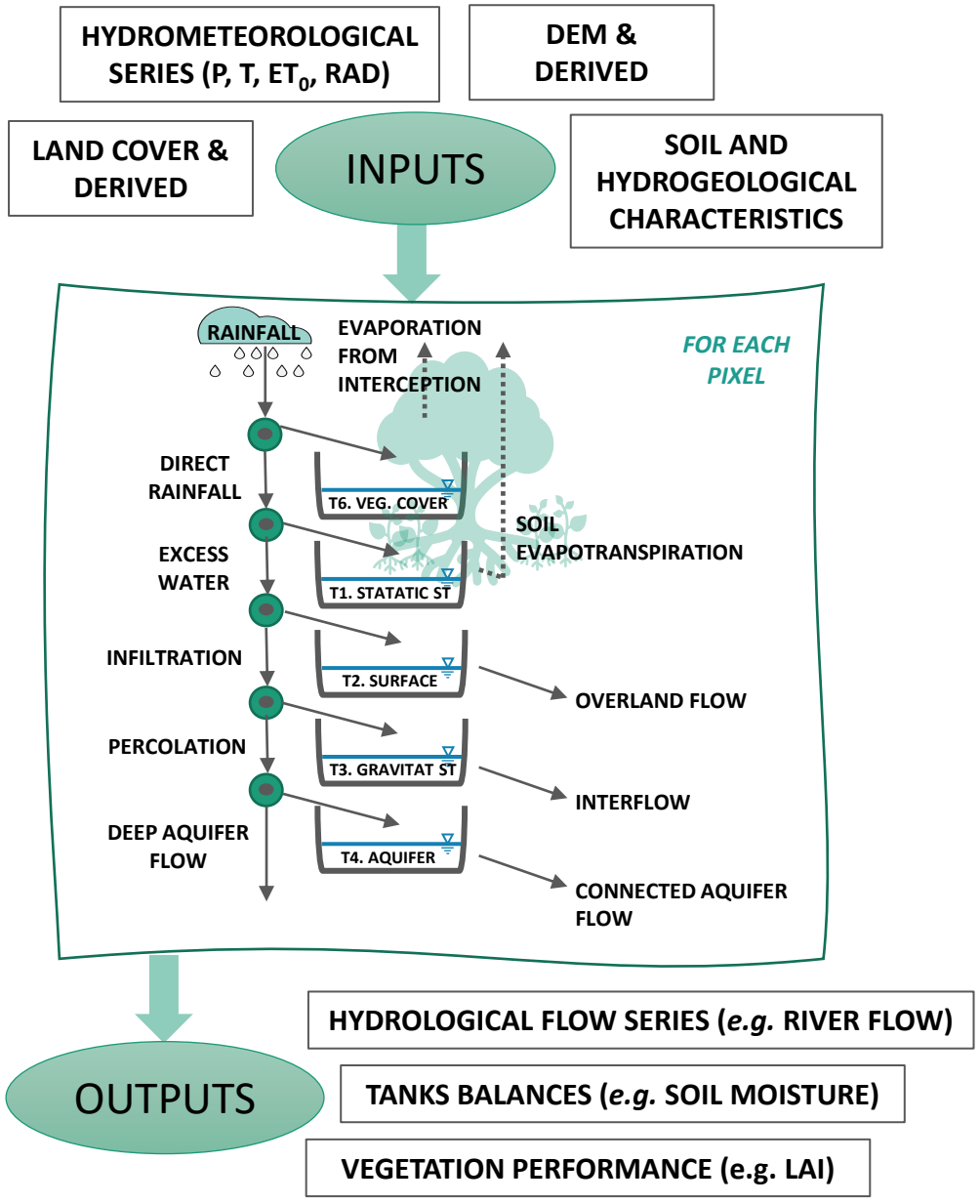




Gleeson *et al*. (2011)



MODELLING WITH ECO-TETIS



REQUIREMENTS

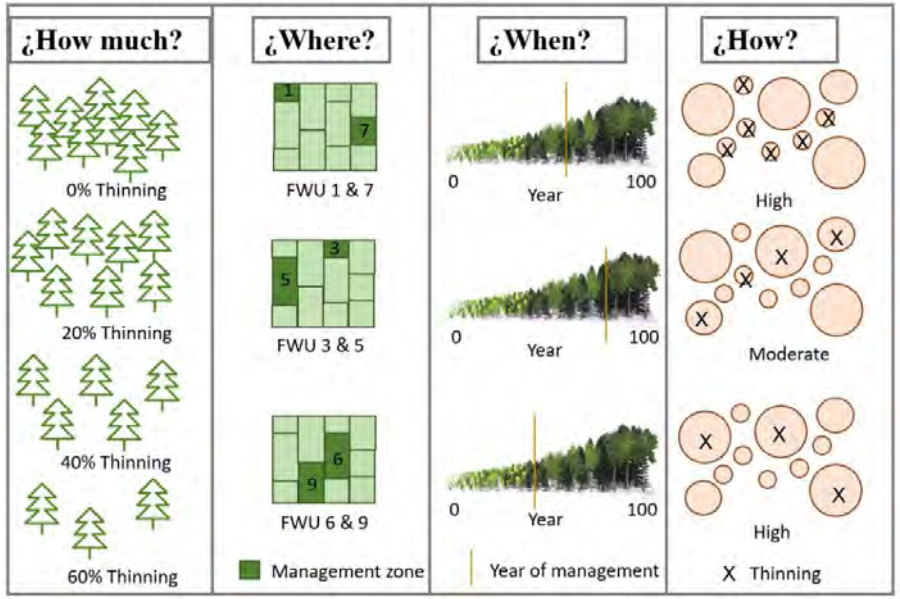
RELIABLE INPUTS

- DIFFERENT SOURCES
- KNOWLEDGE OF THE CASE STUDY

CALIBRATION

- HYDROLOGICAL PARAMETERS
- VEGETATION PARAMETERS

PROJECTIONS ANSWERING



CLIMATE CHANGE SCENARIOS

LIFE RESILIENT FORESTS

MODELLING WITH ECO-TETIS

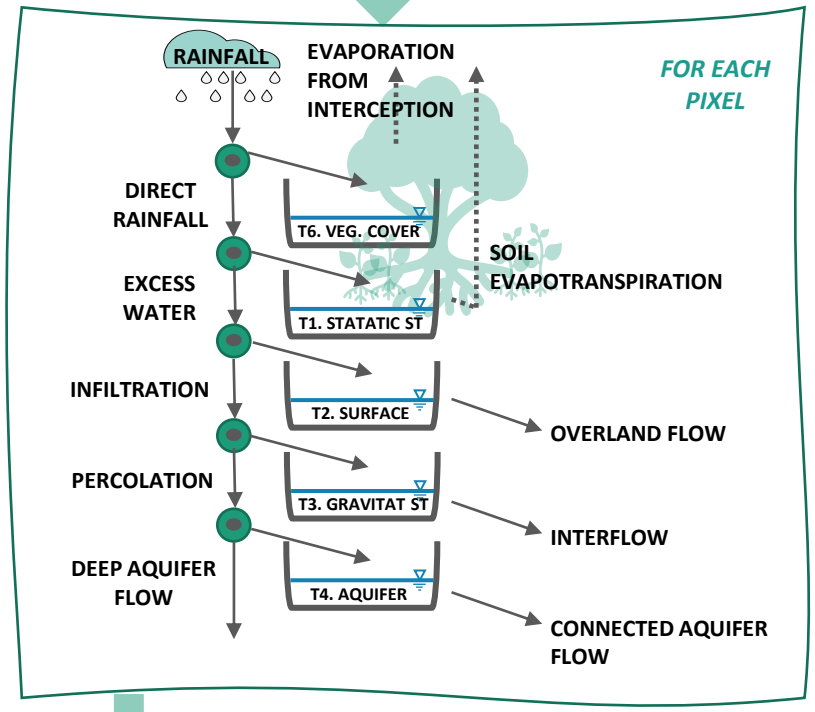
HYDROMETEOROLOGICAL SERIES (P, T, ET_0, RAD)

DEM & DERIVED

LAND COVER & DERIVED

INPUTS

SOIL AND HYDROGEOLOGICAL CHARACTERISTICS

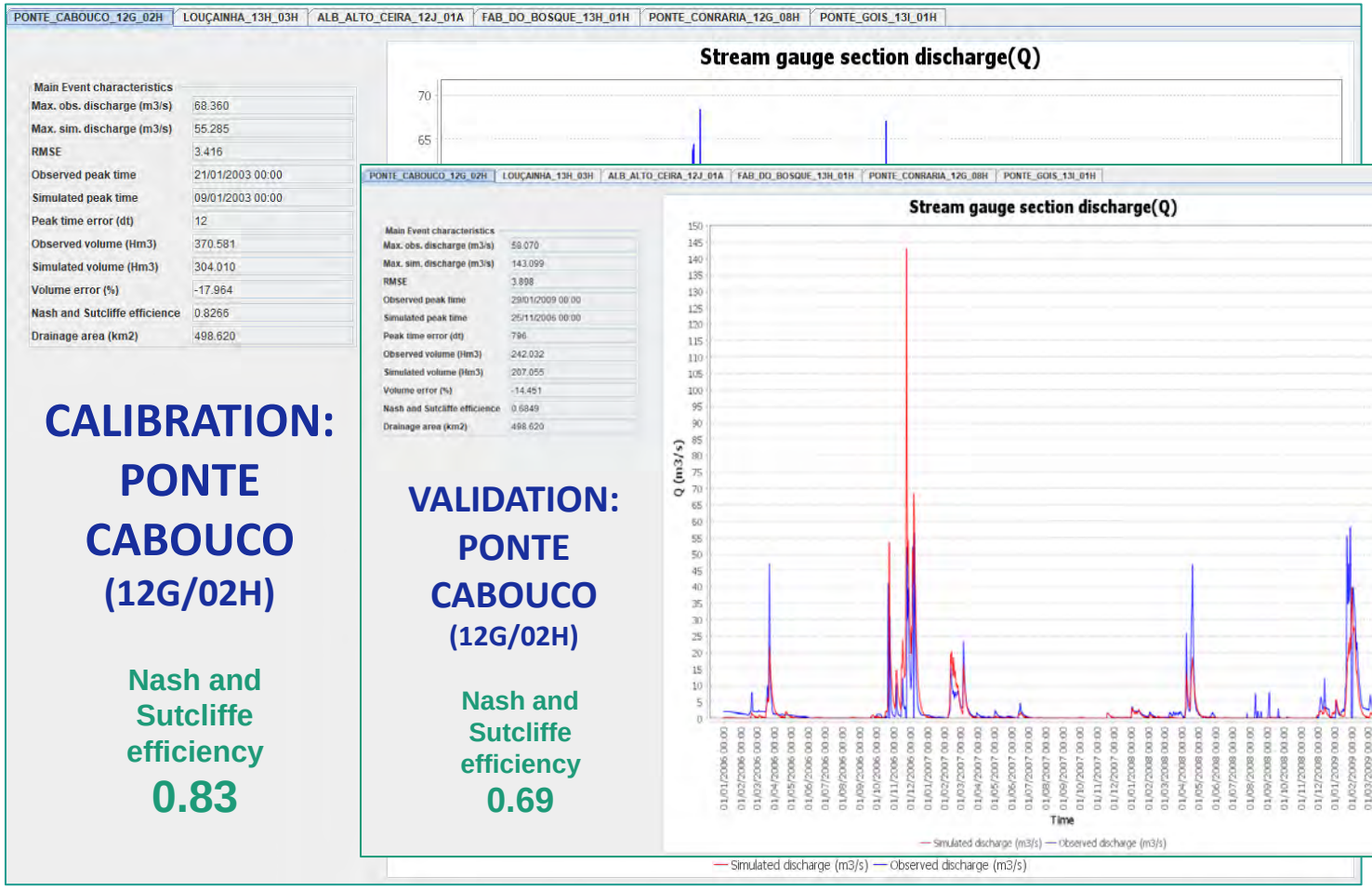


OUTPUTS

HYDROLOGICAL FLOW SERIES

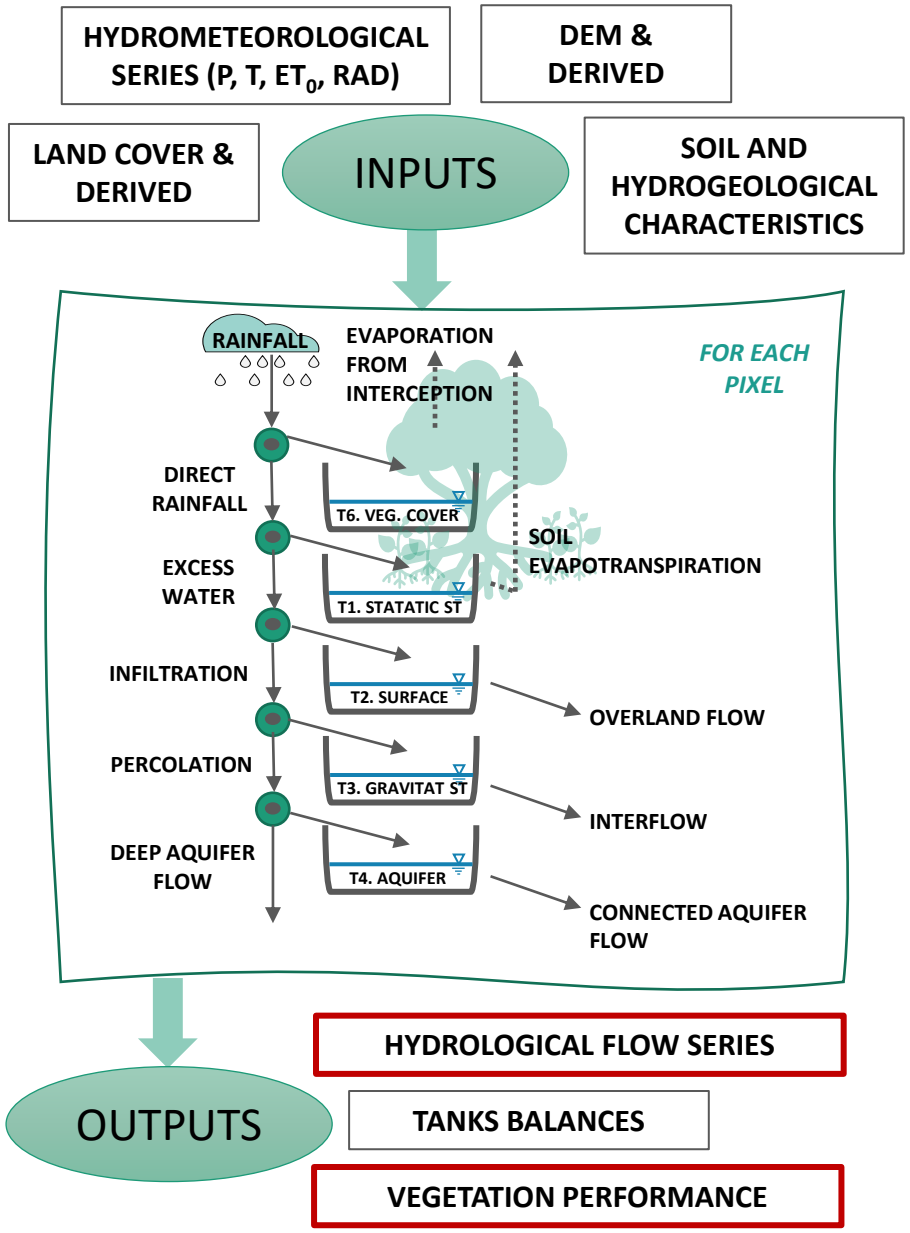
TANKS BALANCES

VEGETATION PERFORMANCE

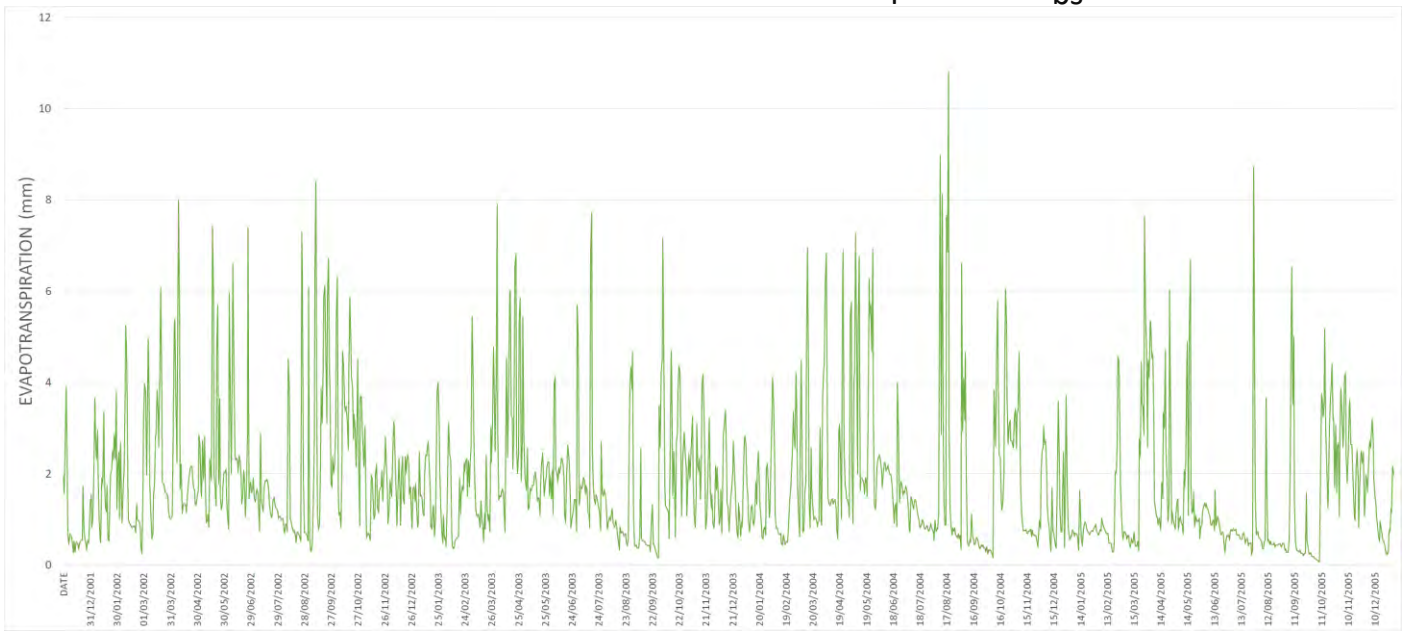


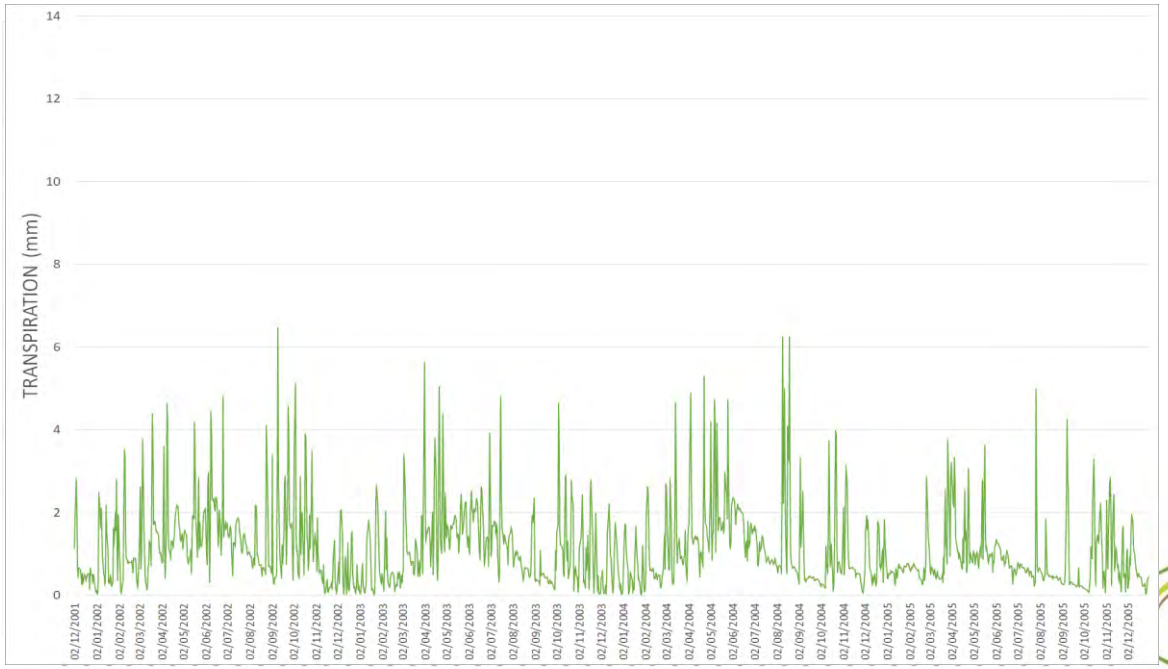
LIFE RESILIENT FORESTS

MODELLING WITH ECO-TETIS



EVAPOTRANSPIRATION = $E_i + T + E_{bs}$

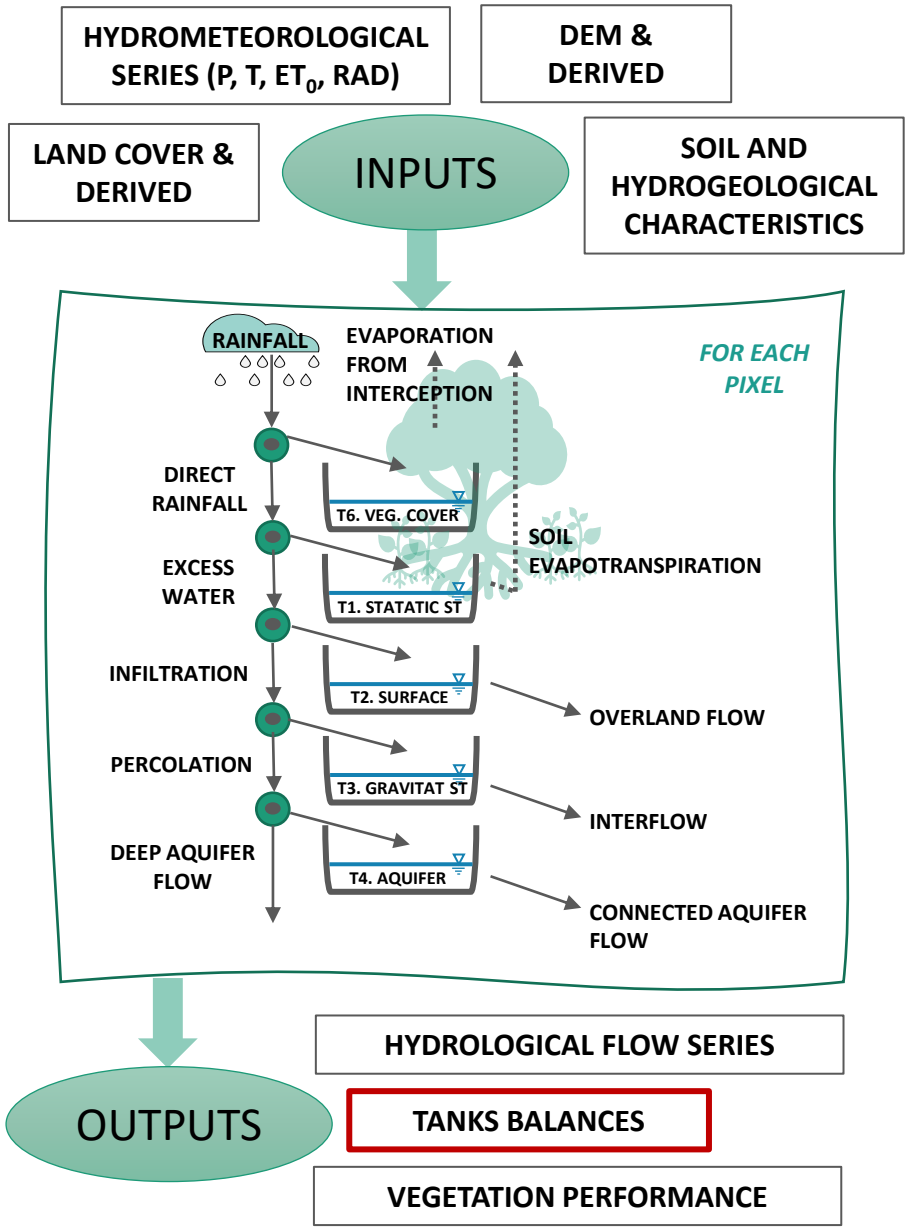


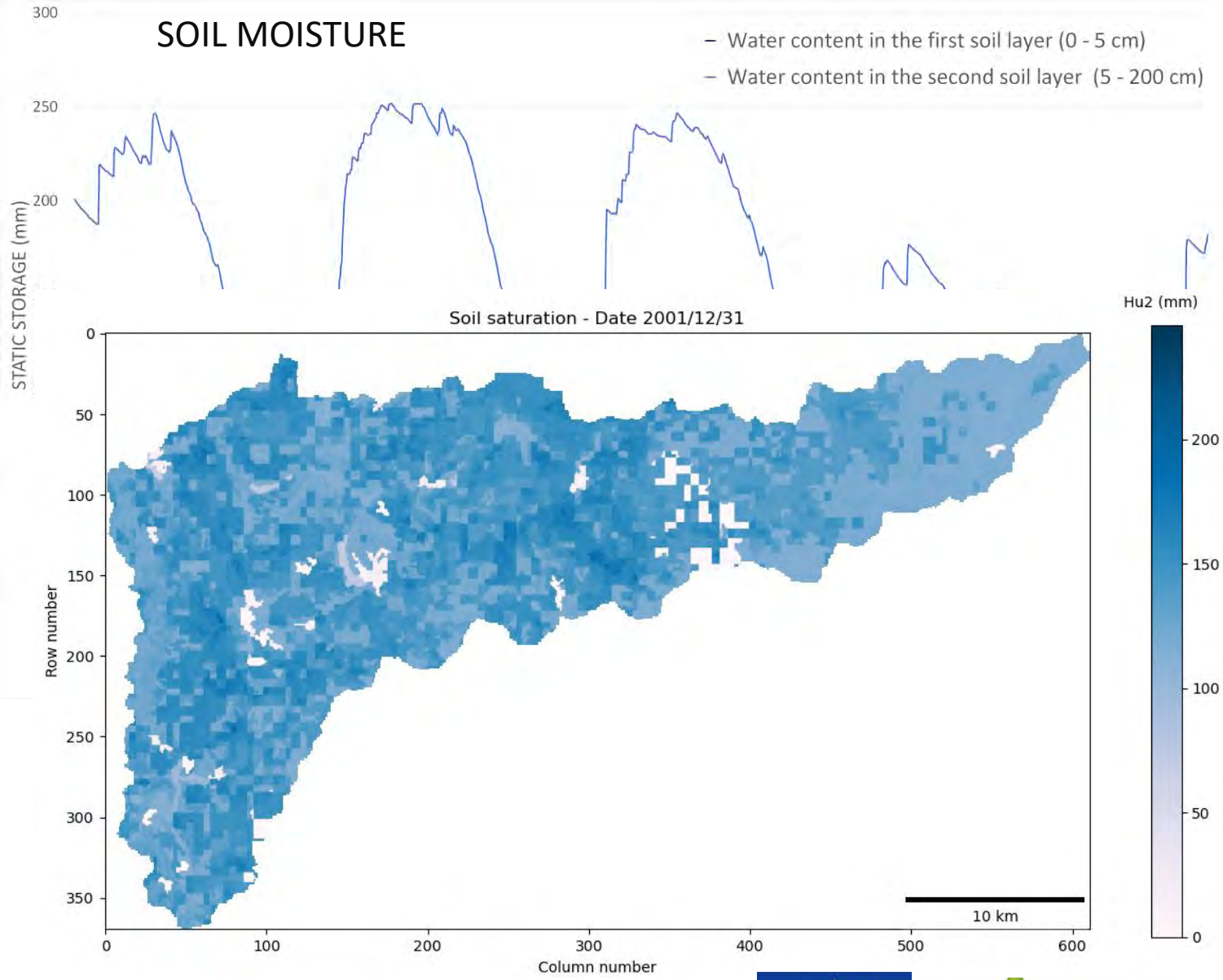


- Evaporation from the interception
- Transpiration
- Evaporation from the bare soil

LIFE RESILIENT FORESTS

MODELLING WITH ECO-TETIS





STATIC STORAGE EVOLUTION

LIFE RESILIENT FORESTS

MODELLING WITH ECO-TETIS

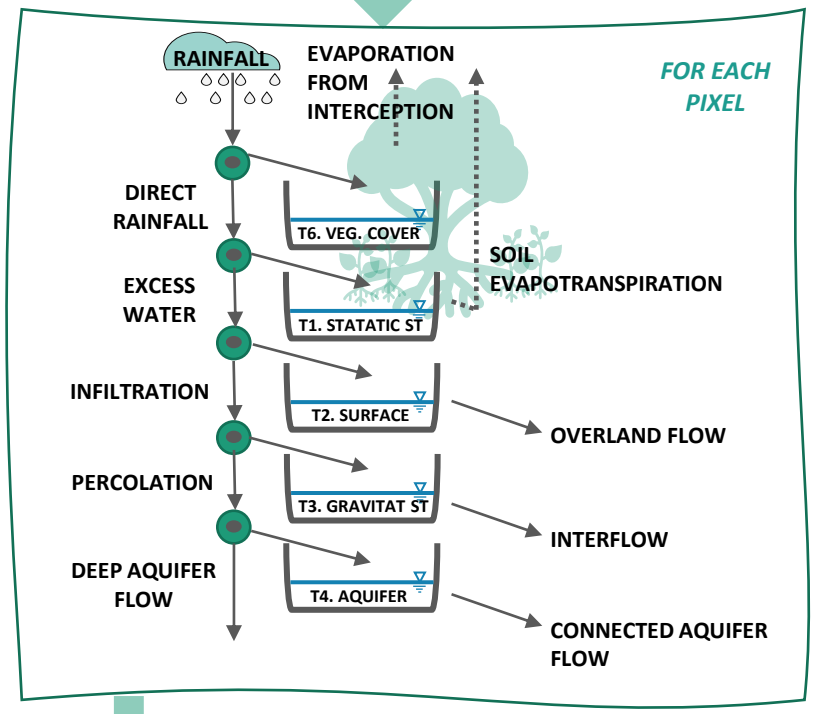
HYDROMETEOROLOGICAL SERIES (P, T, ET_0, RAD)

DEM & DERIVED

LAND COVER & DERIVED

INPUTS

SOIL AND HYDROGEOLOGICAL CHARACTERISTICS

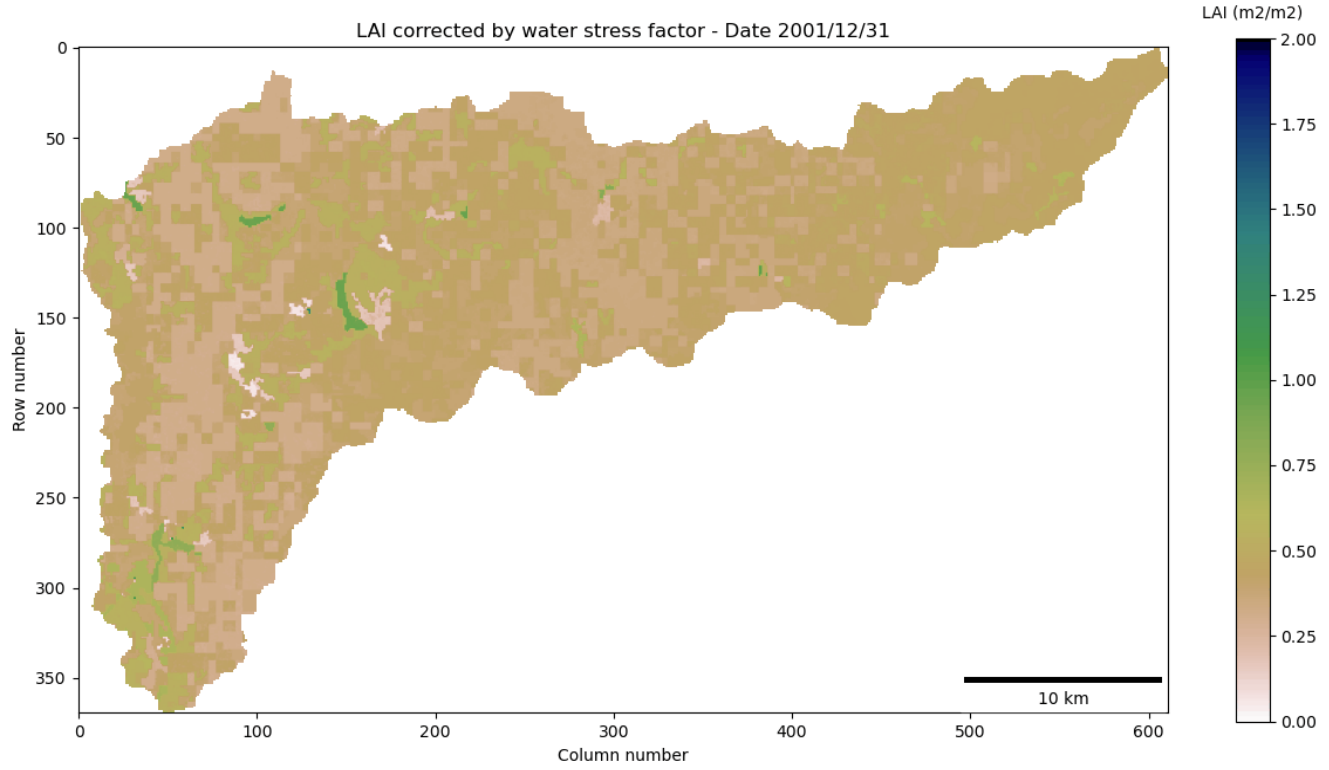


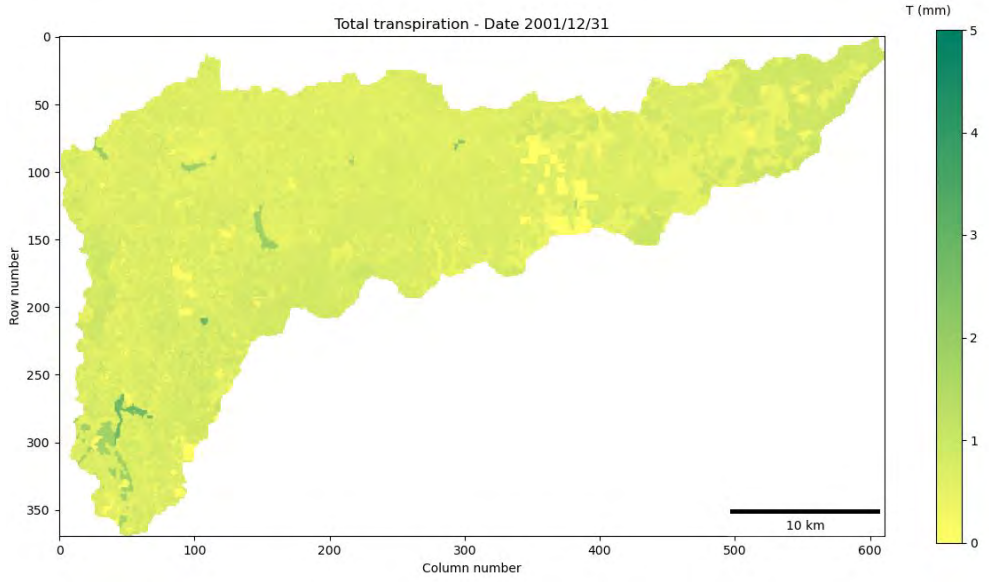
OUTPUTS

HYDROLOGICAL FLOW SERIES

TANKS BALANCES

VEGETATION PERFORMANCE

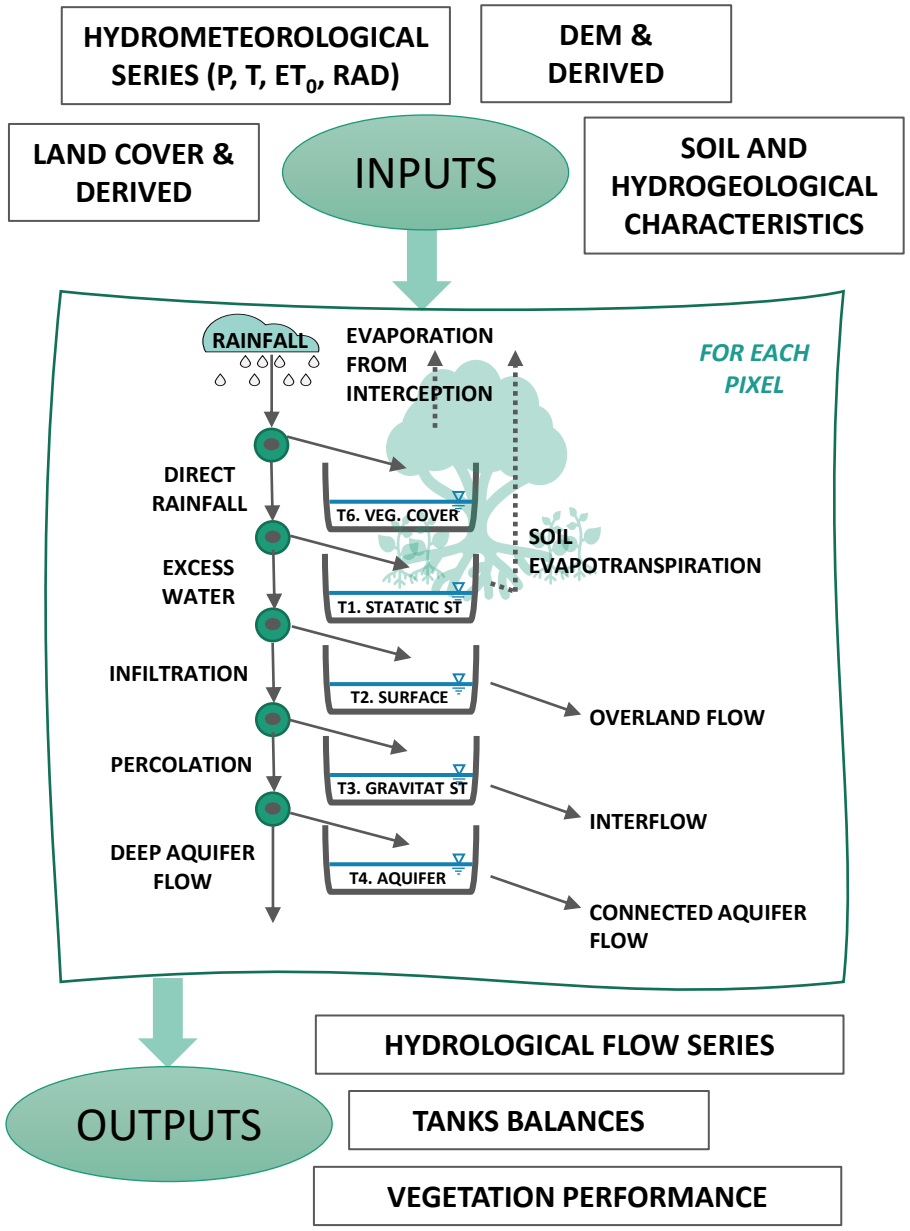




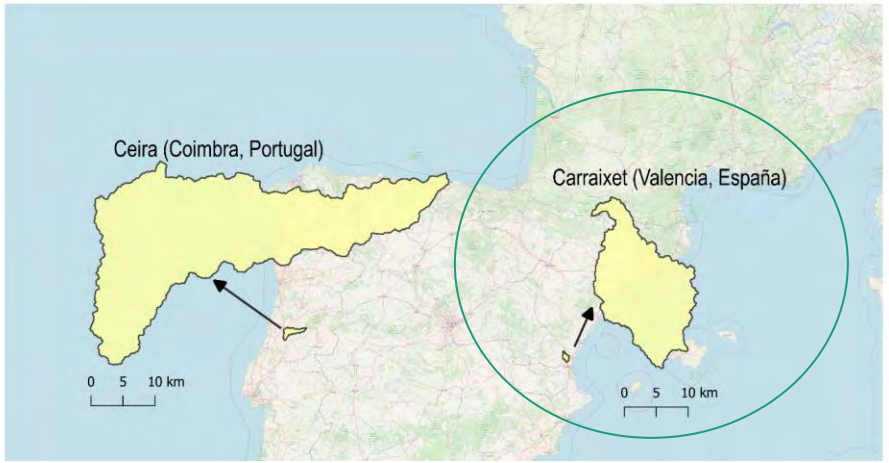
VEGETATION PERFORMANCE EVOLUTION

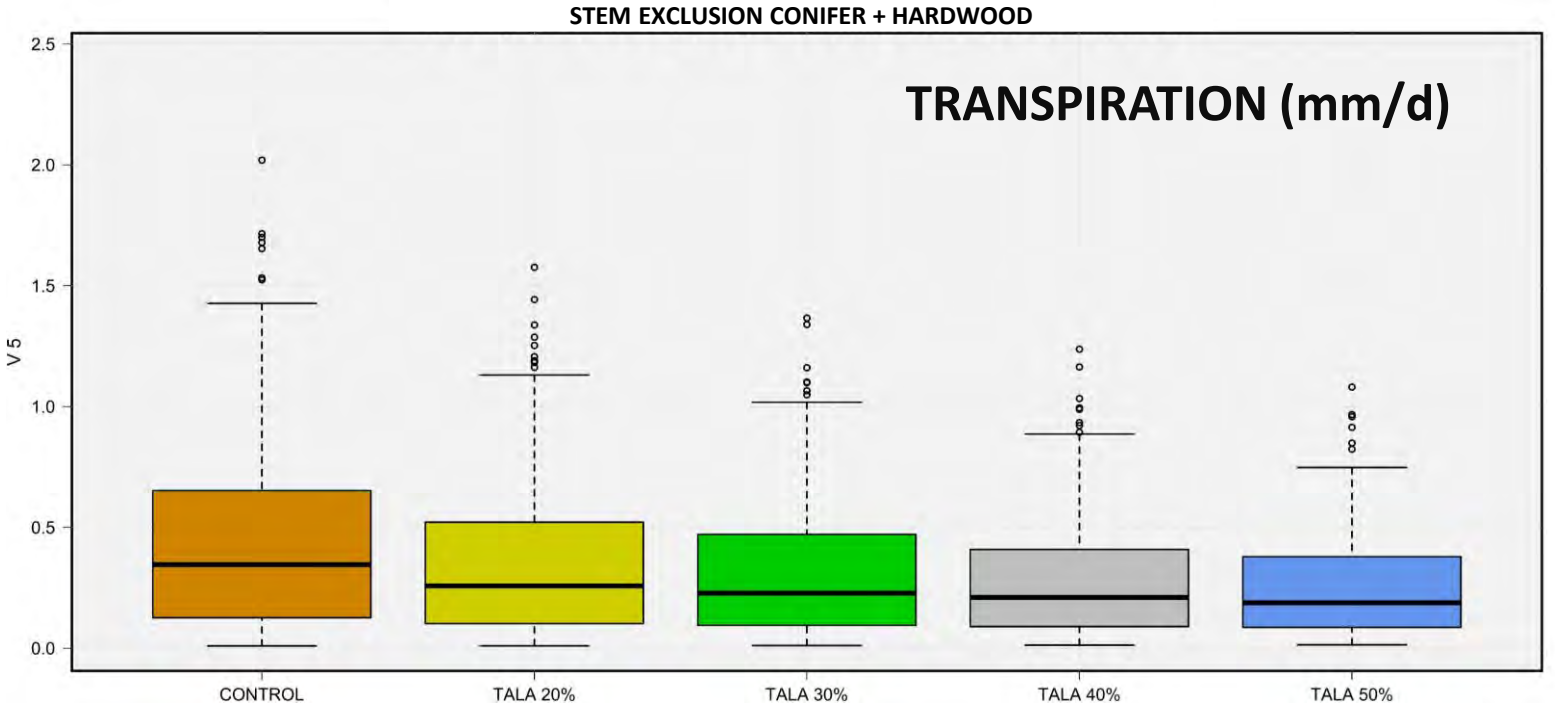
LIFE RESILIENT FORESTS

MODELLING WITH ECO-TETIS



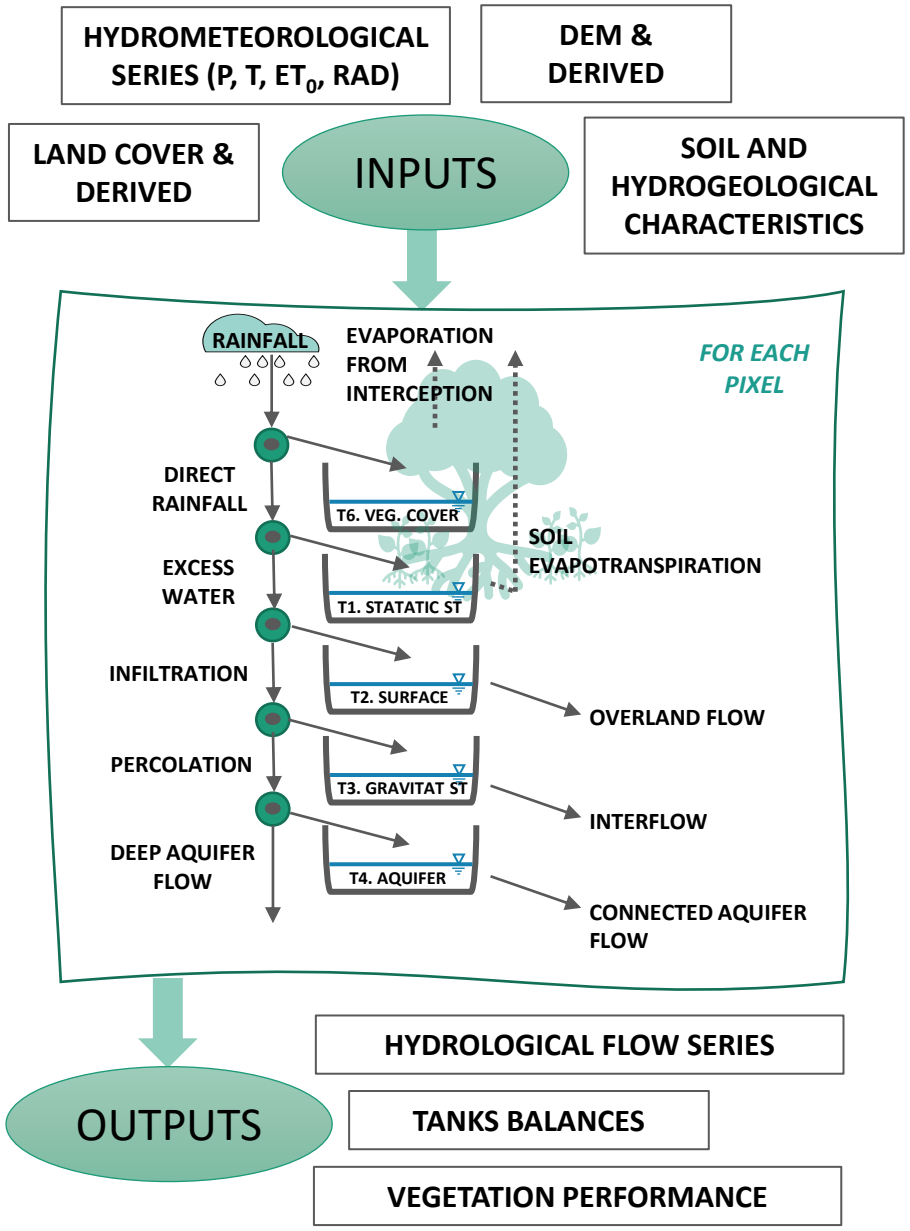
FOREST MANAGEMENT OPTIONS ANALYSIS





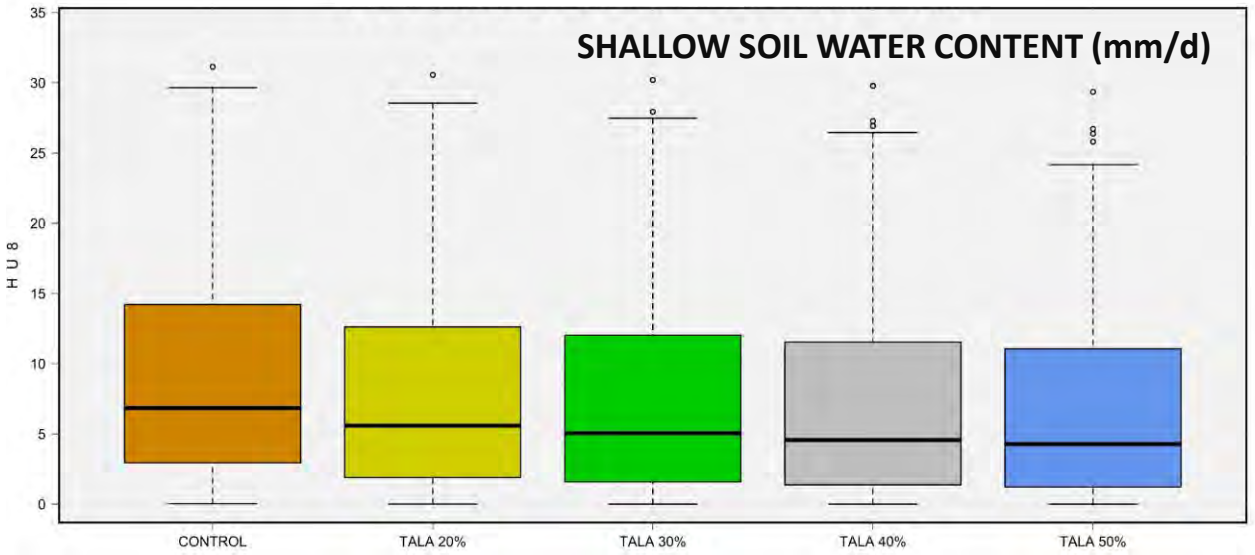
LIFE RESILIENT FORESTS

MODELLING WITH ECO-TETIS

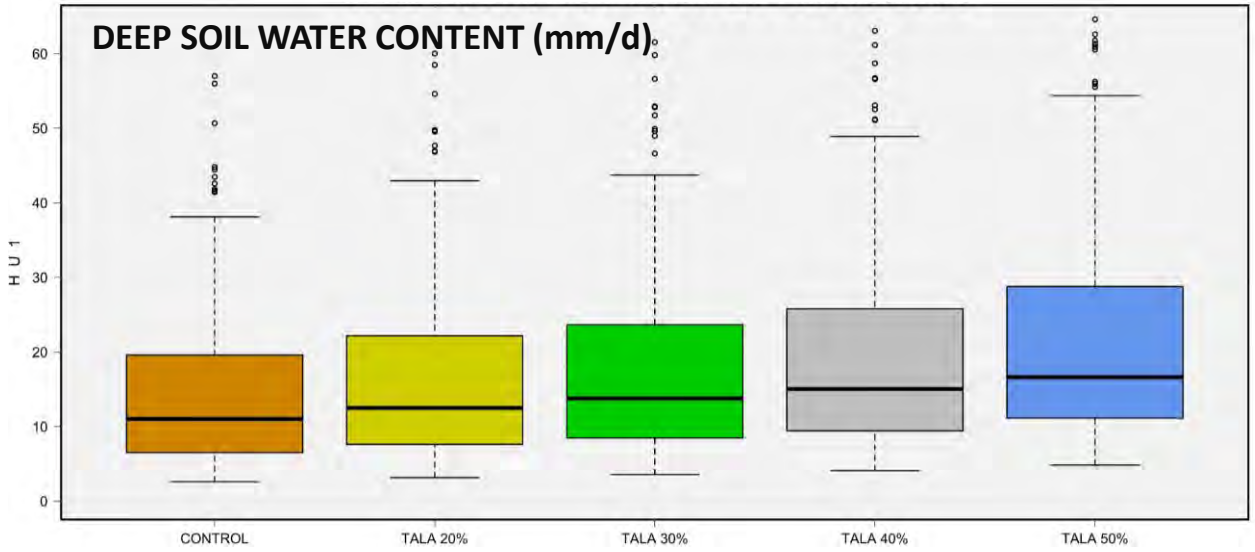


FOREST MANAGEMENT OPTIONS ANALYSIS

STEM EXCLUSION CONIFER + HARDWOOD



STEM EXCLUSION CONIFER + HARDWOOD



LIFE RESILIENT FORESTS

MODELLING WITH ECO-TETIS

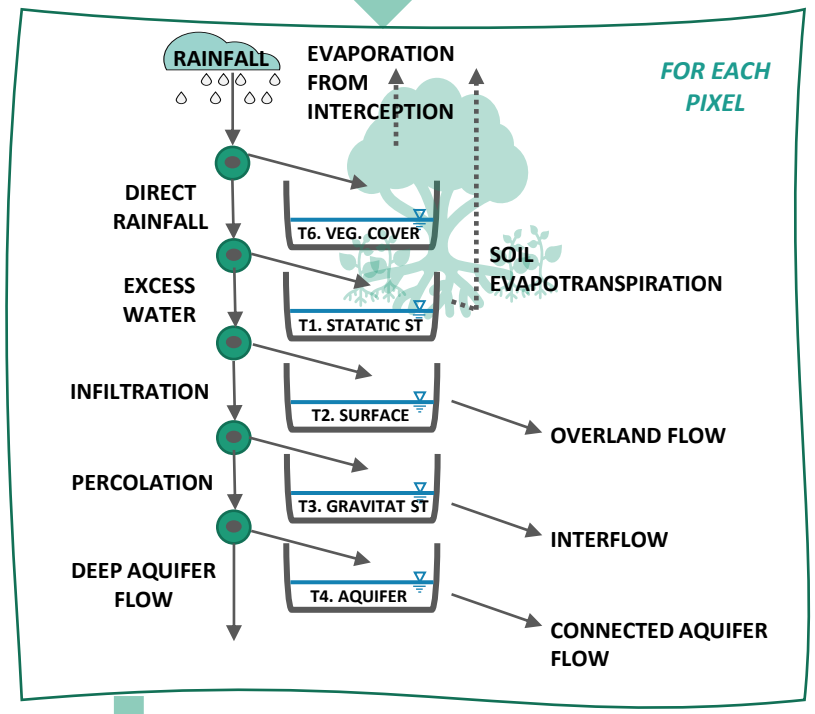
HYDROMETEOROLOGICAL SERIES (P, T, ET_0, RAD)

DEM & DERIVED

LAND COVER & DERIVED

INPUTS

SOIL AND HYDROGEOLOGICAL CHARACTERISTICS



OUTPUTS

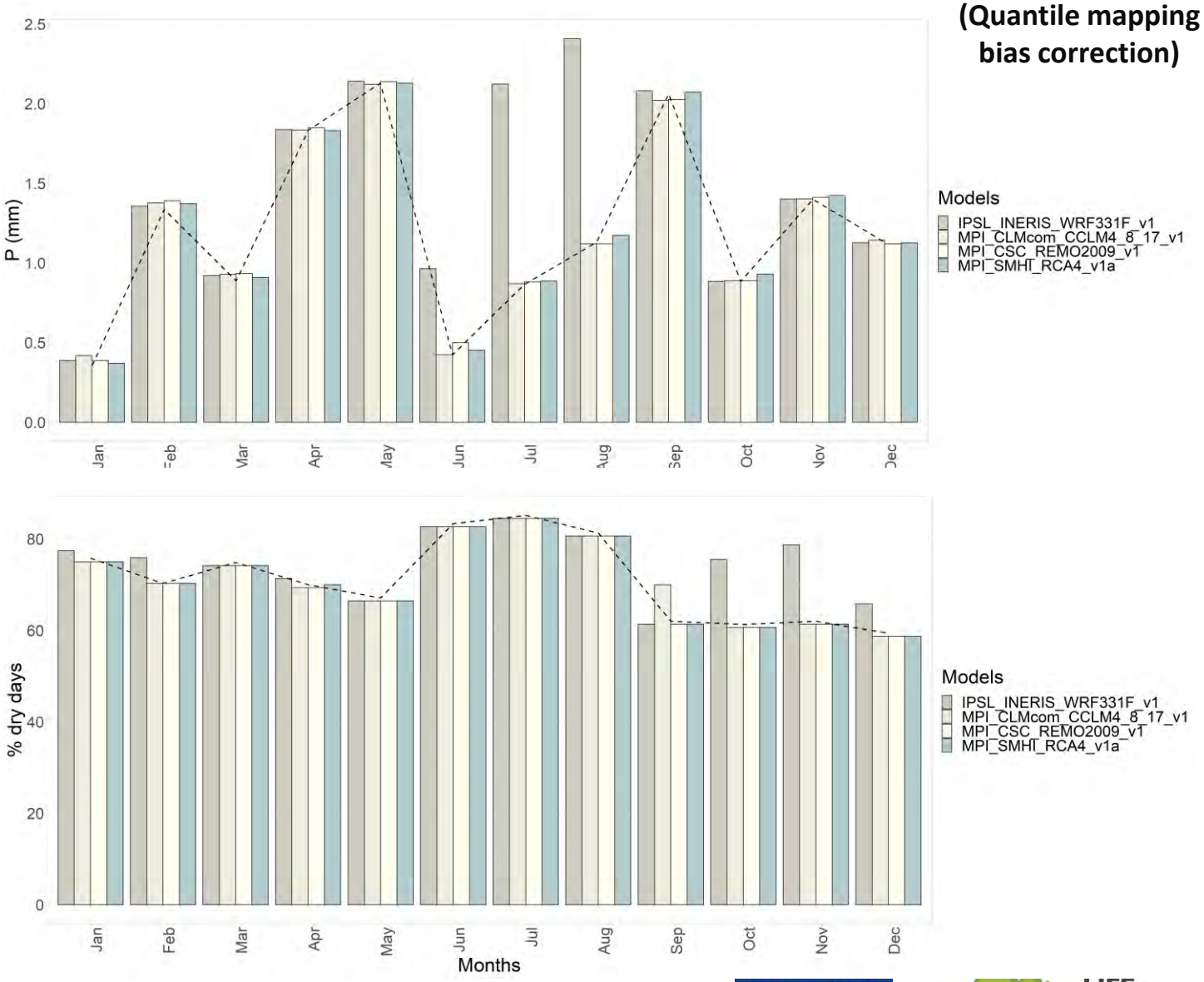
HYDROLOGICAL FLOW SERIES

TANKS BALANCES

VEGETATION PERFORMANCE

CLIMATE CHANGE PROJECTIONS

PRECIPITATION (Quantile mapping bias correction)



% DRY DAYS (important in arid or semiarid environments)

LIFE RESILIENT FORESTS

MODELLING WITH ECO-TETIS

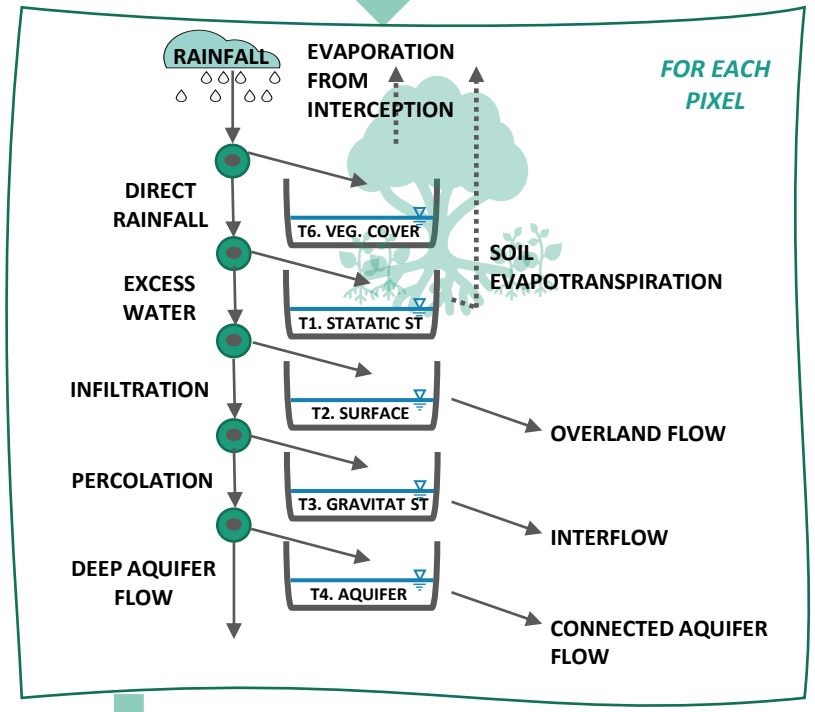
HYDROMETEOROLOGICAL SERIES (P, T, ET_0, RAD)

DEM & DERIVED

LAND COVER & DERIVED

INPUTS

SOIL AND HYDROGEOLOGICAL CHARACTERISTICS



OUTPUTS

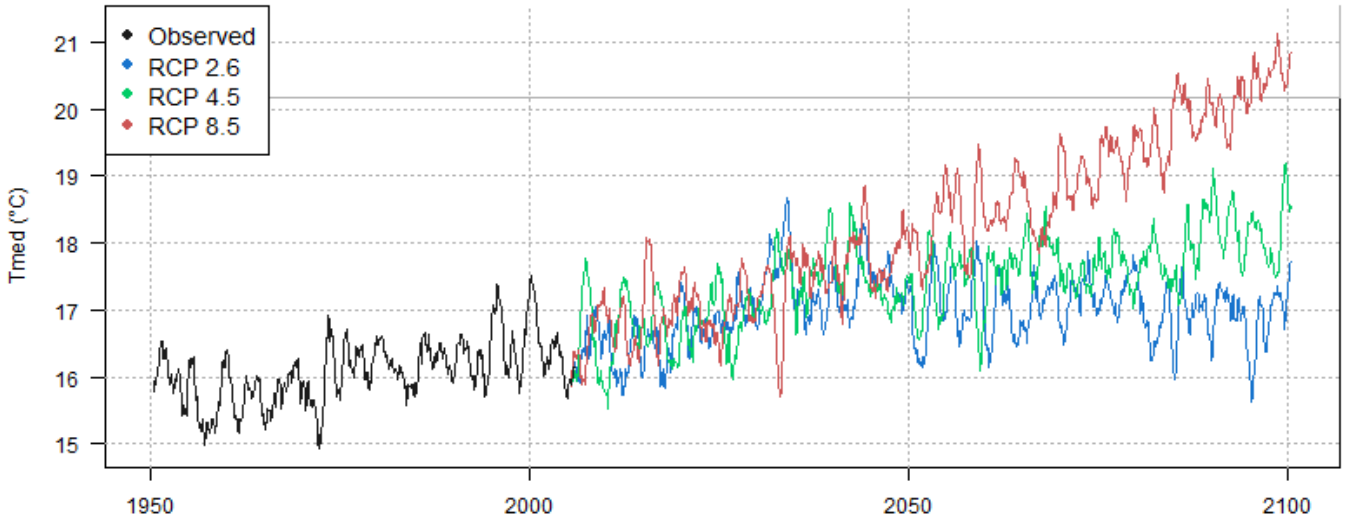
HYDROLOGICAL FLOW SERIES

TANKS BALANCES

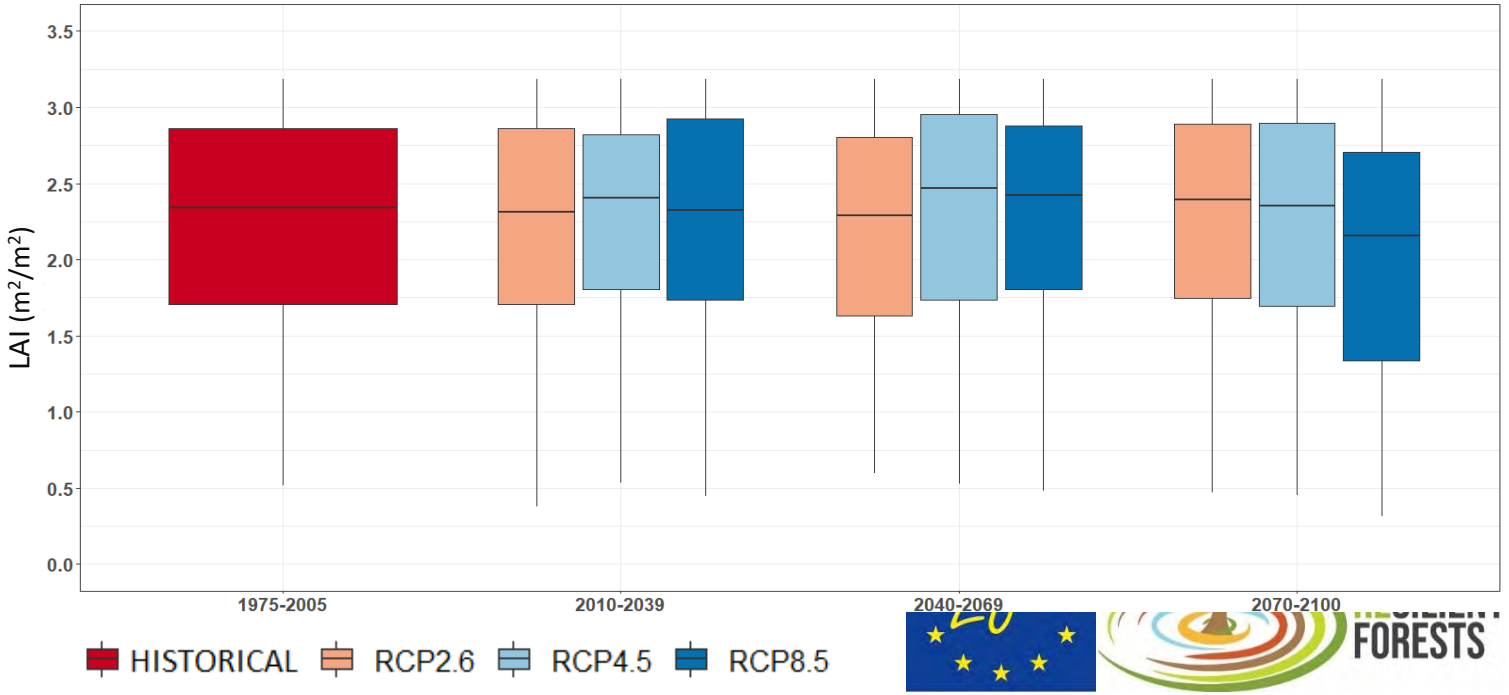
VEGETATION PERFORMANCE

CLIMATE CHANGE PROJECTIONS

RCM:
MPI-CSC – REMO 2009_v1



STEM EXCLUSION CONIFER + HARDWOOD
FOREST MANAGEMENT SCENARIO : CONTROL



COST-BENEFIT ANALYSIS

C.A.F.E.

Carbon, Aqua, Fire & Eco-resilience

ECO-TETIS	• HYDROLOGICAL SERIES • TANKS BALANCES • VEGETATION PERFORMANCE
RHESSYS	• WOOD • CO_2
FWI	• FIRE WEATHER INDEX • SOIL MOISTURE REGRESSIONS

MANAGEMENT OPTIONS *n alternatives*

FOREST RESILIENCE *n responses*

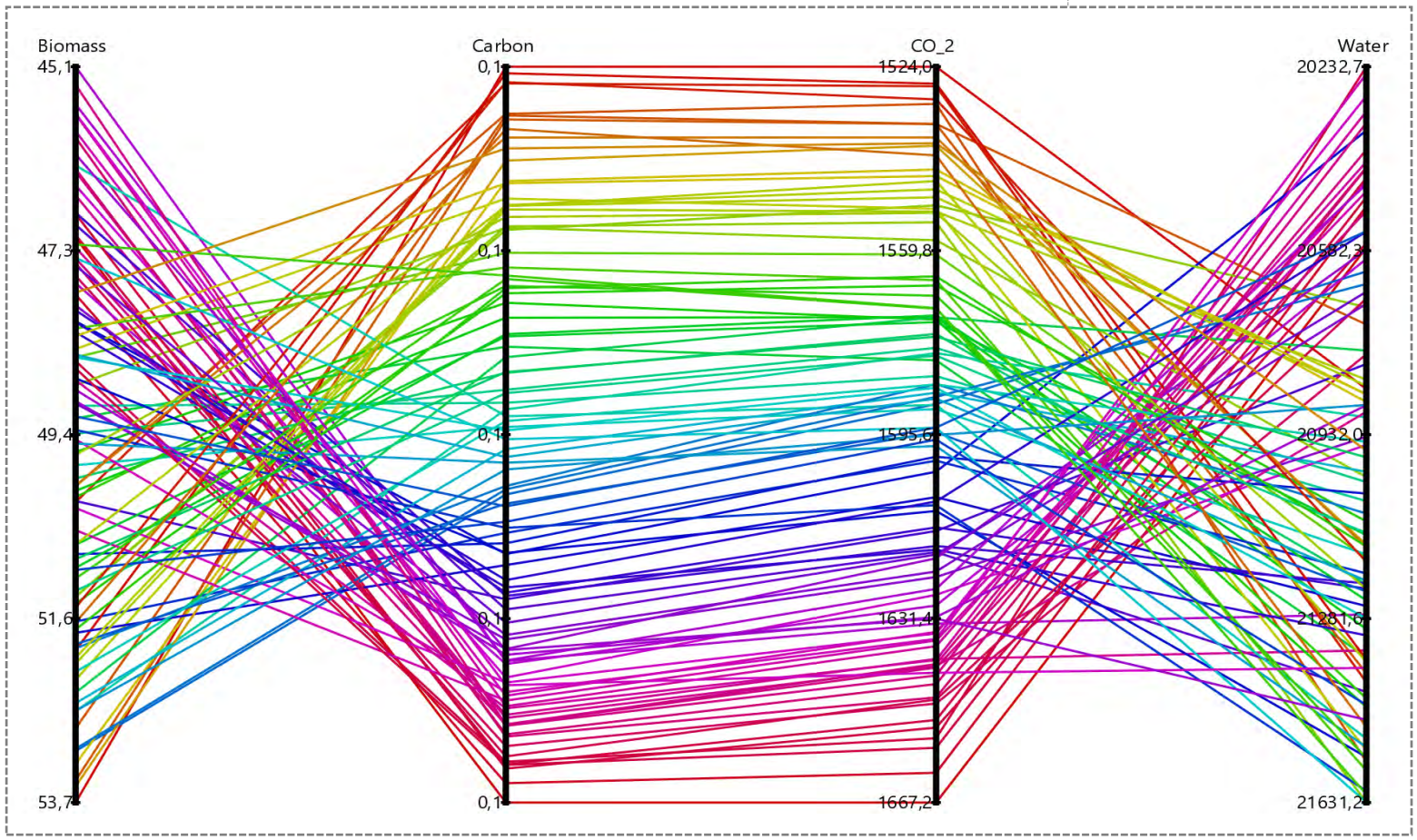
DSS

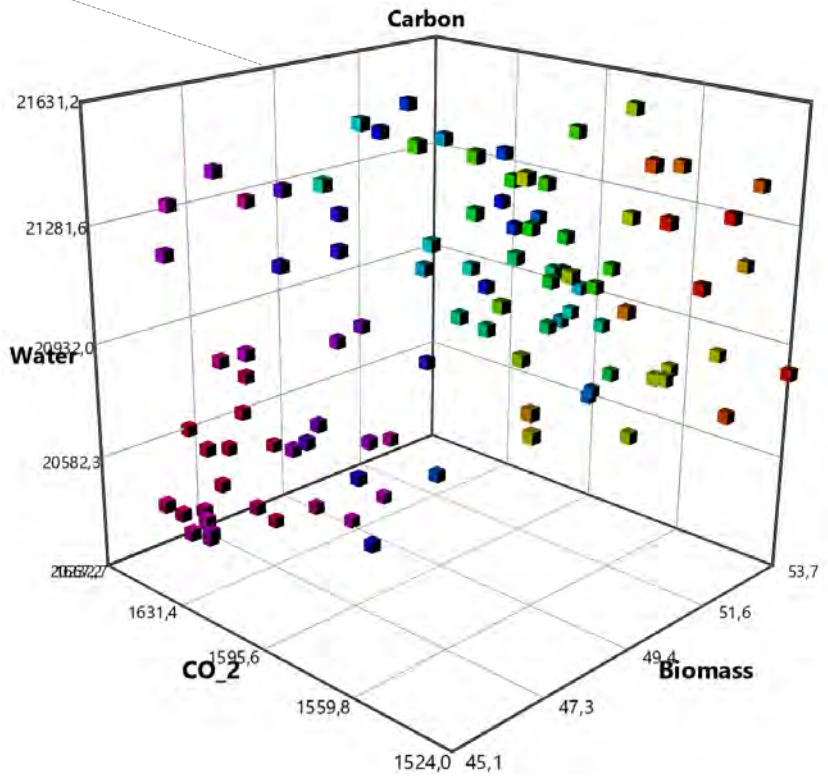
PARETO FRONT
Dominant alternatives (*ecosystem services / costs*)

MAX. ECOSYSTEM SERVICES

MAX. ECONOMIC VALUE

DECISION





LIFE RESILIENT FORESTS

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THANK YOU FOR YOUR ATTENTION

Webminar
October 28th, 2020

Prepared by: Alicia García Arias
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