

An aerial photograph of Stockholm, Sweden, taken at sunset. The city's architecture, including a prominent church tower with a golden spire in the foreground, is silhouetted against the warm, orange glow of the setting sun. The city is built on islands and connected by bridges, with the water reflecting the golden light.

ARF@Pt creating free easy-access economic analysis for Portuguese forests

Susana Barreiro, Coelho M, Correia A, Tomé M
CEF, School of Agriculture, University of Lisbon

ARF@Pt creating free easy-access economic analysis for Portuguese forests

The problem:

Forest profitability has long been debated in Portugal

Few studies scrutinized/criticized for not accurately representing reality

Main reasons behind the discredit that forests are no to little profitable

- Calendar of silvicultural operations
- Silvicultural operation costs



ARF@Pt creating free easy-access economic analysis for Portuguese forests

The Challenges :

- 97% Private property
- UFO – unidentified forest owners
- Small-sized fragmented property
- Costly operations & low stumpage prices
- Reduced ecosystem services valuation
- Poor management
- Recurrent fires
- Wood/biomass logistic challenges



ARF@Pt creating free easy-access economic analysis for Portuguese forests

The solution: Creating a task force to tackle the limitations pointed in these studies, discuss perceptions and knowledge sharing



Coordinated by ISA and involving stakeholders representing different groups: academia, public administration, research institutes, forest owners' associations, industrial and private owners, industries

ARF@Pt creating free easy-access economic analysis for Portuguese forests



a participatory task force: A detailed and correct analysis of the costs and revenues associated with the plantation and management of stands of different species using different silvicultural systems and forest operations schedules is essential to:

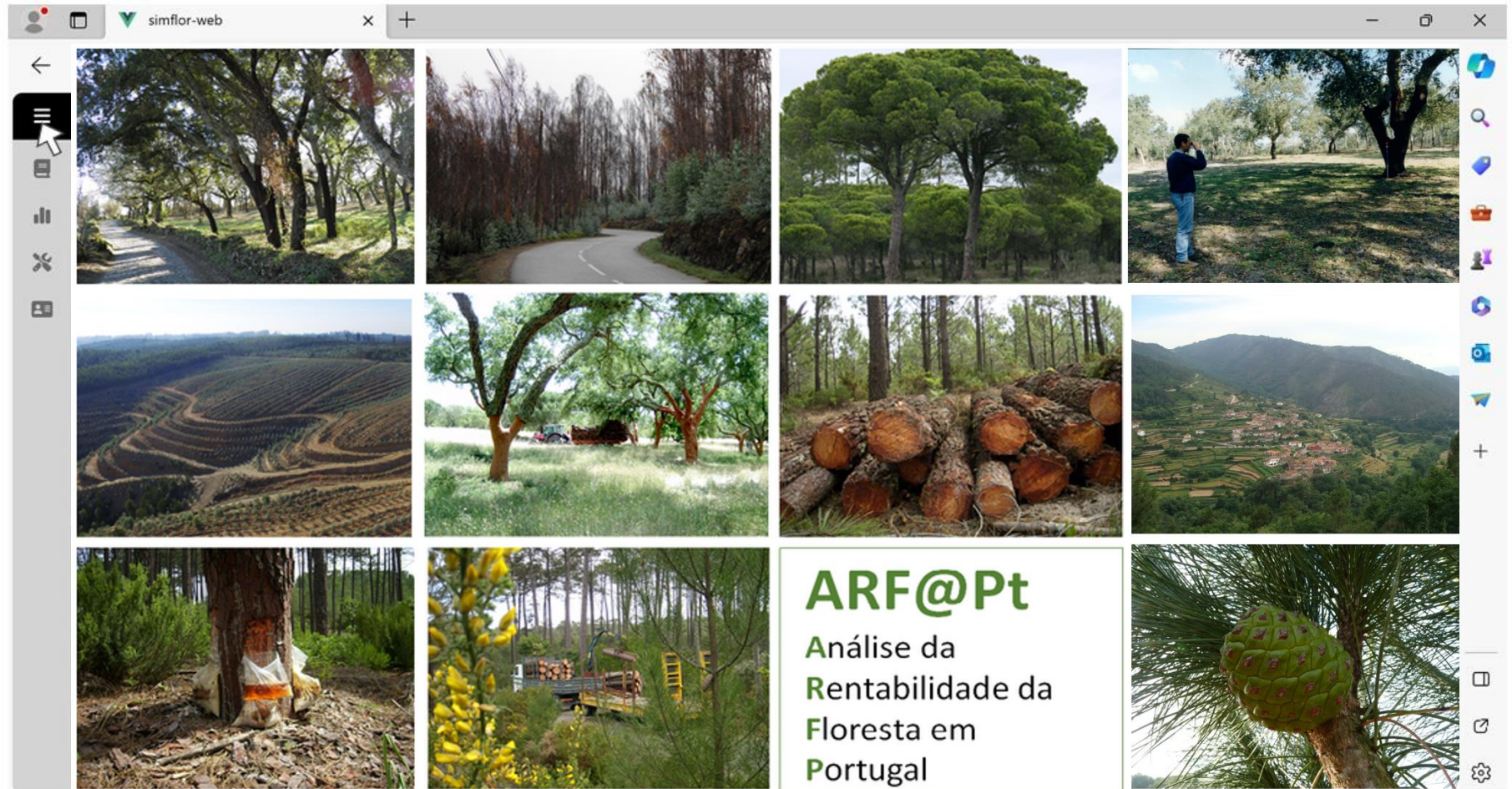
- **understand** the true dimension of the problem (is in fact not profitable to invest in plantations in Portugal?)
- **find solutions** to improve the situation
- support **policies to compensate forest owners for selecting less profitable forestry options relevant for the provision of public services** when compared to the “direct” goods (payment of public ecosystem services by the difference between the “best” economic solution and more close to nature solutions?)

Susana Barreiro et al.

ARF@Pt creating free easy-access economic analysis for Portuguese forests

The development of an interactive tool is on-going to disseminate economic analysis

Workshops will be organized to train users



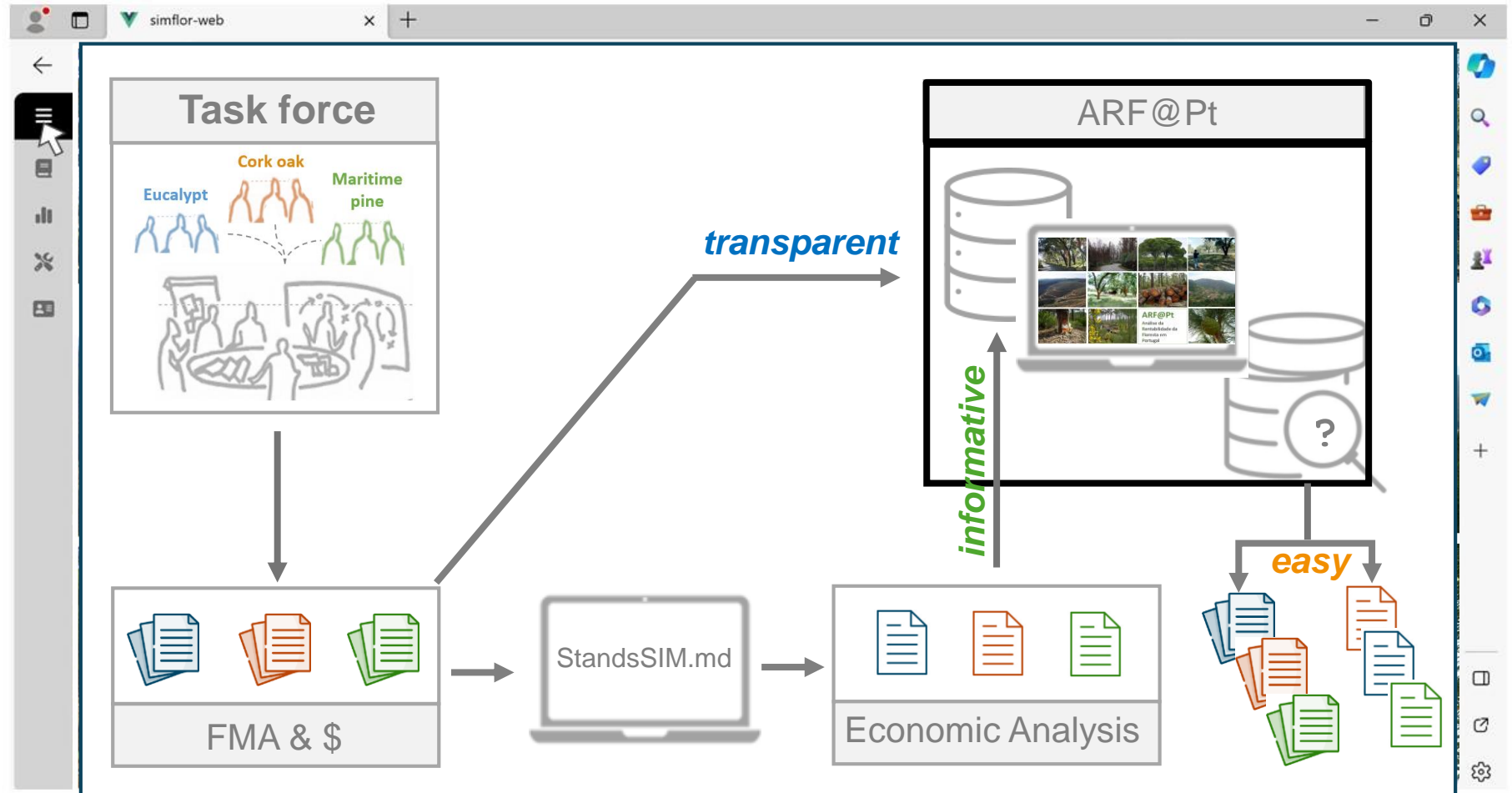
ARF@Pt creating free easy-access economic analysis for Portuguese forests

The development of an interactive tool is on-going to disseminate
Economic Analysis

Workshops will be organized to train users

ARF@Pt aims:

- **easy** to use
- **transparent** inputs
- **informative** outputs

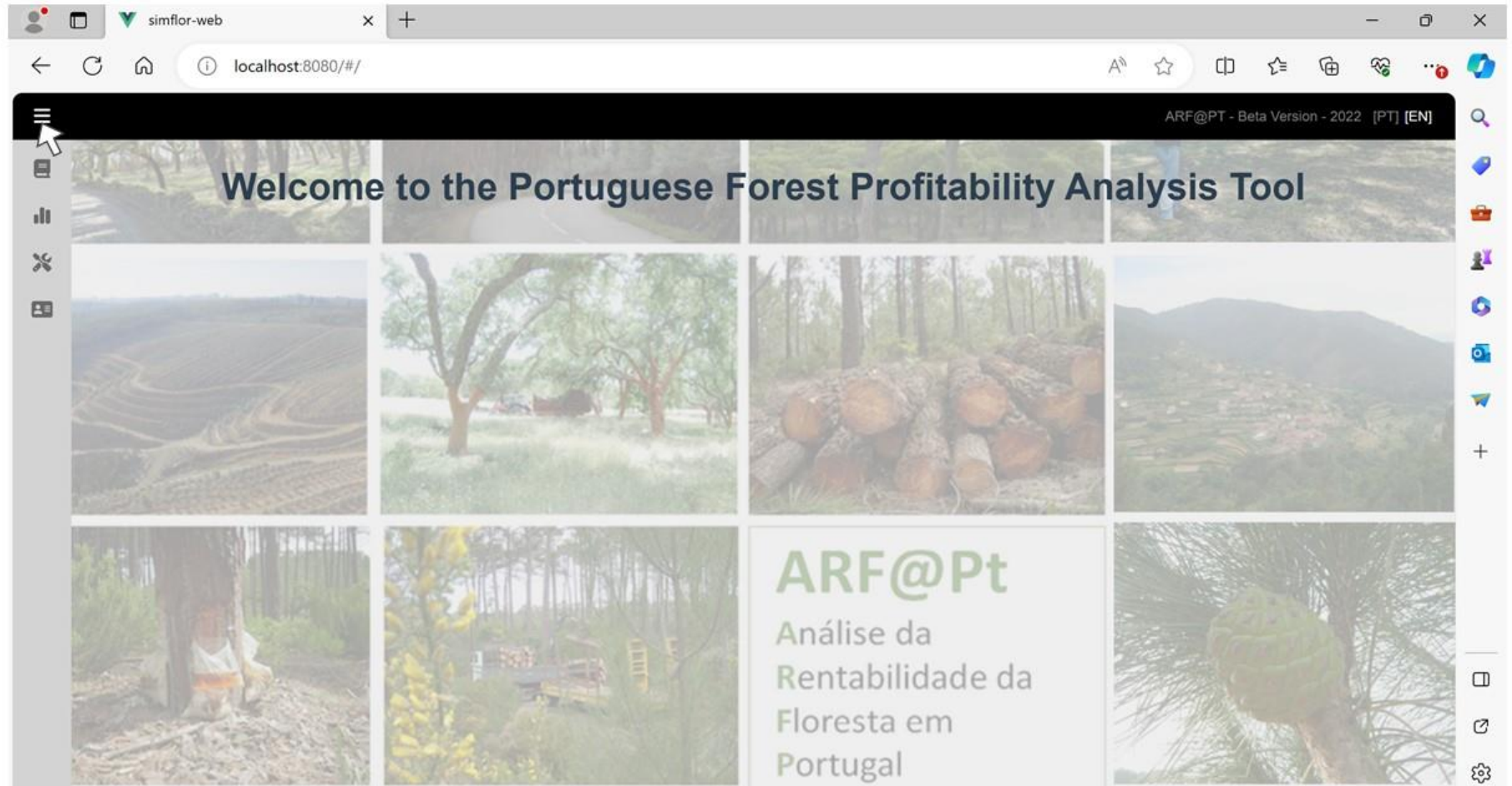


Susana Barreiro et al.

ARF@Pt creating free easy-access economic analysis for Portuguese forests

The development of an interactive tool is on-going to disseminate economic analysis

Workshops will be organized to train users

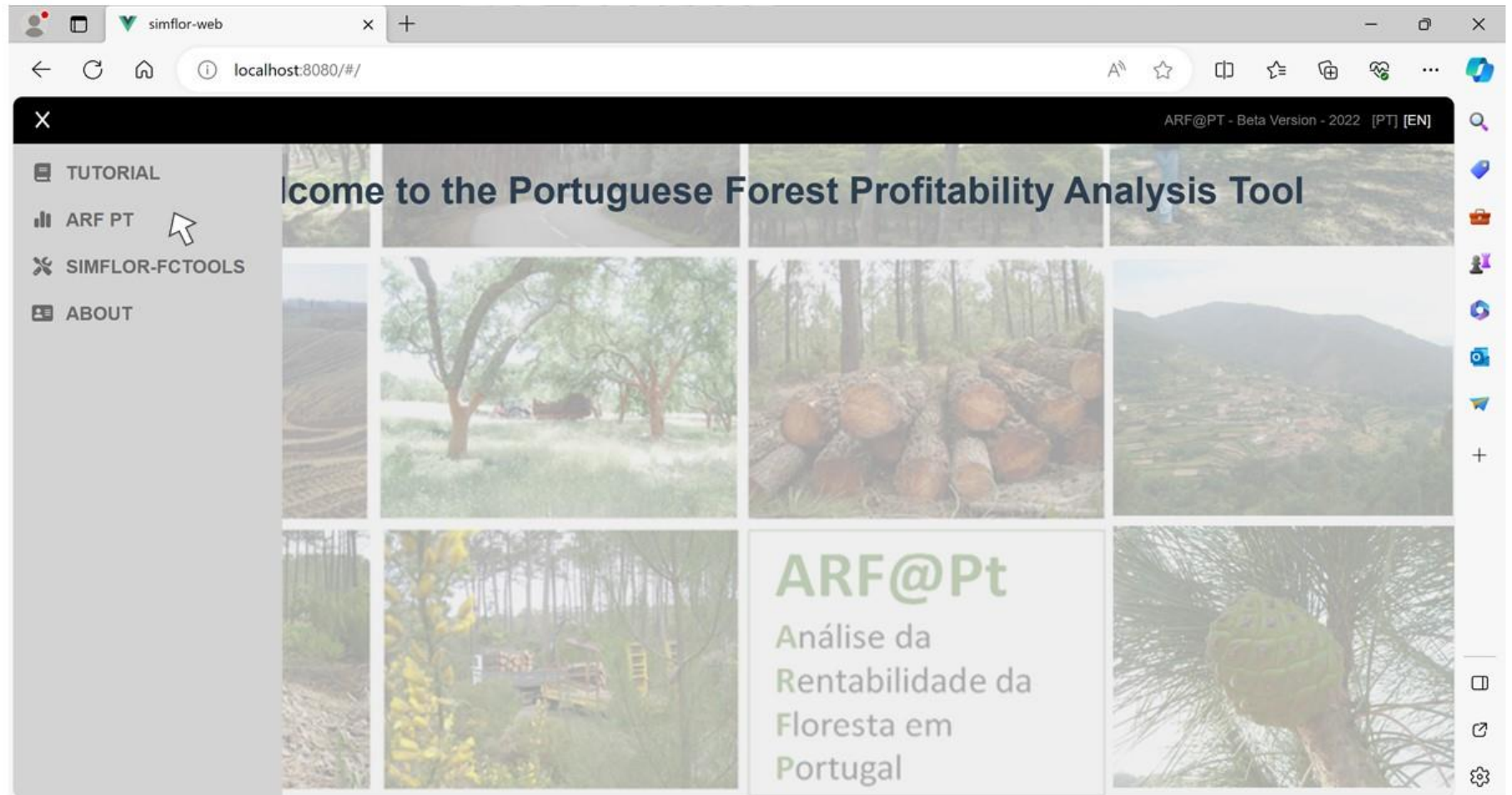


Susana Barreiro et al.

ARF@Pt creating free easy-access economic analysis for Portuguese forests

The development of an interactive tool is on-going to disseminate economic analysis

Workshops will be organized to train users



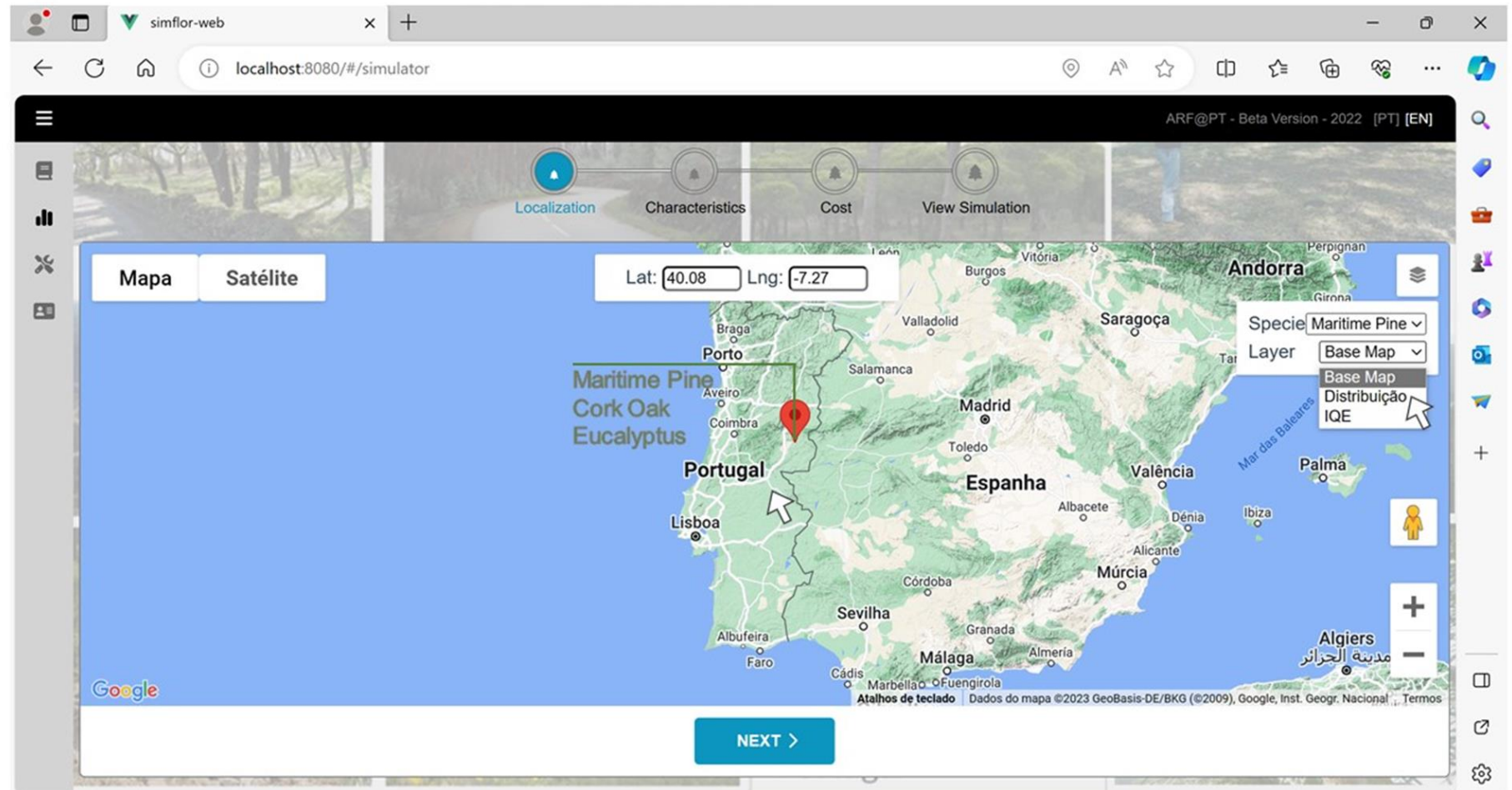
Susana Barreiro et al.

ARF@Pt creating free easy-access economic analysis for Portuguese forests

Ecological envelopes for each species (EES)

Models for the estimation of site index (S) will be used for each NFI pixel (500 x 500 m)

average S and 5%, 25%, 75% and 95% percentiles



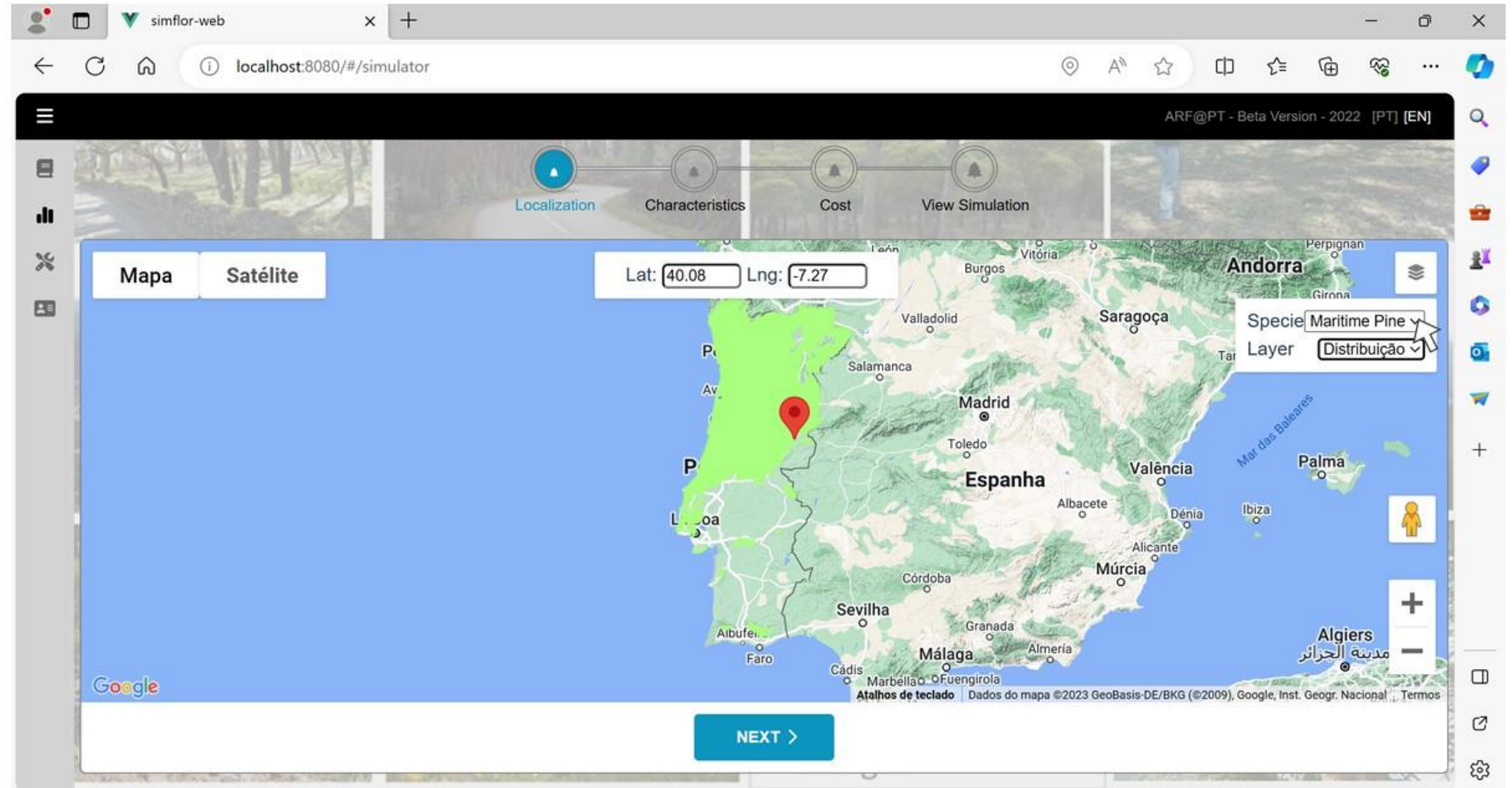
Susana Barreiro et al.

ARF@Pt creating free easy-access economic analysis for Portuguese forests

Ecological envelopes for each species (EES)

Models for the estimation of site index (S) will be used for each NFI pixel (500 x 500 m)

average S and 5%, 25%, 75% and 95% percentiles



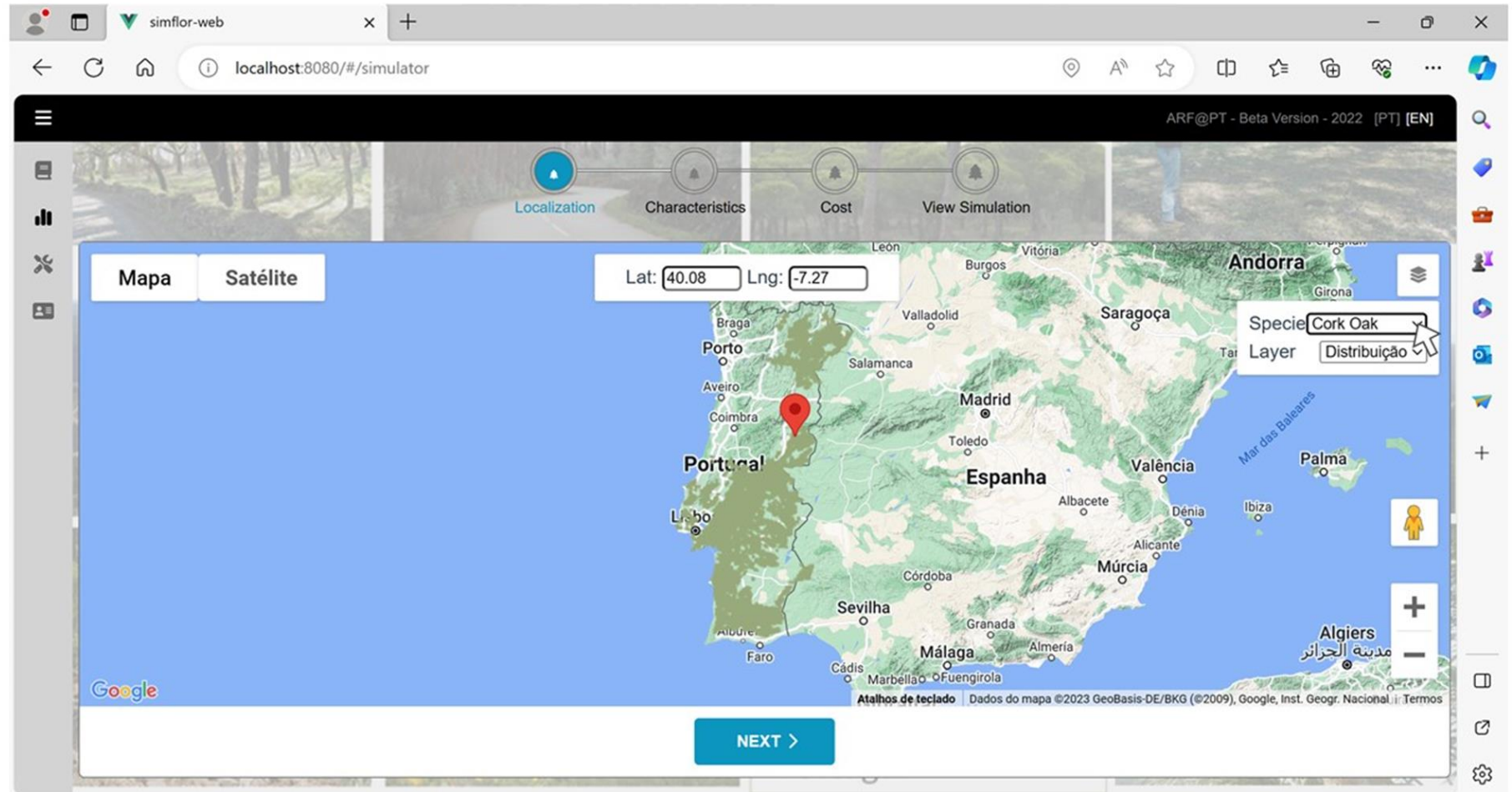
Susana Barreiro et al.

ARF@Pt creating free easy-access economic analysis for Portuguese forests

Ecological envelopes for each species (EES)

Models for the estimation of site index (S) will be used for each NFI pixel (500 x 500 m)

average S and 5%, 25%, 75% and 95% percentiles



Susana Barreiro et al.

ARF@Pt creating free easy-access economic analysis for Portuguese forests

Definition of site:

“working conditions”
(slope, stoniness)

The screenshot displays the ARF@Pt simulator web interface in a browser window. The browser's address bar shows 'localhost:8080/#/simulator'. The page title is 'ARF@Pt - Beta Version - 2022 [PT] [EN]'. The interface features a navigation bar with four tabs: 'Localization', 'Characteristics' (which is active), 'Cost', and 'View Simulation'. Below the navigation bar, the 'Characteristics' section is titled 'Select simulation characteristics'. It includes a 'Site conditions' dropdown menu with options 'Easy', 'Average', 'Difficult', and 'Very difficult'. A 'Sylvicultural s' dropdown menu is also visible. To the right, there is a 'Site index' slider ranging from 'Low' to 'High'. Below these, there is a search bar labeled 'Search'. At the bottom of the interface, there are four expandable sections: 'idade', 'Fase', 'Operação I', and 'Operação II'. At the very bottom, there are two buttons: '< PREVIOUS' and 'NEXT >'. The browser's taskbar on the right side shows various application icons.

Susana Barreiro et al.

ARF@Pt creating free easy-access economic analysis for Portuguese forests

Definition of site:

“working conditions”
(slope, stoniness)

“silvicultural systems”

The screenshot displays the 'simflor-web' application in a web browser at the URL 'localhost:8080/#/simulator'. The interface is titled 'ARF@PT - Beta Version - 2022 [PT] [EN]'. A navigation bar at the top includes icons for 'Localization', 'Characteristics' (which is active), 'Cost', and 'View Simulation'. The main content area is titled 'Characteristics' and contains the following elements:

- A section 'Select simulation characteristics' with a 'Site conditions' dropdown menu currently set to 'Easy'.
- A 'Site index' slider ranging from 'Low' to 'High', with a marker positioned in the middle.
- A 'Sylvicultural system - operational schedule' dropdown menu that is open, showing options: 'Please Select', 'Please Select', 'Plantation', 'Natural regeneration', and 'High density natural regeneration'. A mouse cursor is pointing at the second 'Please Select' option.
- A search bar with the placeholder text 'Search'.
- At the bottom, there are two buttons: '< PREVIOUS' and 'NEXT >'.

On the left side of the interface, there is a vertical sidebar with various icons for navigation and settings.

Susana Barreiro et al.

ARF@Pt creating free easy-access economic analysis for Portuguese forests

Definition of site:

“working conditions”
(slope, stoniness)

“silvicultural systems” &
operation schedule” for the selected species

The screenshot shows the ARF@Pt simulator web interface. The browser address bar indicates the URL is localhost:8080/#/simulator. The interface has a top navigation bar with tabs: Localization, Characteristics (selected), Cost, and View Simulation. A sidebar on the left contains icons for file management, charts, and other tools. The main content area is titled 'Characteristics' and includes a 'Select simulation' dropdown menu set to 'Average'. Below this is a 'Sylvicultural system - operational schedule' dropdown menu set to 'Plantation'. A table displays the operational schedule for different ages (idade) and phases (Fase). The table has four columns: idade, Fase, Operação I, and Operação II. The rows show operations for ages 1, 5, 5, and 10, all in the 'MANUTENÇÃO' phase. The operations include Retanča, Controlo de vegetação, and Desramação. At the bottom, there are 'PREVIOUS' and 'NEXT' buttons.

idade	Fase	Operação I	Operação II
1	MANUTENÇÃO	Retanča	Retanča
5	MANUTENÇÃO	Controlo de vegetação	Controlo de vegetação espontânea total com grade de discos
5	MANUTENÇÃO	Controlo de vegetação	Limpeza de matos com motorroçadora
10	MANUTENÇÃO	Desramação	Desramação de árvores jovens com tesoura de poda

Susana Barreiro et al.

ARF@Pt creating free easy-access economic analysis for Portuguese forests

For the whole planning horizon display all forest operations

associated operation costs, consumable costs and revenues to be used in the economic analysis

Identification of other funding (e.g. subsidies or other incentives)

ARF@PT - Beta Version - 2022 [PT] [EN]

Localization Characteristics **Cost** View Simulation

Costs

OPERATION	UNIT	COST
Abertura manual de covas (30 x 30 x 30 cm)	€/ha	400
Aplicação de adubo total (tractor agrícola/ florestal)	€/ha	90,00 €
Aplicação manual de adubo	€/ha	17,5
Construção da pilha	@	0,5
Controlo da vegetação com corta matos de facas ou correntes (tractor agrícola ou florestal borracheiro)	€/ha	180
Controlo da vegetação espontânea na linha ou de forma localizada (mão de obra especializada, incluindo equipamento)	€/ha	650
Corte seletivo ou salteado	€/ha	26
Desbaste seletivo	0	0
Desbóia	€/ha	46,66667
Descortiçamento	€/ha	116,662

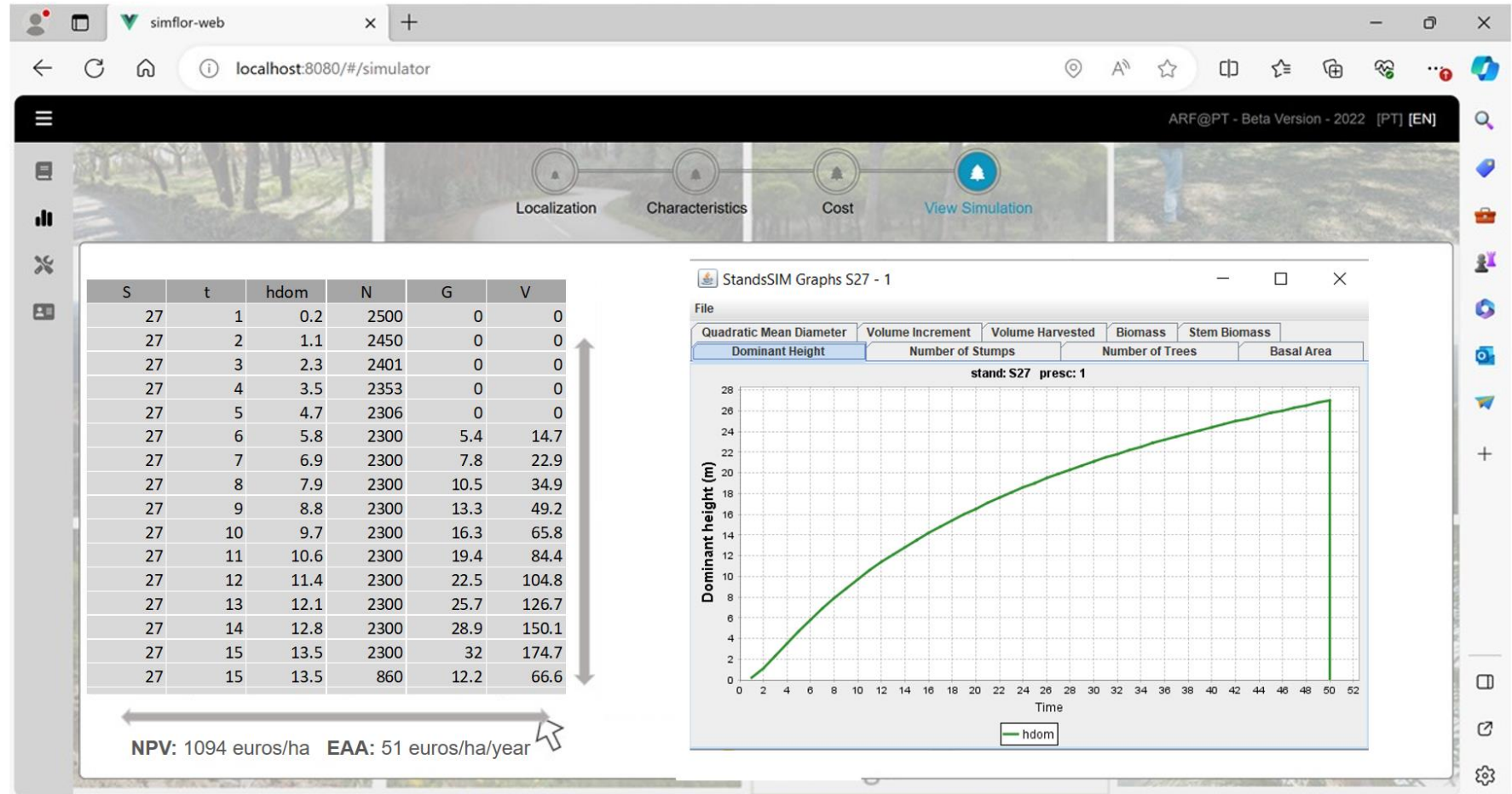
TYPE: CORK			RAW MATERIAL PRICE			
Calibre		Linhas	1/5		6	
mm	mm		min	max	min	max
14	18	6/8	2,30 €	2,50 €		
18	27	8/12	2,50 €	2,50 €		
27	32	12/14				
29	34	13/15				
34	45	15/20	6,00 €	8,00 €	1,75 €	2,00 €
41	54	18/24				
		Refugo				

< PREVIOUS NEXT >

ARF@Pt creating free easy-access economic analysis for Portuguese forests

As all options are selected through the interface a query is created and its results displayed

The economic analysis and simulation results are displayed

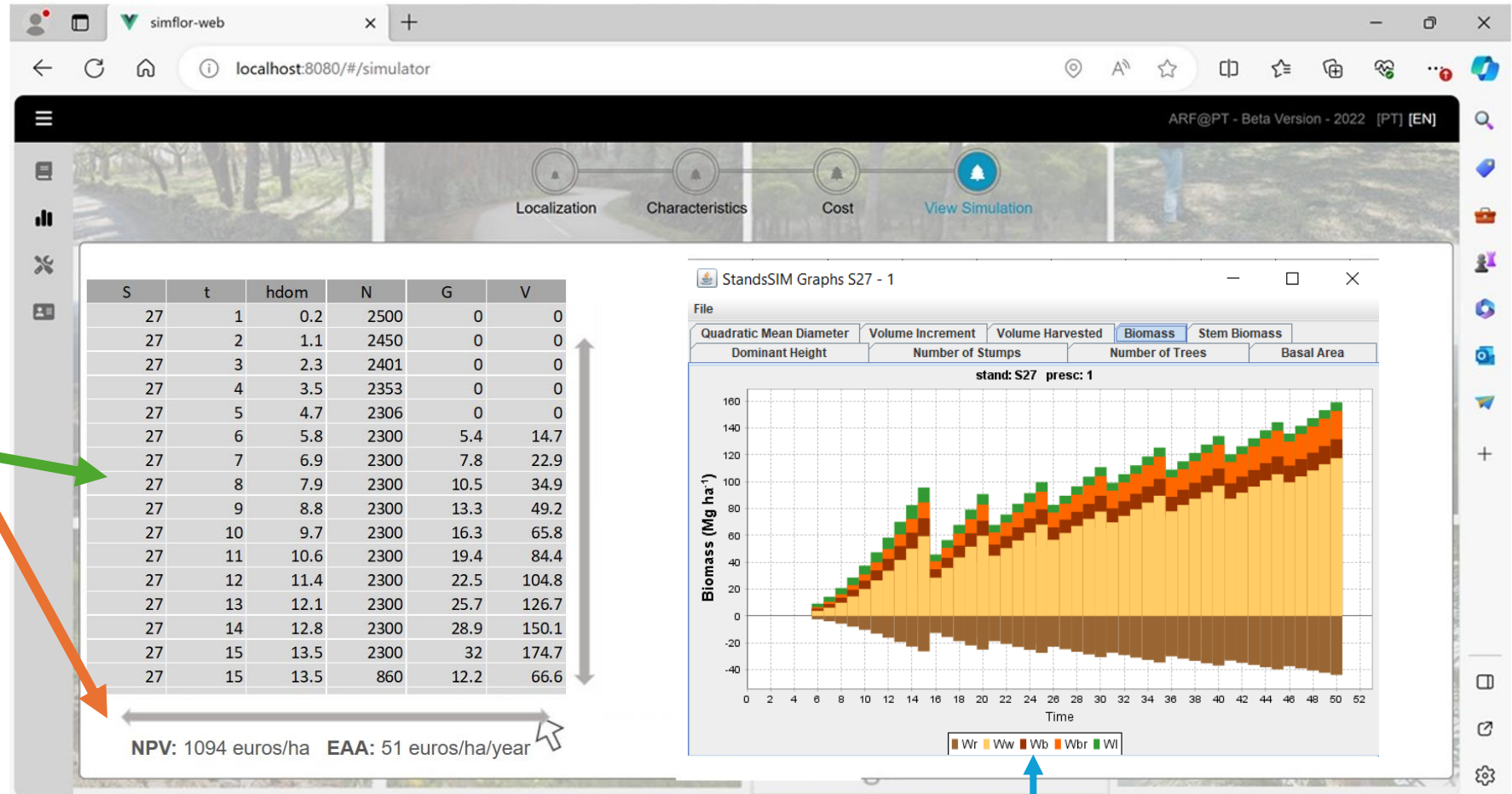


ARF@Pt creating free easy-access economic analysis for Portuguese forests

As all options are selected through the interface a query is created and its results displayed

The economic analysis and simulation results are displayed

the user can navigate through several stand level variables



ARF@Pt creating free easy-access economic analysis for Portuguese forests

The project is interactive:

- The **methodology** is based on **up-to-date knowledge**
- It allows identifying **knowledge gaps**
- As **new knowledge** is available, it will be **incorporated**



Susana Barreiro et al.

ARF@Pt creating free easy-access economic analysis for Portuguese forests

Thank you!

smb@isa.ulisboa.pt

The Portuguese Forests'

Traditional wood production species



Eucalyptus globulus (23%)

Pulp :

1 plantation (1250 trees
ha⁻¹) + 2 coppices
harvest around 10 yr

Pinus pinaster (23%)

Wood (and resin):

1 plantation (1667
trees ha⁻¹)
harvest around 35 yr

Traditional non-wood production species



Quercus suber (23%)

Cork:

(un)even aged
Debarking every 9 yrs
difficult to regenerate
forbidden to harvest

Pinus pinea (6.5%)

Pine nuts

Plantations
Usually grafted

