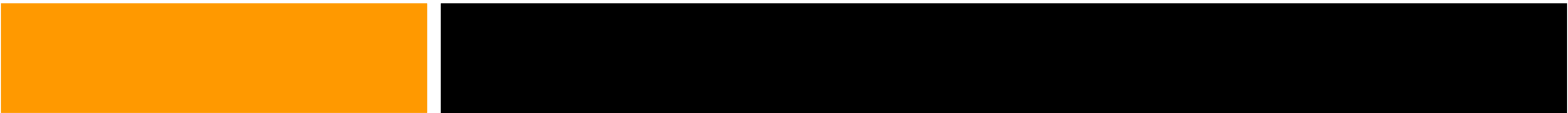


# The ModisPinaster model: an overview (2009-2014)

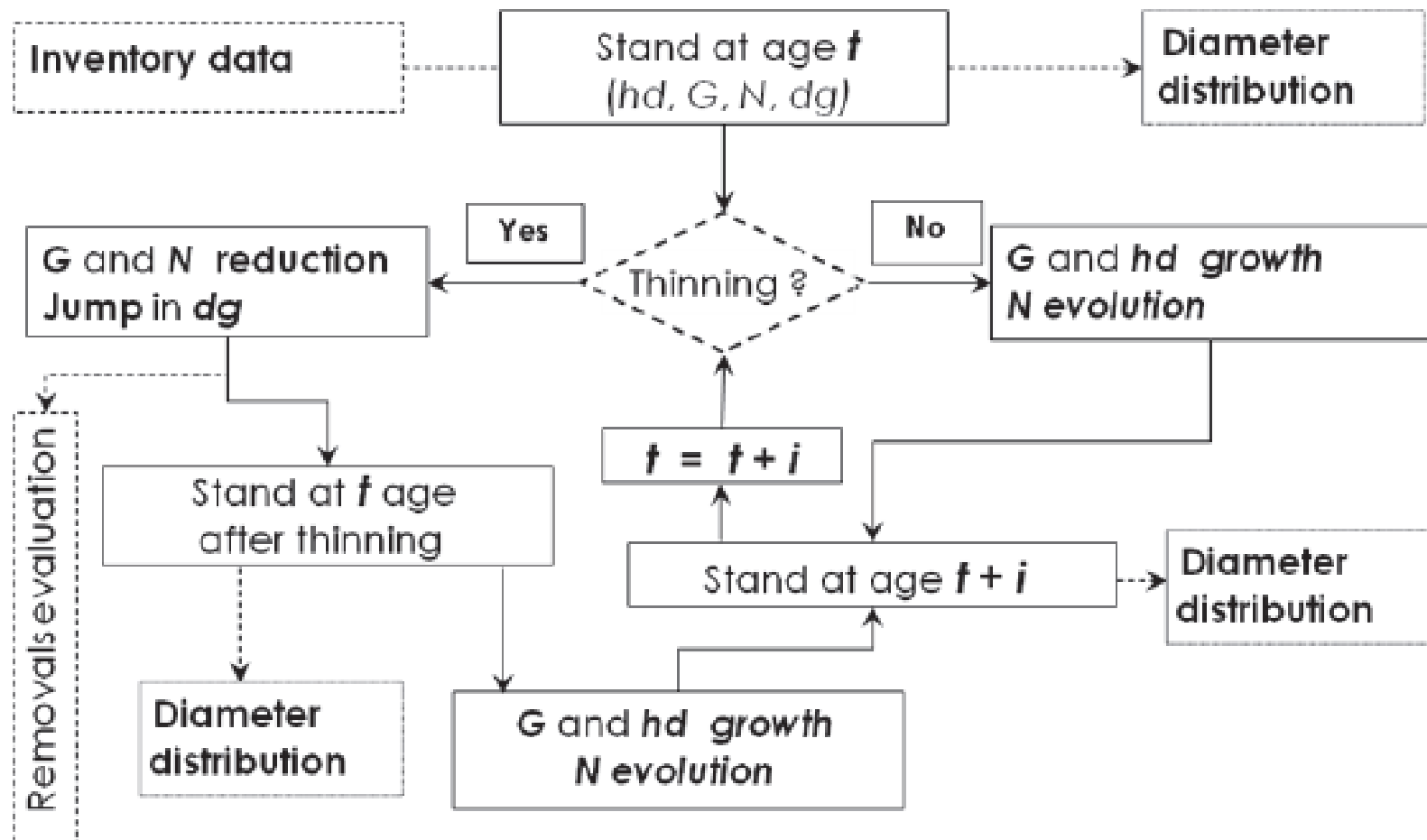
*Teresa Fonseca*

*CIFAP - Universidade de Trás-os Montes e Alto Douro, Portugal*

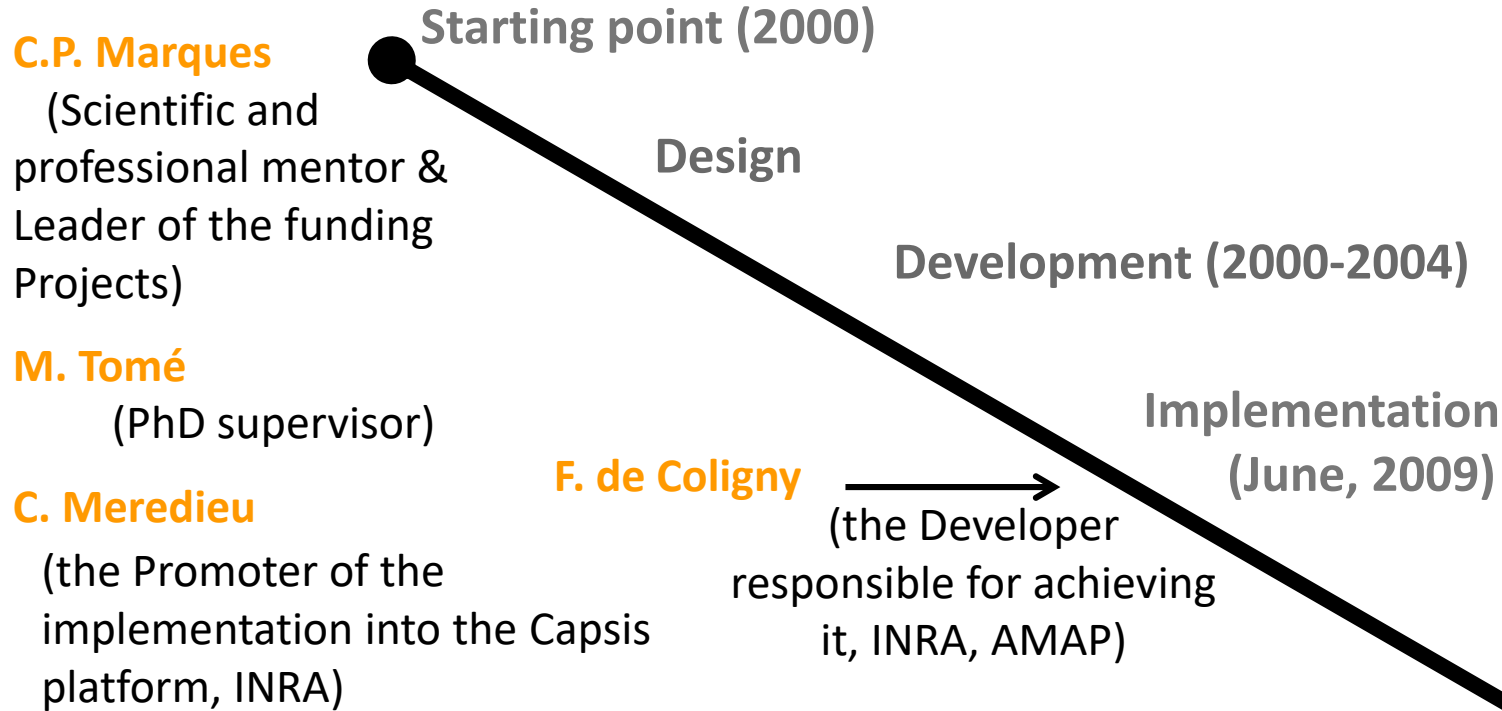
*tfonseca@utad.pt*



# Design



# ModisPinaster



## Why Capsis 4?

**Good reputation** of the supporting institutions (e.g. INRA)

**Secure platform** (confidence on perennity)

**Professional** and **technical support by the Developers**

**Easy to run** in different operative systems (Windows, MacOSX, Linux)

**Free** software

+ all the properties of using Java language  
(easier than others, free, easier for distribution, stable)

**Use of existing extensions** → model improvement

**Easy to share** the model with the forest managers

**Easy to do** simulations within the Capsis platform

# Implementation

## Integration of ModisPinaster in Capsis platform



**Capsis**

Computer-aided projection of strategies in  
silviculture

**François de Coligny**  
(Capsis Developer)



**Training / Discussions (fc, cm)**

**Integration of the stand level modules**

**Integration of the distribution part**

**Submodels revision**

# Results (first version – June 2009)

## Minimal Input

## Homogeneous stands, by default

**Initialize scenario**

**Stand characteristics**

Stand name : No name

Stand age (t, years) : 20

Dominant height (hd, m) : 10.3

Number of trees (N, n.ha<sup>-1</sup>) : 2200

Basal area (G, m<sup>3</sup>ha<sup>-1</sup>) : 23

Dominant diameter (dd, cm) : 17.7

Terrain direction (,°) : 180

Terrain slope (,°) : 15

**Volume merchantable (vmer, sq.m)**

Use top diameter for merchantable volume (cm) 10

Use top height for merchantable volume (m)

**Stand nature**

Stand nature selected

Homogeneous

Heterogeneous

Stand nature estimated

Number of diameter classes :

Diameter standard deviation (sd, cm) :

**Optional data**

Average diameter (davg, cm) :

Median diameter (dmed, cm) :

Minimum diameter (dmin, cm) :

Recent cut :

Recent mortality

**PINASTER MODIS**

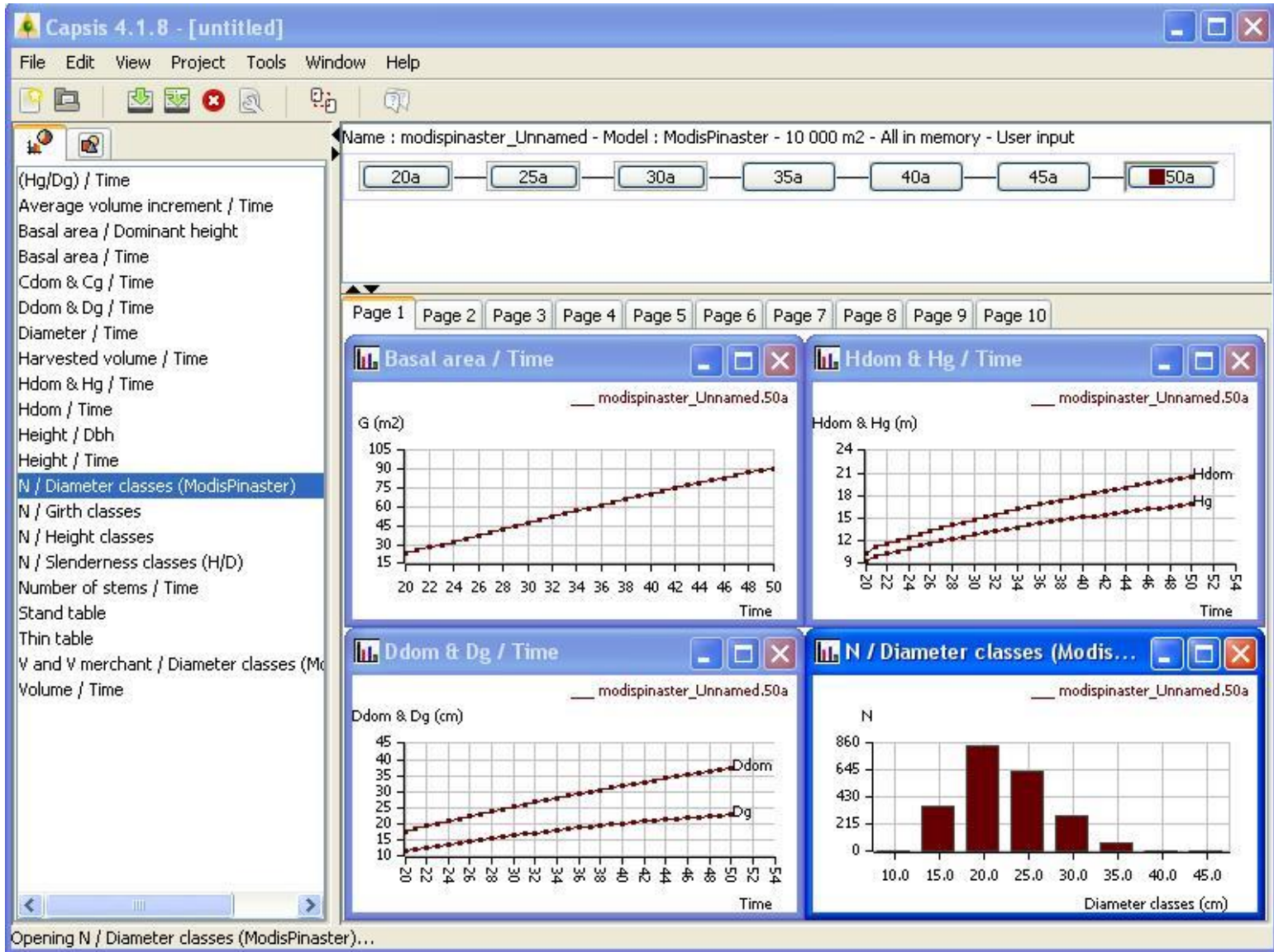
Demo Load Save As

Ok Cancel Help

Merchantability limits, set by the user

To improve the initialization of stand variables

# Evolution



Project ModisPinaster [mod] - 1 ha - All in memory - User input

20a 25a

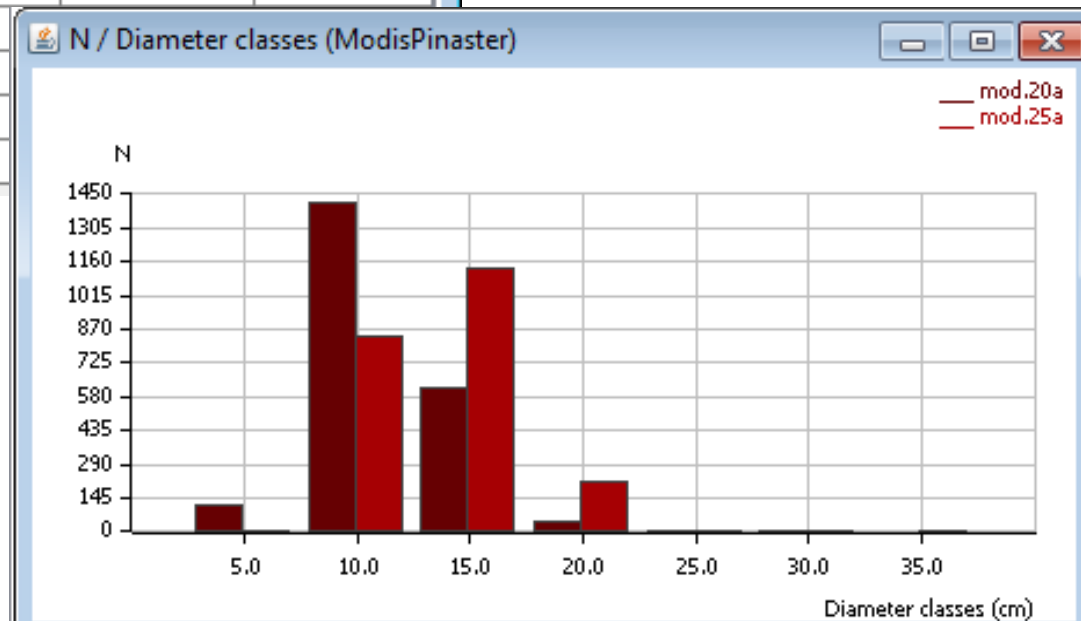
Page 1 Page 2 Page 3 Page 4 Page 5 Page 6 Page 7 Page 8 Page 9 Page 10

Stand table

mod.25a

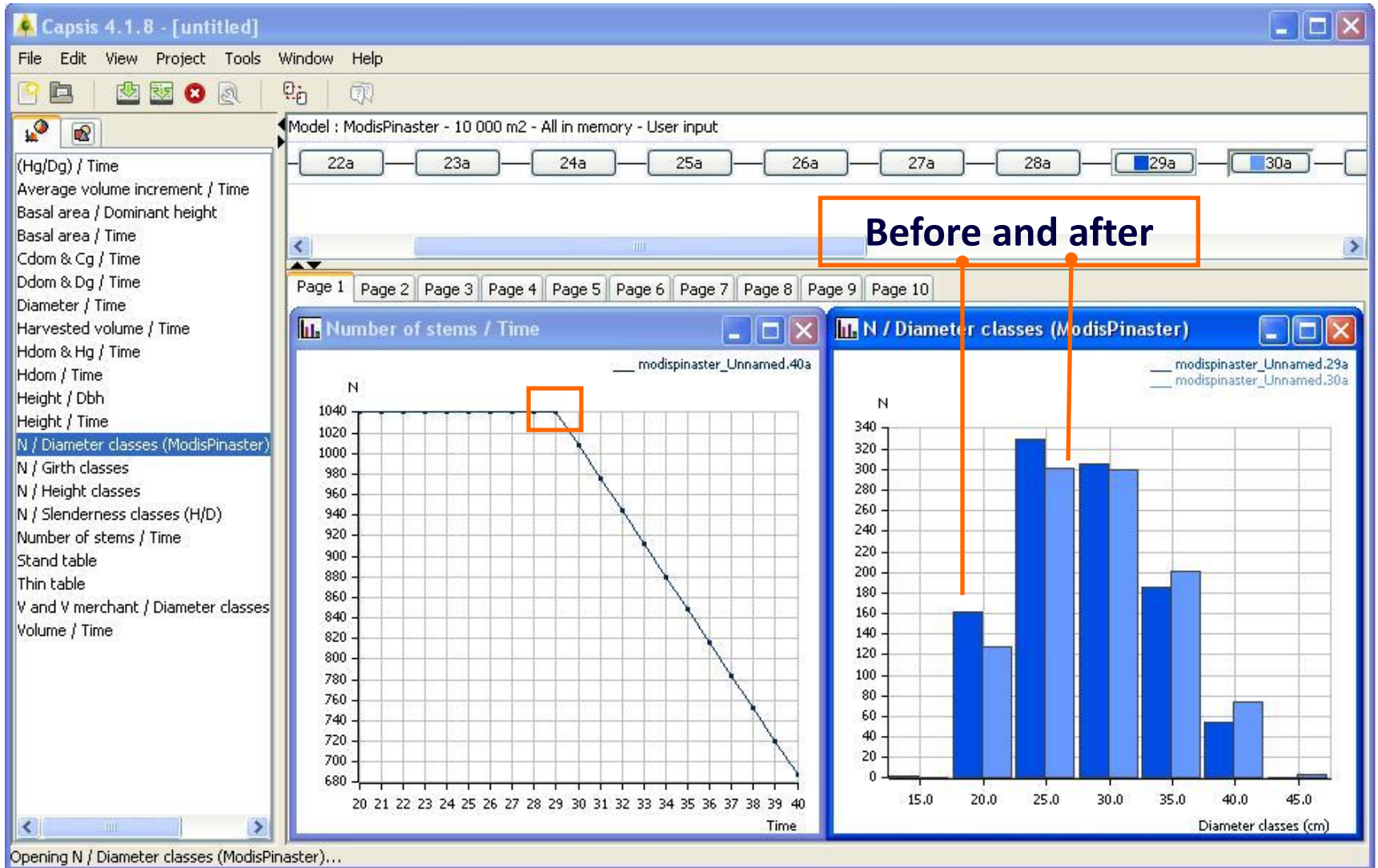
A	B	C	D	E	H
Stand	Stand	Stand	Stand	Stand	Production
Date	N	G	Hg	Dg	V prod
20	2200.0	23.00	9.31	11.54	115.18
21	2200.0	25.02	9.95	12.03	132.08
22	2200.0	27.06	10.31		
23	2200.0	29.14	10.66		
24	2200.0	31.22	10.99		
25	2200.0	33.33	11.31		

**5 years projection  
Stand table and Diameter  
Distribution**





# Mortality



# Thinning

Interactive procedure (low, high, mixed) by F. de Coligny or automatic procedure (Alder's thinning algorithm), or both

**Intervention - modispinaster\_Unnamed.20a**

Group restriction (optional)  
 Group, type: tree, Not: tree

Select an Intervention method  
Intervention type: Selective Thinning  
Available methods: Thinning diagram, Individual Thinning

Description:  
Cut trees by action on an interactive diameter distribution histogram

**Thinning diagram**

Parameters  
Class width (cm): 5.0 Minimum threshold (cm): 0.0  
 Per hectare  
 Girth

Option: use the Alder's thinning algorithm, N to cut: 0 **Apply**

0 118 1435 609 36 0 0

0-5 5-10 10-15 15-20 20-25 25-30 30-35

**Results (approximate)**

	Before	After	Cut
N	2198	2198	0
G (m2)	23	23	0
Dg (cm)	11.54	11.54	0

## Thinning options

1. **Wilson Spacing Factor**
2. **Number of trees**
3. **SDI %**
4. **Thinning diagram**

(By F. de Coligny)  
Cut trees by action on an  
interactive diameter  
distribution histogram

Thinning diagram

Parameters

Class width (cm) : 5.0 Minimum threshold (cm) : 2.5

Per hectare  Girth  Centered classes

Option: use the Alder's thinning algorithm

Wilson factor : 0.23  Stand density index : 24.16

N trees to cut : 418

48 1111 585 38 0

2.5-7.5 7.5-12.5 12.5-17.5 17.5-22.5 22.5-27.5

Results (approximate)

	Before	After	Cut
N	2200	1782	418
G (m <sup>2</sup> )	23	20.45	2.55
Dg (cm)	11.54	12.09	8.8

20a 25a  
\*20b 24b 29b 30b

### Thinning diagram

Parameters

Class width (cm) : 5.0 Minimum threshold (cm) : 2.5

Per hectare  Girth  Centered classes

Option: use the Alder's thinning algorithm

Wilson factor : 0.23  Stand density index : 24.16

N trees to cut : 418 Apply

48 1098 598 40 0 0

2.5-7.5 7.5-12.5 12.5-17.5 17.5-22.5 22.5-27.5 27.5-32.5

Results (approximate)

	Before	After	Cut
N	2200	1782	418
G (m2)	23	20.45	2.55
Dg (cm)	11.54	12.09	8.8

Ok Cancel Help



### Stand table

mod.30b

	A	B	C	D
Stand	Stand	Stand	Stand	Stand
Date	N	G	Hg	
20	2200.0	23.00	9.31	
20	1782.0	20.45	9.34	
21	1782.0	22.34	10.00	
22	1782.0	24.26	10.37	

### V and V merchant / Diameter classes ...

mod.30b

V and V merchant (m3)

Diameter classes (cm)

### Biomass & C / Diameter classes (Modis...)

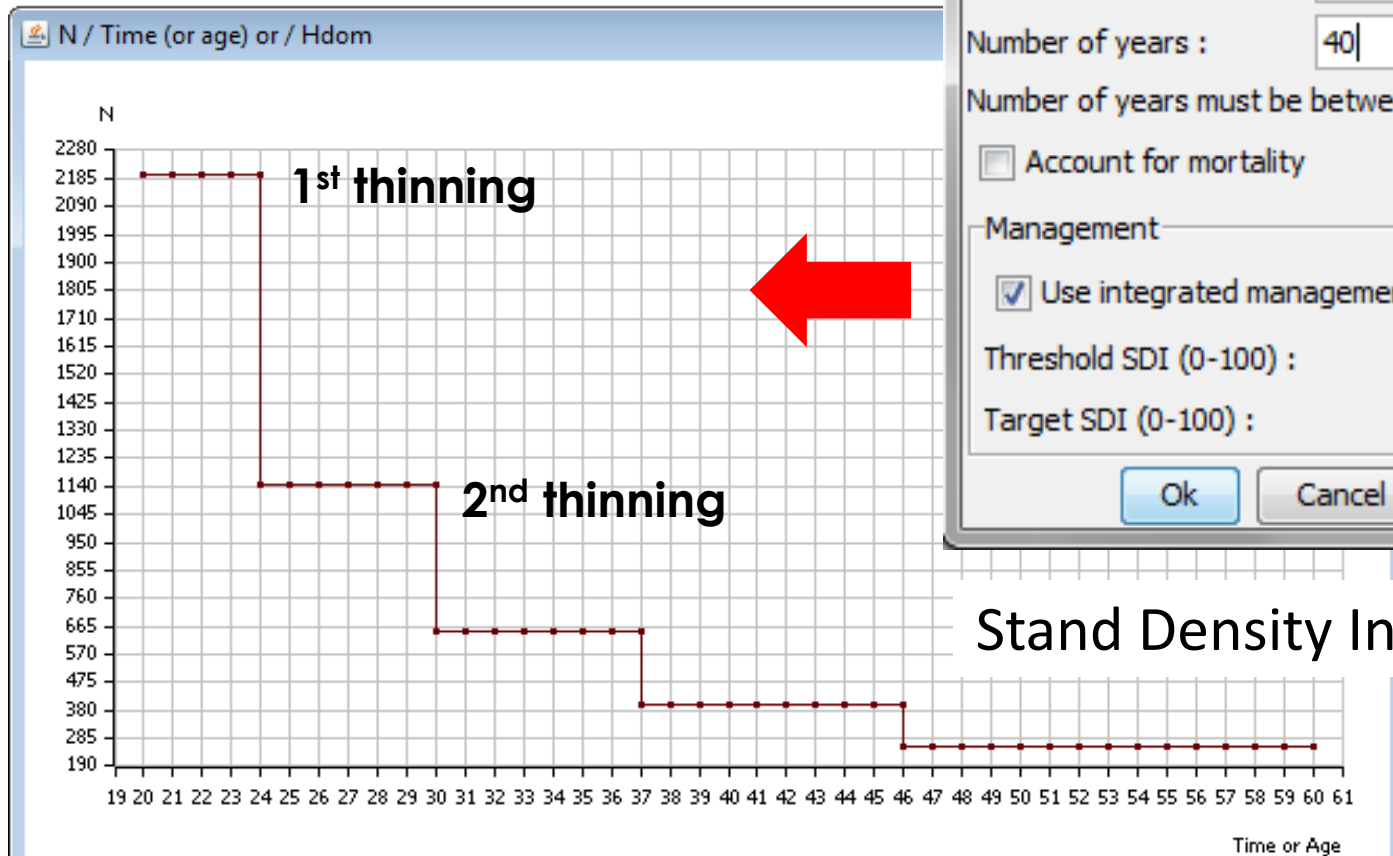
mod.30b

Carbon (kg)

Diameter classes (cm)

# Evolution

“Automatic” integrated management procedures were incorporated



Evolution values

Current age : 20

Number of years : 40

Number of years must be between 1 and 45

Account for mortality

Management

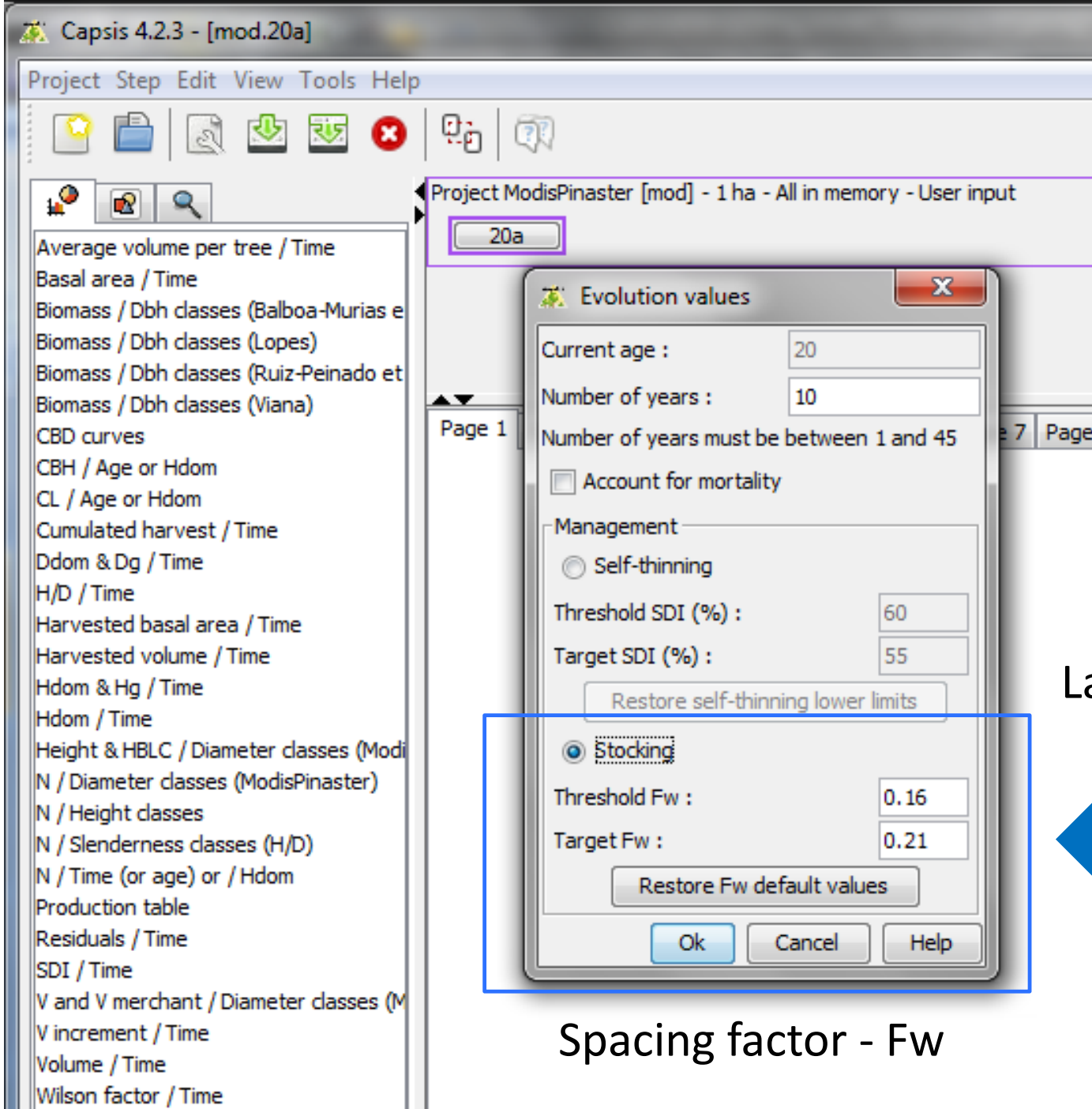
Use integrated management

Threshold SDI (0-100) : 35

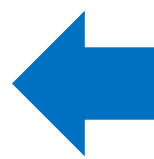
Target SDI (0-100) : 25

Ok Cancel Help

Stand Density Index- SDI

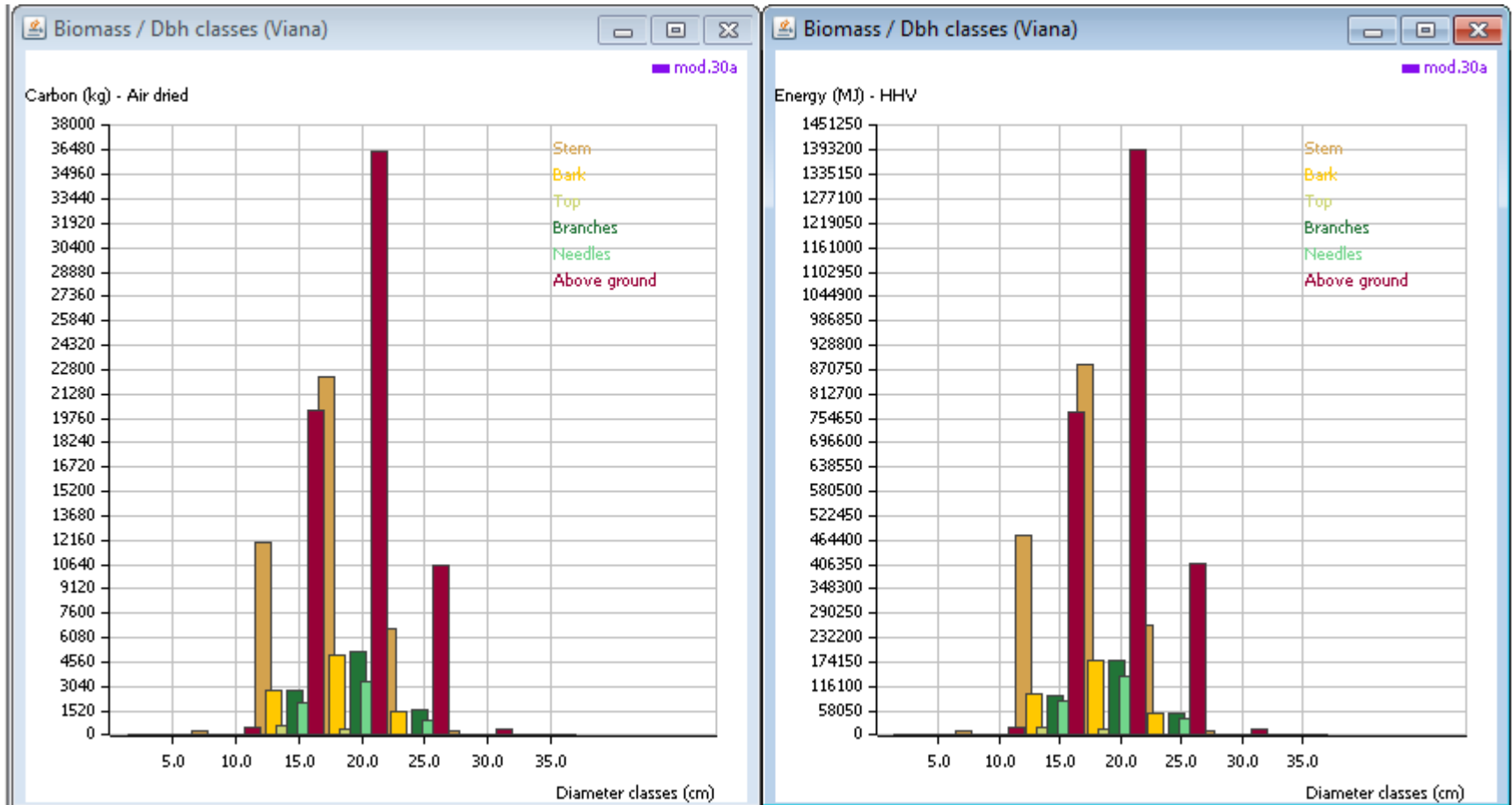


Later on:



Spacing factor - Fw

# Biomass, carbon and energy by diameter class and by tree component



Viana, H., 2012. Modelling and mapping aboveground biomass for energy usage and carbon storage assessment in mediterranean ecosystems. PhD Thesis. University of Trás-os-Montes e Alto Douro, Portugal.

# Divulgation

Presentation of the model

Selection of “case studies” for simulation purposes

**Feedback  
from the users**

## Experimentação e Questões 1

### Dados de entrada “Demo”

Obter o gráfico da distribuição de N por classe de d aos 20 anos.

### Cenário 1

- Evolução até aos 45 anos.
- Gestão automática com SDI% entre 25 e 35%

Obter gráficos de evolução das variáveis N e dg em função do tempo.

Obter dados de N e de volume ao longo do tempo, sob a forma gráfico e como tabela.

Description of the model in:

**Fonseca, T.F., B. Parresol, C. Marques, F. de Coligny, 2012. Models to Implement a Sustainable Forest Management – an Overview of the ModisPinaster Model. In: Sustainable Forest Management / Book 1", InTech - Open Access Publisher. ISBN 979-953-307-136-6.**