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# Exercises with the EFISCEN model using Utopia

EFISCEN training, Driebergen, 14-17 October 2013

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# EFISCEN re-implementation

- EFISCEN 3 was used for recent applications (EFSOS, Euwood, LULUCF)
- EFISCEN was re-implemented into Java together with University of Eastern Finland – EFISCEN 4
- Improvements:
  - Scenario options and database linkage added
  - Graphical User Interface was updated
- Both version can be used, but Java version is preferred in the course
- Feedback on Java version is very much appreciated!

Selection

Region(s)

Owner(s)

Site(s)

Species

Scenario

Climate: Undefined

Management: Undefined

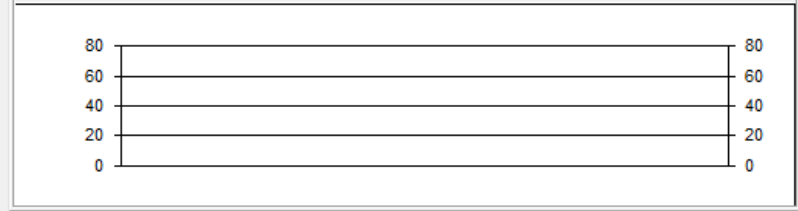
Scaling factor: 1.000

Data

Current step  Steps/click   Thin. int.   Fell. int.

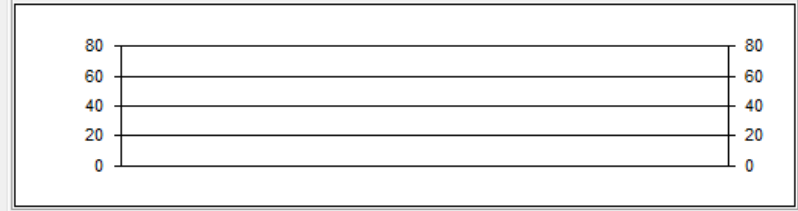
SELECTION

Matrixes <input type="text"/>	Soil	Carbon in trees
Area <input type="text"/> (Th.ha)	NwL <input type="text"/> SOL <input type="text"/>	Total <input type="text"/>
Volume <input type="text"/> (Th.m3)	FwL <input type="text"/> CEL <input type="text"/>	Stem <input type="text"/>
Av. Volume <input type="text"/> (m3/ha)	CwL <input type="text"/> LIG <input type="text"/>	Branches <input type="text"/>
Affor. fund <input type="text"/> (Th.ha)	HUM1 <input type="text"/>	C. roots <input type="text"/>
Bare Area <input type="text"/> (Th.ha)	C-> <input type="text"/> HUM2 <input type="text"/>	F. roots <input type="text"/>
Potential Final Fellings (Th.ha;Th.m3)	Area <input type="text"/> Volume <input type="text"/>	Leaves <input type="text"/>



TOTAL

Matrixes <input type="text"/>	Soil	Carbon in trees
Area <input type="text"/> (Th.ha)	NwL <input type="text"/> SOL <input type="text"/>	Total <input type="text"/>
Volume <input type="text"/> (Th.m3)	FwL <input type="text"/> CEL <input type="text"/>	Stem <input type="text"/>
Av. Volume <input type="text"/> (m3/ha)	CwL <input type="text"/> LIG <input type="text"/>	Branches <input type="text"/>
Affor. fund <input type="text"/> (Th.ha)	HUM1 <input type="text"/>	C. roots <input type="text"/>
Bare Area <input type="text"/> (Th.ha)	C-> <input type="text"/> HUM2 <input type="text"/>	F. roots <input type="text"/>
Potential Final Fellings (Th.ha;Th.m3)	Area <input type="text"/> Volume <input type="text"/>	Leaves <input type="text"/>





Version 3.1.3i  
EFI/ALTERRA





Regions

Owners

Sites

Species

 Thinning intensity Felling intensity Scaling

Apply

No data

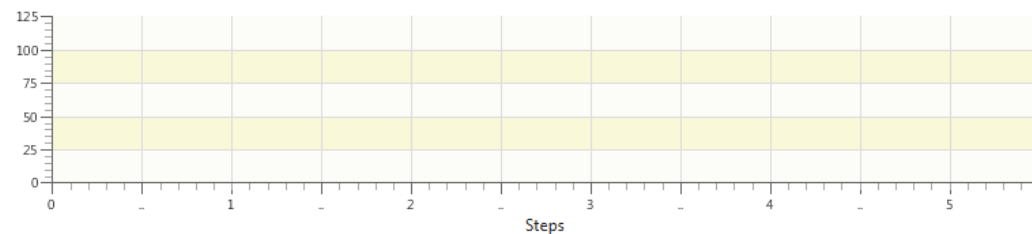
Current year --

Steps

Run

Total

Selected



Matrices 0

General

<input type="text" value="0.0"/> Gr.stock	(Th · m <sup>3</sup> )	<input type="text" value="0.0"/> Affor.fund	(Th · ha)	<input type="text" value="0.0"/> Area	(Th · ha)
<input type="text" value="0.0"/> Avr.gr.stock	(m <sup>3</sup> /ha)	<input type="text" value="0.0"/> Bare area	(Th · ha)	<input type="text" value="0.0"/> Dead Wood	(1000m <sup>3</sup> )
<input type="text" value="0.0"/> Increment	(m <sup>3</sup> /ha)	<input type="text" value="0.0"/> Nat.Mortality	(1000m <sup>3</sup> /step)		

Wood removals

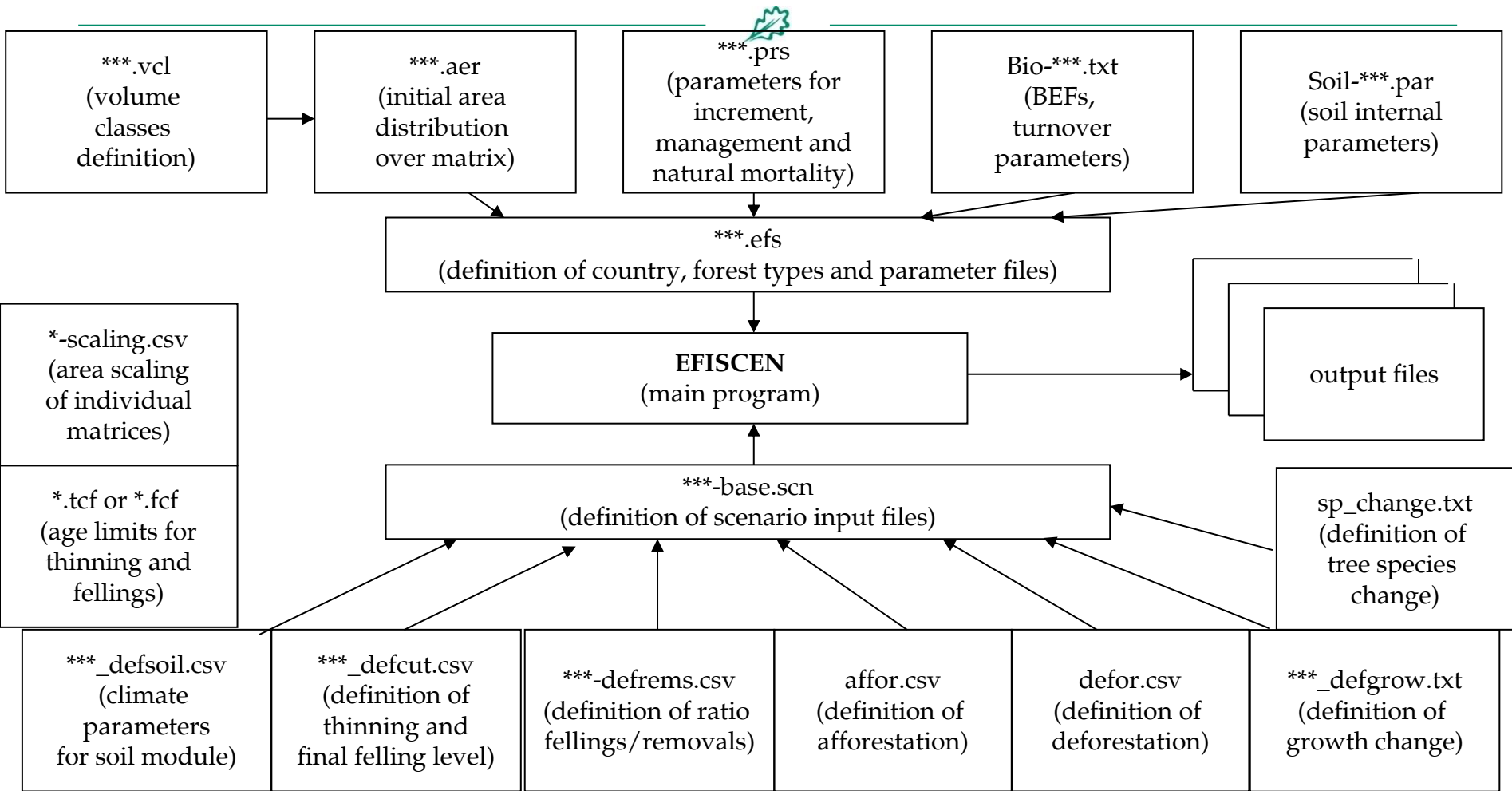
<input type="text" value="0.0"/> FF area	(Th · ha)	<input type="text" value="0.0"/> FF volume	(1000m <sup>3</sup> /step)	<input type="text" value="0.0"/> PF area	(Th · ha)
<input type="text" value="0.0"/> PF volume	(Th · m <sup>3</sup> )	<input type="text" value="0.0"/> Thinarea	(Th · ha)	<input type="text" value="0.0"/> Thinvolume	(1000m <sup>3</sup> /step)

Carbon in trees

<input type="text" value="0.0"/> Branches	<input type="text" value="0.0"/> Coarse roots	<input type="text" value="0.0"/> Fine roots
<input type="text" value="0.0"/> Foliage	<input type="text" value="0.0"/> Stem	<input type="text" value="0.0"/> Total

Carbon in soil

<input type="text" value="0.0"/> CEL	<input type="text" value="0.0"/> COUT	<input type="text" value="0.0"/> CSoil
<input type="text" value="0.0"/> CWL	<input type="text" value="0.0"/> FWL	<input type="text" value="0.0"/> HUM1
<input type="text" value="0.0"/> HUM2	<input type="text" value="0.0"/> LIG	<input type="text" value="0.0"/> NWL
<input type="text" value="0.0"/> SOL		



```
finland.efs - Notepad
File Edit Format View Help
#EFISCEN experiment file
#Experiment's initialisation file
#EFISCEN 3 - Suomi/Finland
Finland
#Base year (starting simulation)
2005
#Regions should be listed first, started from how many
14
1 246001 Ahvenmaa
2 246002 Ranniko
3 246003 Lounais-Suomi
4 246004 Häme-Uusimaa
5 246005 Kaakkois-suomi
6 246006 Pirkanmaa
7 246007 Etelä-Savo
8 246008 Etelä-Pohjanmaa
9 246009 Keski-Suomi
10 246010 Pohjois-Savo
11 246011 Pohjois-Karjala
12 246012 Kainuu
13 246013 Pohjois-Pohjanmaa
14 246014 Lappi
#Owners
2
1 private
2 non-private
#Sites
2
1 Mineral_soil_CLASS_1-4
2 Peatland_soil_CLASS_1-4
#Species
3
1 Scots pine
2 Norway spruce
4 deciduous
#File name for parameters
Finland.prs
#
#File name for bioparameters
fin_biocomp.txt
#File name for matrixes
e3_fin.aer
#
#File name for soils
soilfin.par
#END
Ln1, Col1
```

```
Finland_base.scn - Notepad
File Edit Format View Help
#Efiscen_scenario file
#name
Finland current base
#Forest grow scenario file
fin_base_defgrow.csv
#soil climate scenario file
fin_base_defsoil.csv
#cuttings regimes scenario file
fin_defcut_base.csv
#removals definition
fin_defrems.csv
#afforestation scenario file
no_affor.csv
#deforestation scenario file
no_defor.csv
#Species change
nofile
#END
Ln1, Col1
```



## ▼ Regions

SouthernFinland\_(1986-1992)

## ▼ Owners

ALL

## ▼ Sites

Mineral\_soil\_CLASS\_2

## ▼ Species

Pine

## Climate

## Management

Scaling

Apply

(13:06) Datafile loaded utopia.efs  
 (13:06) Scenariofile loaded utopia.scn

Utopia

Current year 1990

Steps

Run



Matrices 1

## General

Gr.stock	199156.5	(Th · m <sup>3</sup> )	Affor.fund	278.62	(Th · ha)	Area	1777.46	(Th · ha)
Avr.gr.stock	112.05	(m <sup>3</sup> /ha)	Bare area	0.0	(Th · ha)	Dead Wood	0.0	(1000m <sup>3</sup> )
Increment	0.0	(m <sup>3</sup> /ha)	Nat.Mortality	0.0	(1000m <sup>3</sup> /step)			

## Wood removals

FF area	0.0	(Th · ha)	FF volume	0.0	(1000m <sup>3</sup> /step)	PF area	531.23	(Th · ha)
PF volume	98851.32	(Th · m <sup>3</sup> )	Thinarea	0.0	(Th · ha)	Thinvolume	0.0	(1000m <sup>3</sup> /step)

## Carbon in trees

Branches	9081.58		Coarse roots	10594.33		Fine roots	3915.22	
Foliage	4132.78		Stem	39831.33		Total	67555.23	

## Carbon in soil

CEL	0.0		COU2	0.0		CSoil	0.0	
CWL	0.0		FWL	0.0		HUM1	0.0	
HUM2	0.0		LIG	0.0		NWL	0.0	
SOL	0.0							

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# Exercises

- Use Utopia

- Basic run (for reference purposes)
- Modify uto\_defcut.csv from step 0 by adding 1000 to the wood demand from final fellings, but keep demand from thinning the same
- Modify uto\_defcut.csv from step 0 by tripling the wood demand from final fellings, but keep demand from thinning the same
- Thinnings represent 33% of total removals in step 0. Modify uto\_defcut.csv so that thinning become 25% of total removals (i.e. redistribute demand between thinning and final fellings)
- Modify uto\_defrems.csv from step 0 by adjusting ratio between removals and fellings to 0.95 (i.e. assume less harvest losses)
- Extract logging residues (stem parts and branches) from final fellings (uto\_defrems.csv)
- Assume that climate change affects growth rates. Modify uto\_defgrow.csv from step 0 by modifying the increment scaling factor (a factor 1 means no change)
- Modify rotation lengths by increasing them to 100 years. If you use EFISCEN4, you can modify it in \*.prs or in \*.fcf. In EFISCEN 3 it is only possible in \*.prs



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# Exercises

- Analyze:

- Can you supply sufficient wood?
- What happens to volume and age-classes?
- What happens to carbon stocks in biomass and soil?

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# Exercises

- Use Austria

- What do the 64 matrices represent?
- What are region 6 and species 7?
- What is the forest area in region 6?
- What is the growing stock of species 7?
- At what age can final harvest of species 7 start?
- Between what ages can species 7 be thinned?
- What percentage harvest losses occur when species 7 is harvested?
- What is the basic wood density of species 7?
- What is the share of foliage in total biomass of forests of species 7 older than 110 years?
- What is the litter production rate of coarse roots of species 7?