

# Carbon sequestration in forest

## Objective

To assess the carbon sequestration regimes under the land use change scenarios as derived with CLUE model

## Assumptions

We use land use change scenarios as provided by CLUE

CLUE uses land use categories : abandoned, forest, cropland, grassland. For each of these carbon sink/source estimates per country are derived from literature, we assume that when land use changes, the emission factor changes immediately as well. Furthermore:

- static calculation of emission factor \* area per time step
- assumed that the emission factors do not change over time (i.e. no saturation)
- only for the land use change of 'deforestation' the loss of stock was calculated. It was assumed that 80% of the biomass will be lost
- for all other land use changes no carbon stock loss was assumed (e.g. conversion between grassland and arable land)

## Method

See also 5. CLUE model is used, EFISCEN (European forest resource model is used) , emission factors are derived from literature:

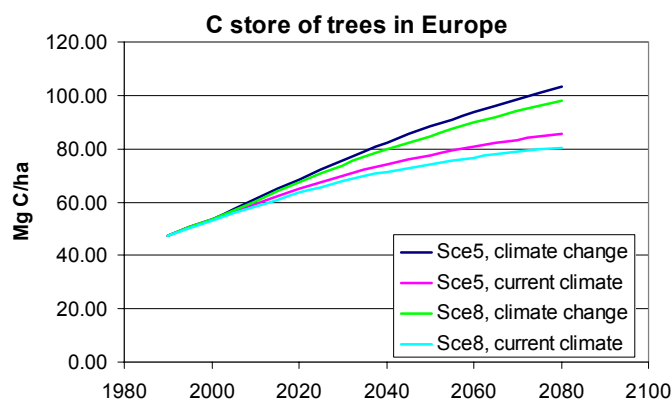
DATA MOSTLY FROM JANSSENS ET AL (PAPER TWO)  
SUBMITTED TO BIOGEOSCIENCES

Country	g C m <sup>-2</sup> y-1	g C m <sup>-2</sup> y-1	g C m <sup>-2</sup> y-2	g C m <sup>-2</sup> y-3
	grasssink	cropsink	peatsink	forestsink
Slovenia (Sl)	3.672	-8.2	0.46	142.45
Slovakia (Sk)	12.162	-24.68	-0.65	127.86
Austria (Au)	25.517	-16.19	0.13	89.88
Switzerland (Swi)	40.081	-10.49	-0.32	29.51
France (Fr)	12.023	-19.07	-0.74	25.94
Romania (Ro)	11.086	-30.71	-0.2	56.41
Germany (Ge)	13.599	-28.34	-6.44	64.48
Bulgaria (Bu)	6.751	-19.8	-0.25	43.61
Sweden (Sw)	1.178	-6.49	0.44	29.67
Czech Republic (Cz)	6.593	-35.82	-0.7	49.43
Croatia (Cr)	6.722	-15.43	0.22	30.38
Finland (Fi)	5.616	-5.49	-12.81	25.56
Yugoslavia (Yu)	11.44	-25.77	0.22	28.85
Bosnia-Herc. (BH)	6.827	-31.4	0.22	41.02
Norway (No)	3.557	-2.23	-0.59	16.54
Spain (Sp)	20.687	-4.73	-0.41	8.89
Latvia (La)	2.86	-44.1	-7.94	48.84
Hungary (Hu)	6.3	-44.77	-6.43	37.51
Italy (It)	12.718	-19.47	-2.84	31.73

Greece (Gr)	2.772	-10.13	-0.46	5.23
Albania (Al)	1.782	-10.89	0.17	5.2
Macedonia (Ma)	2.788	-12.02	0.03	0
Ukraine (Ukr)	10.458	-39.13	-11.43	22.26
Lithuania (Li)	3.248	-60.82	-2.39	38.22
Estonia (Es)	2.209	-39.69	-26.21	34.67
Poland (Pol)	8.475	-36.85	-26.15	32.04
Belarus (Blr)	8.853	-20.39	-59.08	49.71
United Kingdom (UK)	24.226	-13.67	-27.47	10.57
Portugal (Por)	-4.494	-28.08	-2.02	17.93
Moldova (Mo)	4.822	-49	0	12.47
Irish Republic (Ir)	21.186	-12.29	-52.73	6.43
Denmark (Dk)	2.554	-39.91	-6.03	11.63
Belg.+Lux. (BLx)	15.84	-9.11	-9.11	12.68
Netherlands (NI)	18.381	-25.39	-47.07	21.62

## Current and historical situation

Forests are young in Europe, they are in a stage of fast sequestration,. This has occurred since 1900, and will most likely continue until at least 2050 .



## Input (data sets)

National scale emission factors (Janssens et al)  
CLUE output on areas until 2030

## Results

Greenhouse gas balance per country until 2030

## Output

National scale GHG balance

## **Resolution of output**

National scale

## **Accuracy**

Rather large assumptions are made on immediate change of emission factor when land use changes. These responses take years to decades in reality.

## **Conclusions**

These are 'what if' scenarios. Results are indicative only.

## **References**

A. Janssens, A. Freibauer, B. Schlamadinger, R. Ceulemans, P. Ciais, A. J. Dolman, M. Heimann, G.-J. Nabuurs, P. Smith, R. Valentini and E.-D. Schulze. The carbon budget of terrestrial ecosystems at country-scale. A European case study. Submitted to Biogeosciences