

# Environmental impact assessment of CAP greening measures using CAPRI model

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19<sup>th</sup> MARS conference – Vilnius

Plenary session: Environmental aspects of the CAP

# Content

- CAPRI as an impact assessment tool
- Greening measures: effect on crops / livestock
- Greening measures environmental impacts, indicators
- Conclusions

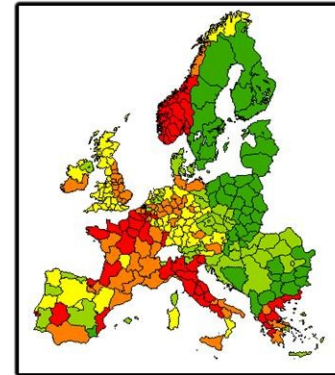
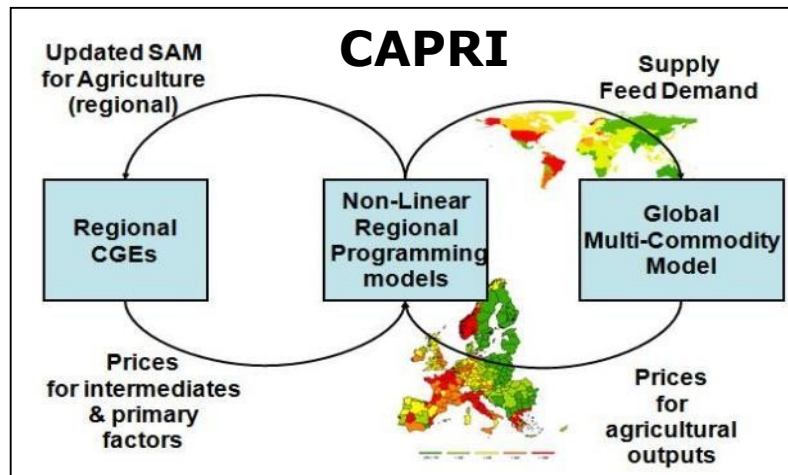
# Integrated economic and agri-environment modelling

## CAPRI for agri-environmental assessment: why?

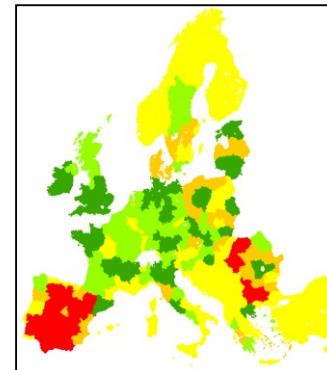
- Provides **input data** to bio-physical models or to indicators (e.g crop shares, animal stocking densities, yields, input use (N,P,K; energy; feed ...))
- These data (e.g. production, consumption, trade flows, prices, crop shares, yield, N-fertilizer input per crop ...)
  - are based on EU official data sources (FSS, FADN ...)
  - are consistent across scales: farm type / region / MS / EU / trade blocks
  - are used in economic modules and passed to environmental models / indicators
- The CAPRI baseline
  - is in line with DG-AGRI projections,
  - provides benchmark for counterfactual scenarios

Therefore **consistent** modelling chain for economic (farm income, trade flows ...) and environmental assessment is ensured

# CAPRI for agri-environmental assessment



- CAPRI NUTS2 data
- Crops / Livestock
  - Inputs
  - Commodities
  - Prices
  - Income
  - ...



- Agri-env indicators
- N balance
  - GHG emission
  - Biodiversity
  - ...

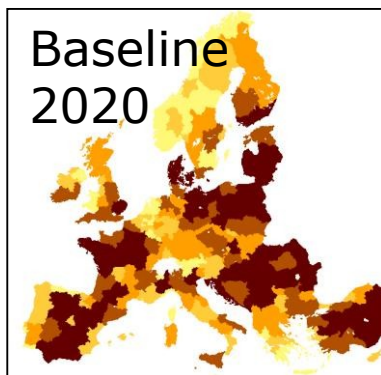
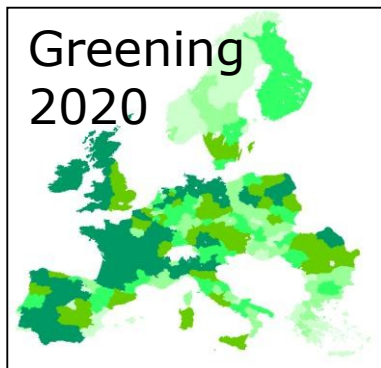
# CAP greening measures

Modelisation of CAP greening measures (as proposed by EC in Oct 2011)

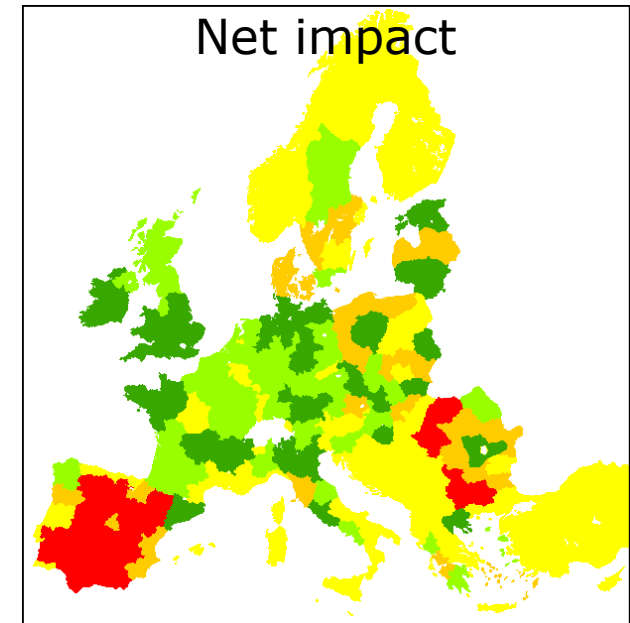
- **Permanent grasslands:** maintenance of grassland area to prevent its conversion to arable land.
- **Ecological focus area** (5% fallow and/or set-aside land of total eligible area, landscape features)
- **Crop diversity:**
  - minimum 3 crops on arable land
  - minimum and maximum thresholds for each crop set at 5% and 70% of the arable land, respectively.

## Environmental impact of CAP greening

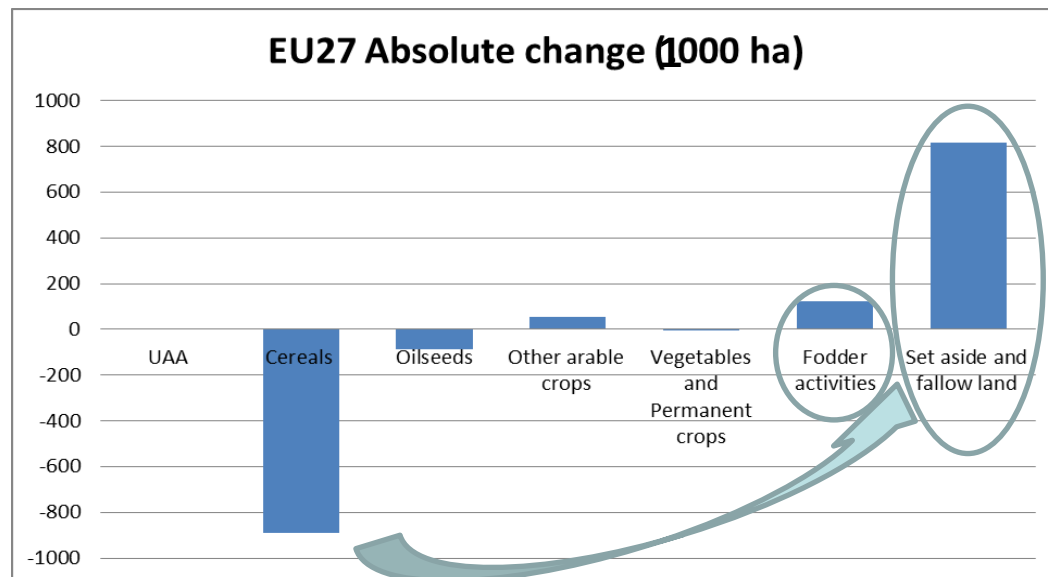
Method: difference between '*greening scenario*' and '*no policy change*'  
 $\text{Greening 2020} - \text{Baseline 2020} = \text{net impact}$



Greening - Baseline



# CAP Greening measures: effect on crops area, yield



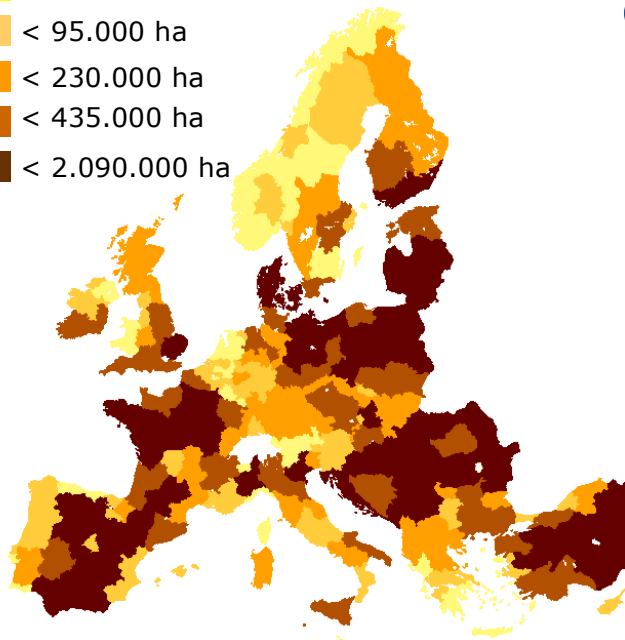
## General trends

- UAA stable
- Cereals decrease (-890.000 ha or -1.6%)
- Shift to Set aside & Fallow (+816,000 ha or +7,7%) (ecological focus area effect)
- Fodder increase (grassland +1.2M ha, 2.1%) (maintenance of pasture effect)
- Increase yield for cereal (+2.2%) (net effect) => Increased productivity

# CAP Greening measures: effect on crops area

Baseline (ha)

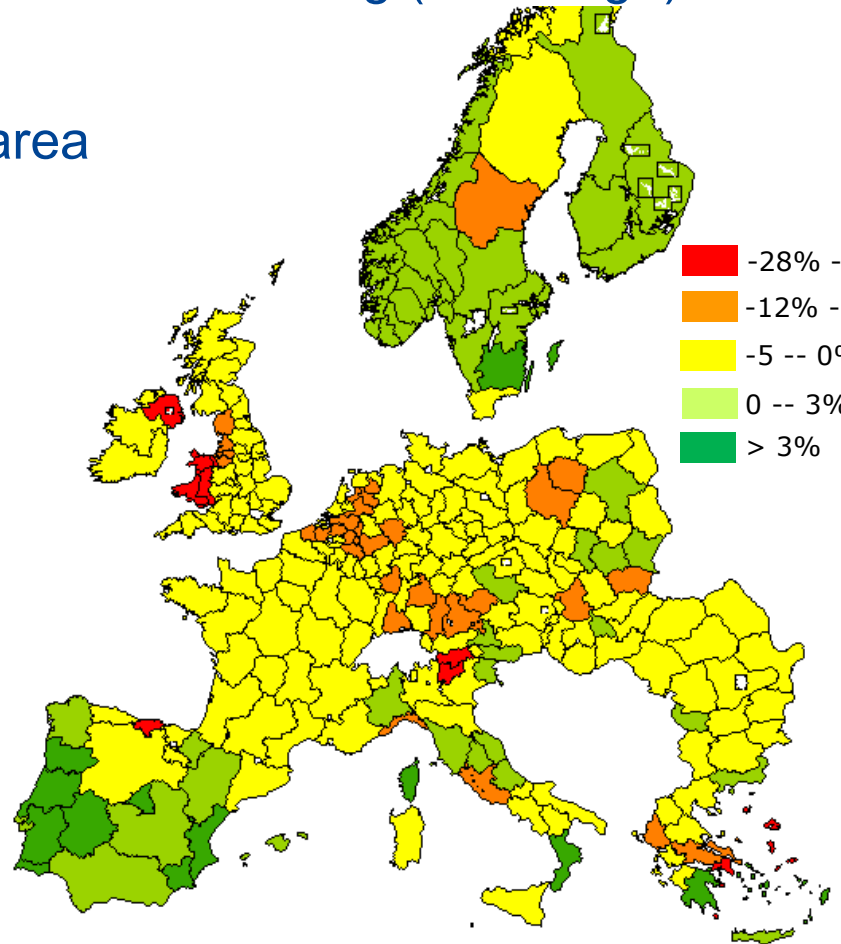
- < 25.000 ha
- < 95.000 ha
- < 230.000 ha
- < 435.000 ha
- < 2.090.000 ha



Greening (% change)

Cereal area

- 28% -- -12%
- 12% -- -5%
- 5 -- 0%
- 0 -- 3%
- > 3%



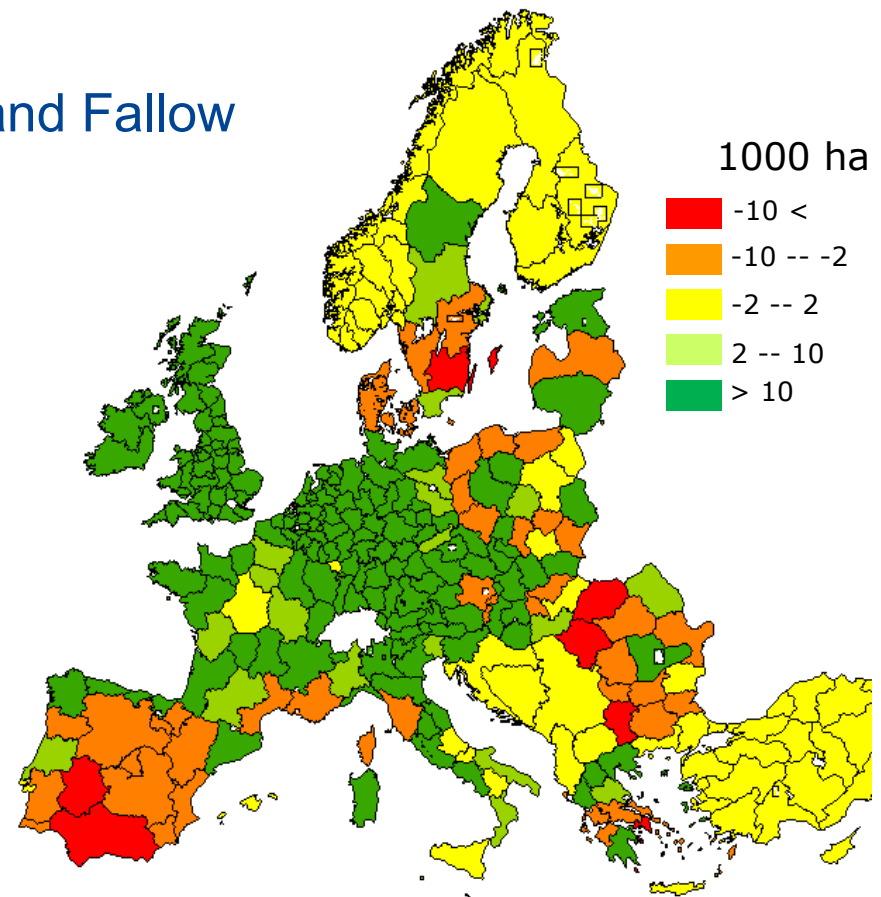
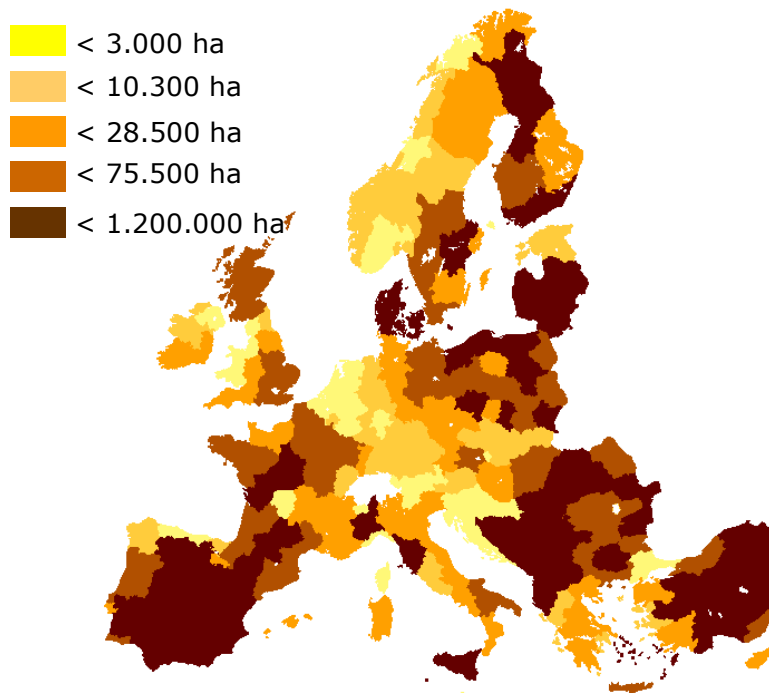


# CAP Greening measures: effect on crops area

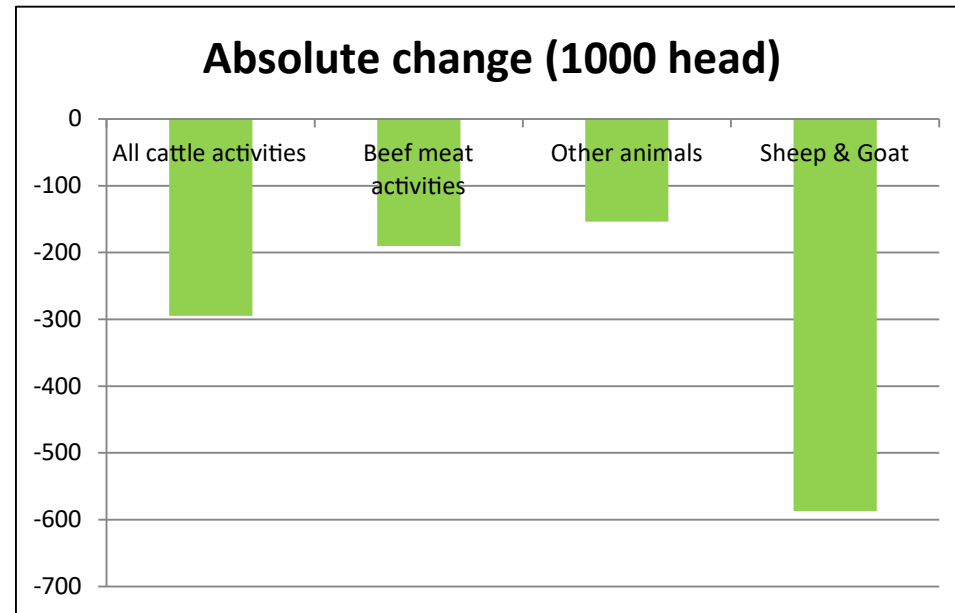
Baseline (ha)

Greening (abs change)

Set-aside and Fallow



## CAP Greening measures: effect on EU livestock





### General trends

- decrease in livestock number(-0,45%)
- Larger for sheep and goat (absolute); Beef Meat (-1.1%)
- Increase yield for livestock (+1,6%) (net effect) => Increased productivity

# Overall effects on land-use, cattle, productivity, income

## Net effect of greening measures:

- Decrease of cereal area
  - Increase area of grassland (maintenance of pasture)
  - Higher Set-aside and fallow (used for the Ecological Focus Area)
  - Decrease number of beef meat animals, sheep and goat
  - Cereal yield: +2.2%
  - Cattle activities yield: +1.6%
  - Importation of cereal (+1.040.000t), mainly from Europe (non-EU) and North America
-  
- Increased productivity
  - Leakage effect of environmental impact
  - Agricultural income: +0.87%
  - Cost of CAP for tax payer: -0.06%

# CAP greening measures environmental impact

## Nitrogen budget

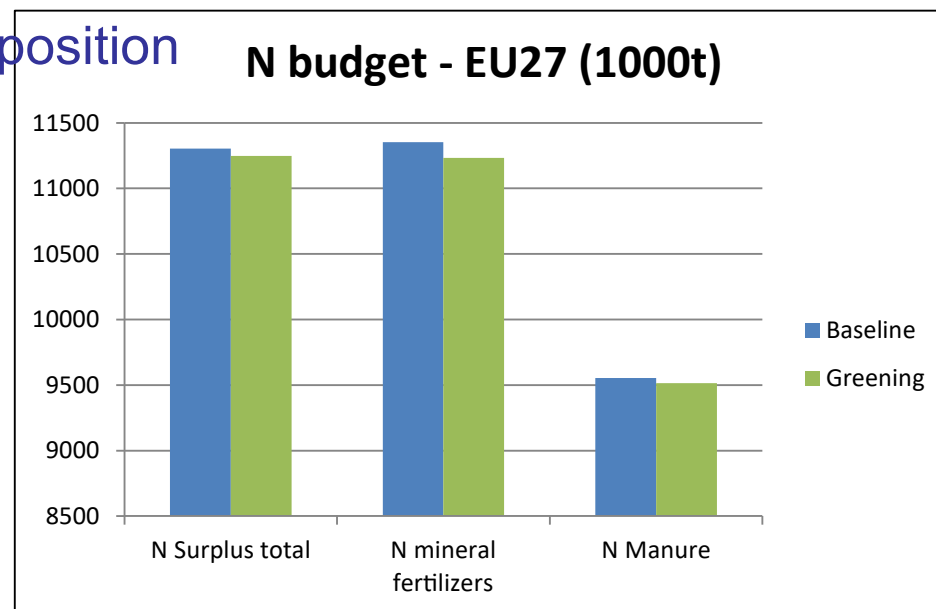
### Input

- Mineral fertiliser
- Manure
- Biological fixation
- Crop residue
- Atmospheric deposition



### Output

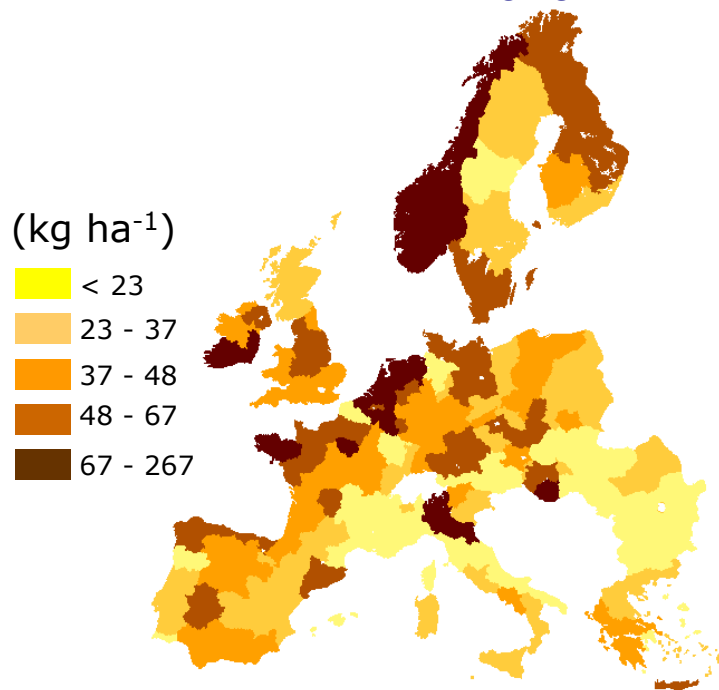
- Exported Crop



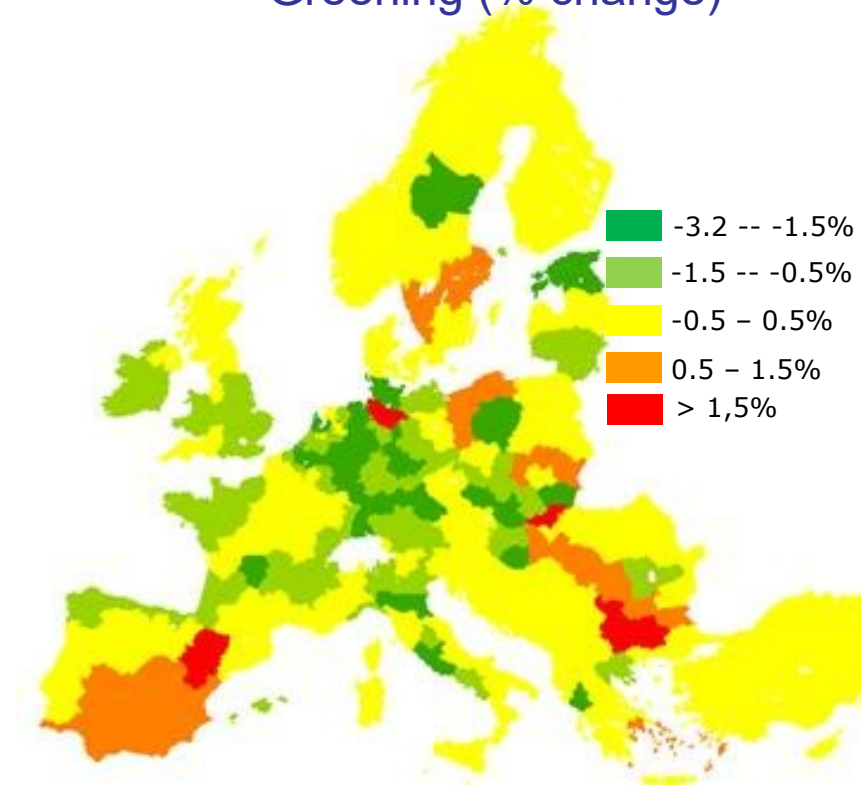
# CAP greening measures environmental impact

## Nitrogen budget

Baseline 2020



Greening (% change)



Very limited impact (-0.2 kg ha<sup>-1</sup> for EU27)

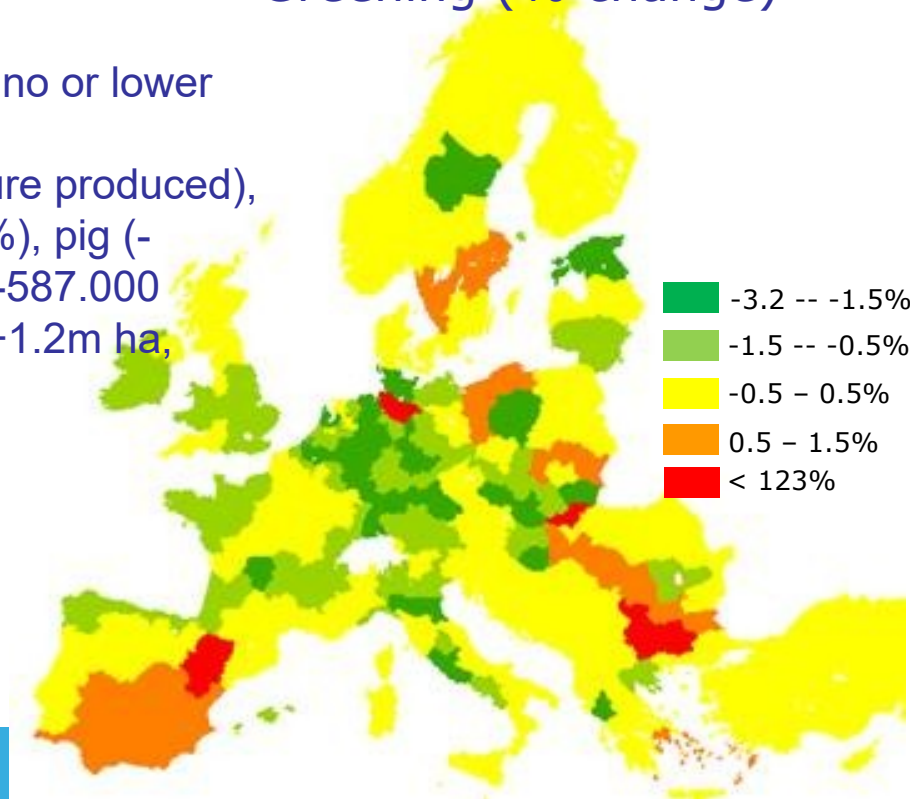
# CAP greening measures environmental impact

## Nitrogen budget

Modest improvements for greening scenario in intensive cropping areas (lower cereal area) and in livestock farming regions (reduced number of animals)

- Smaller area for crops with high N fertilisation rate (wheat, maize)
- Larger area for ecological focus area (with no or lower fertiliser application)
- Smaller number of animal (=> less N manure produced), beef meat activities (-190.000 heads, -1.1%), pig (-680.000 heads, -0.25%), sheep and goat (-587.000 heads, -0.5%) and larger grassland area (+1.2m ha, +2.1%) where manure is spread.

Greening (% change)



	Baseline 2020		Greening 2020	
	Mineral N (kg ha <sup>-1</sup> )	Manure N (kg ha <sup>-1</sup> )	Mineral N (kg ha <sup>-1</sup> )	Manure N (kg ha <sup>-1</sup> )
EU 27	63,25	53,23	62,59	53,01

# CAP greening measures environmental impact



## Global Warming Potential (CH<sub>4</sub>, N<sub>2</sub>O)

- Greening scenario with slightly lower GWP (-0.5% for EU27)
- Higher decrease in BE, DE, NL, IE

	Baseline (kg CO <sub>2</sub> eq ha <sup>-1</sup> )	Greening (kg CO <sub>2</sub> eq ha <sup>-1</sup> )	Abs diff	Percent diff
Belgium	6835	6768	-67	-1,0
Denmark	4090	4101	11	0,3
Germany	3567	3535	-32	-0,9
Austria	2385	2376	-9	-0,4
Netherlands	9867	9795	-72	-0,7
France	2257	2240	-18	-0,8
Portugal	1522	1520	-2	-0,2
Spain	1366	1365	-1	-0,1
Greece	1304	1297	-7	-0,5
Italy	1889	1883	-6	-0,3
Ireland	4542	4507	-35	-0,8
Finland	3006	3010	4	0,1
Sweden	1965	1964	-1	-0,1
United Kingdom	2505	2492	-13	-0,5
Czech Republic	1670	1660	-10	-0,6
Estonia	1448	1424	-24	-1,6
Hungary	1274	1262	-12	-0,9
Lithuania	1199	1184	-15	-1,2
Latvia	1089	1093	3	0,3
Poland	1686	1690	4	0,2
Slovenia	2854	2862	9	0,3
Slovak Republic	1059	1041	-19	-1,8
Cyprus	2555	2558	2	0,1
Malta	7781	7795	15	0,2
Bulgaria	770	771	2	0,2
Romania	909	910	1	0,1
European Union 27	2140	2129	-10	-0,5

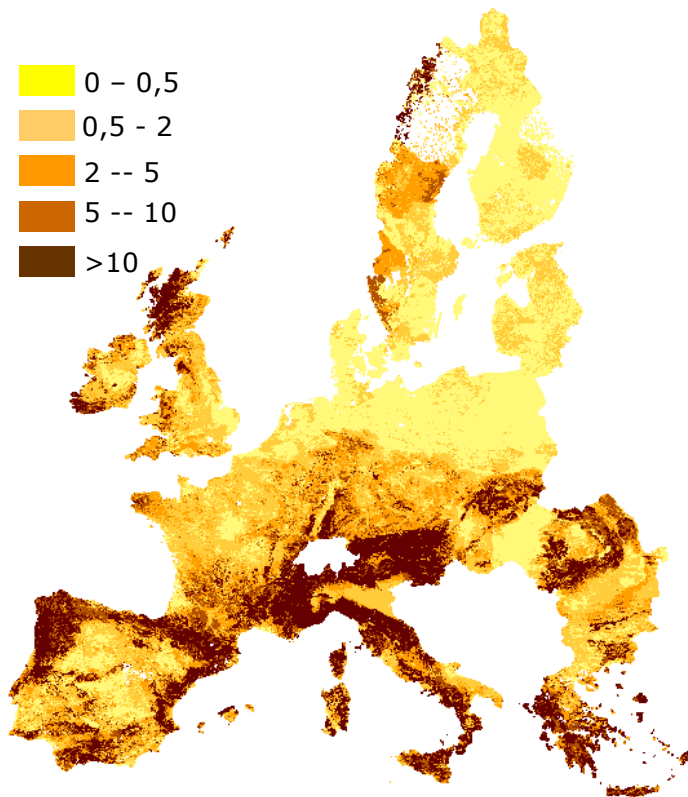
Methodology: IPCC for agricultural sector



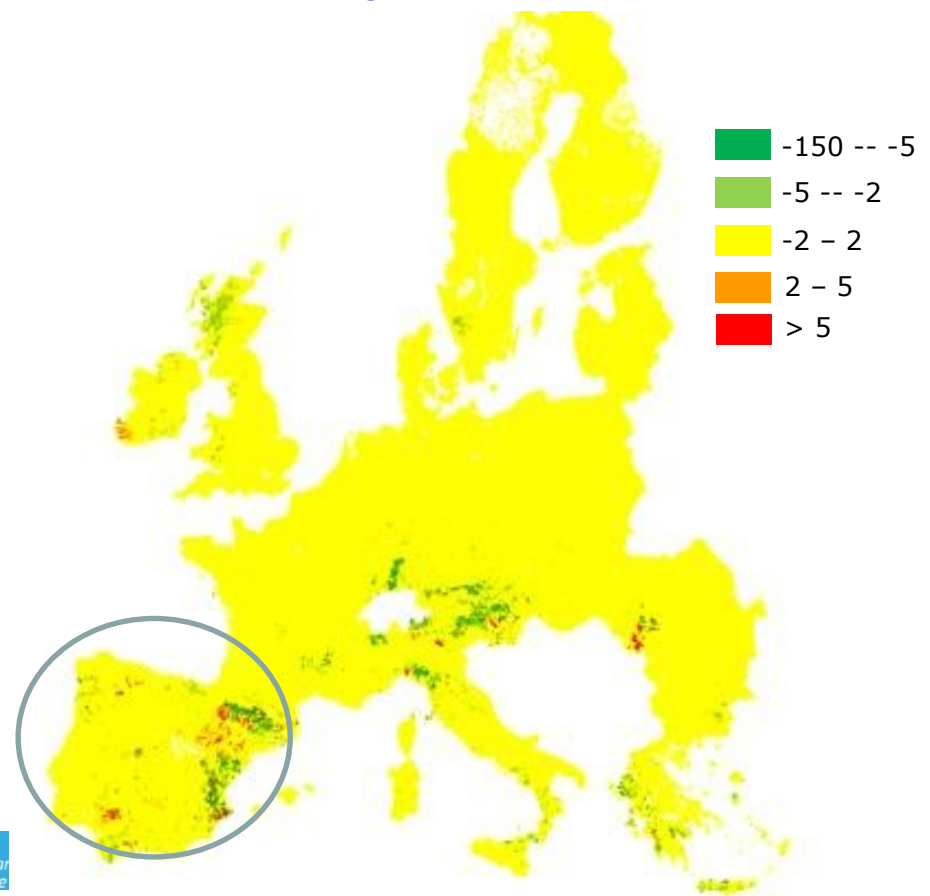
# CAP greening measures environmental impact

## Soil erosion

Baseline (average  $\text{t ha}^{-1}\text{year}^{-1}$ )



Greening (abs change  $\text{t ha}^{-1}\text{yr}^{-1}$ )

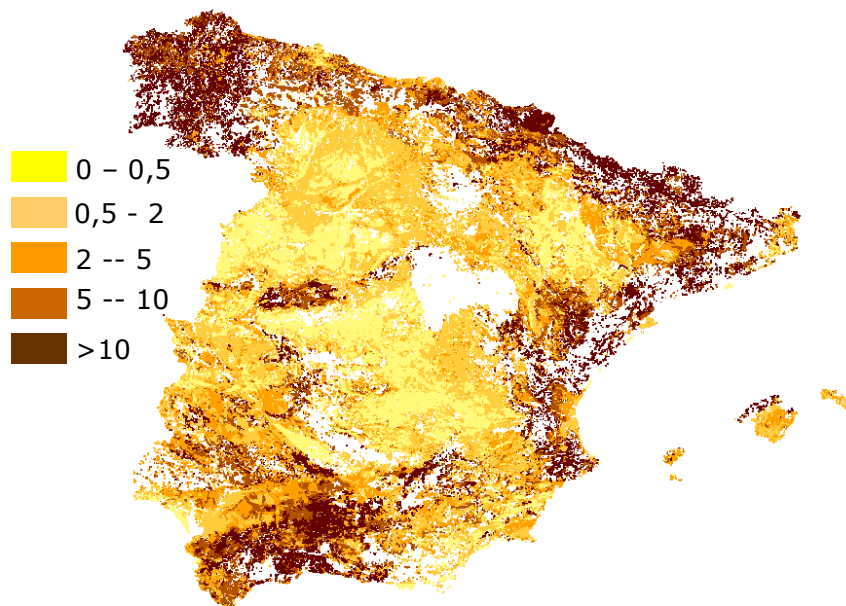




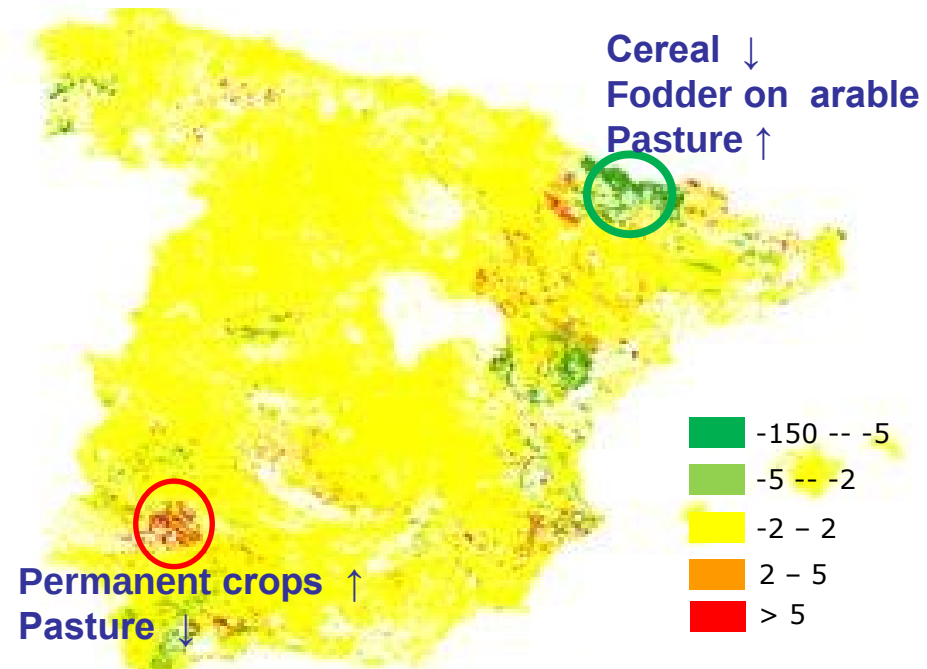
# CAP greening measures environmental impact

## Soil erosion - Spain



Baseline (t ha<sup>-1</sup>year<sup>-1</sup>)



Greening (abs change) (t ha<sup>-1</sup>year<sup>-1</sup>)



## CAP Greening measures: Results (with CAPRI)

- Decrease (small) in cereal area
  - Decrease (small) nb beef animals, sheep & goat
  - Cereal yield: +2.2%
  - Cattle activities yield: +1.6%
- => increased productivity
- 
- Import cereal (+1.040.000t), from Europe (non-EU) and North America
- 
- Leakage (limited) effect outside EU on environment

Overall, no (big) environmental changes between ‘*Greening*’ and ‘*no policy change*’:

- 😊 N balance: limited positive impact (-0.2 kg ha<sup>-1</sup> for EU27)
- 😊 Global Warming Potential: slightly lower GWP (-0.5% for EU27)
- 😊 Soil Erosion: no impact
- 😊 Agricultural income: +0.87%
- 😊 Cost of CAP for tax payer: -0.06%