

Agroforestry options in Pillar I (2021-27)



- What is Agroforestry?
- Agroforestry versus forestry
- Agroforestry in Pillar I Policy
- Agroforestry for Climate
- Agroforestry for Environment





What is Agroforestry?

“Land use systems in which trees are grown in combination with agriculture on the same land (Reg 1305/2013)”.

Agroforestry trees can be inside parcels or on boundaries (e.g. hedges).



EURAF Landscape Feature Eco-scheme Proposal

1. Calculate the ratio of Landscape Features/UAA (i.e. the **"Farm Landscape Ratio (FLR)"**) for each farm and compare with statistics for each NUTS-3 Region.

2. Introduction would be required for GAEC-9 landscape features

3. Eco-scheme and management

but below the "forest" threshold size. Also payments for ponds, berms/swales, walls & other Landscape Features.

4. Ecoscheme could be **"entry-level requirement"** for eligibility to Pillar II "agri-environment-climate" schemes - e.g. agroforestry - possibly with "payment by results"

Farm Landscape Ratio (compare each farm with others in the Region)

Upper Quartile Farms (25%)

Eligible for Agri-environment-climate schemes in Pillar II - e.g. **agroforestry** with "payment results".

GAEC-9 of "Enhanced Conditionality" asks MS to set a "minimum threshold % of landscape features and non-productive land". MS could use this threshold to focus a LANDSCAPE FEATURE ECO-SCHEME on farms with the lowest existing density of landscape features, and could use the ECO-SCHEME as an entry level requirement for access to agri-environmental-climate payments in Pillar II.

feature optional (as an scheme for Pillar

--- GAEC-9 Landscape Feature Threshold % ---

Lower Quartile Farms (25%)

Not compliant with GAEC-9 therefore Landscape Feature Eco-scheme is mandatory or a proportion (30%?) of BPS will be lost.

Agroforestry ... a traditional technique in most parts of Europe



Le bocage dans le Perche, près de Nogent-le-Rotrou (Eure-et-Loir). - Cl. L.P.V.A.

... which can fit with modern machinery is spacings are c





... with at least 8 Mha of dehesa/montado in Iberian Peninsula ...

There are many management options ... and benefits to animals



Tree protection



Animal welfare



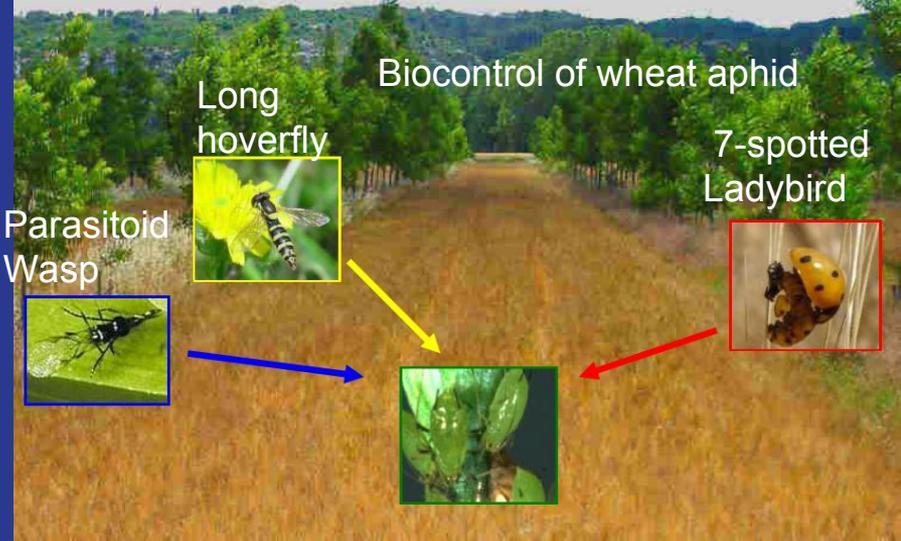
... and biodiversity benefits ...

Crop Protection

- tree rows can serve as a refuge for crop-pests & weeds but also shelter species which predate on pests

Biodiversity

- flowers of trees & tree rows provide nectar and pollen
- fruit and mast gives food for birds and wild animals.
- insects are food for birds and bats
- bats need lines of trees to navigate
- landscape corridors give small mammals foraging and migration
- vegetation in tree rows gives habitats for bumblebees wildflowers in the tree-rows favour pollinators - like bumblebees, bees, butterflies, moths, flies, beetles, wasps and thrips



Wildflower tree-rows

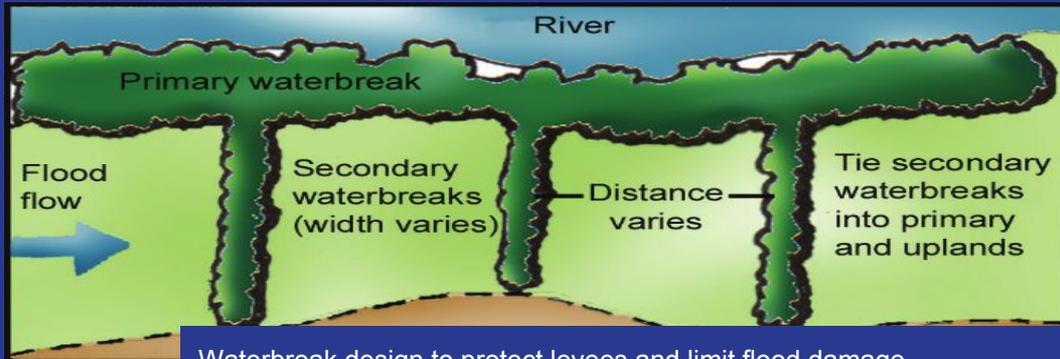
Biocontrol of wheat aphid

Long hoverfly

7-spotted Ladybird

Parasitoid Wasp

... tree-engineering can be used for flood control ..



Waterbreak design to protect levees and limit flood damage



Flooding at Nimes ... Gardon valley



Huevelland, Flanders. Fruit trees & shrubs to be planted on the berm.



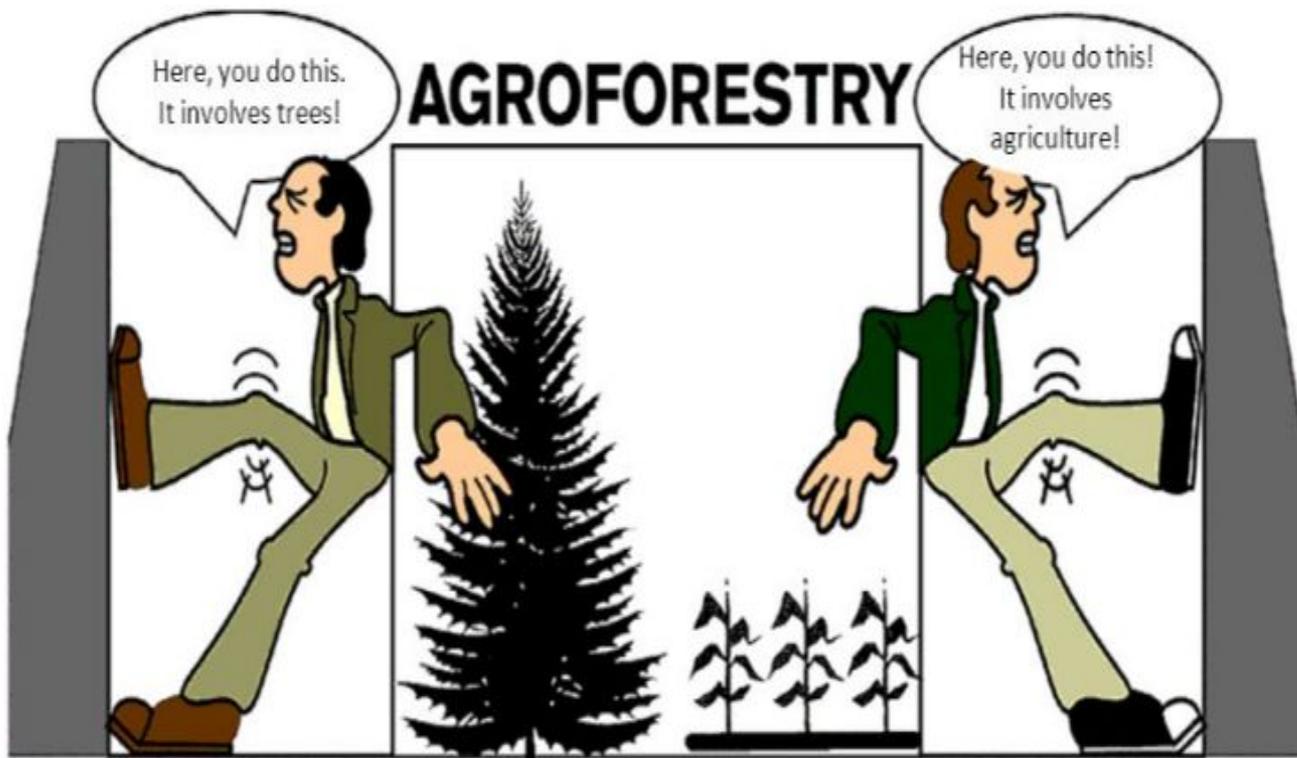
Berm & swale AF on same farm, after berm was planted with strawberries.

Swale & Berm Agroforestry



Agroforestry waterbreak ... Gardon valley

.. and shares policy between forestry and agriculture



Agricultur
e

Forestry

In most EU Member States forestry is included in Rural Development Policies (Measure 8 and 15).

In the next CAP even greater synergy is needed since targets, criteria and indicators will be set across Pillar I and Pillar II in national CAP Strategic Plans

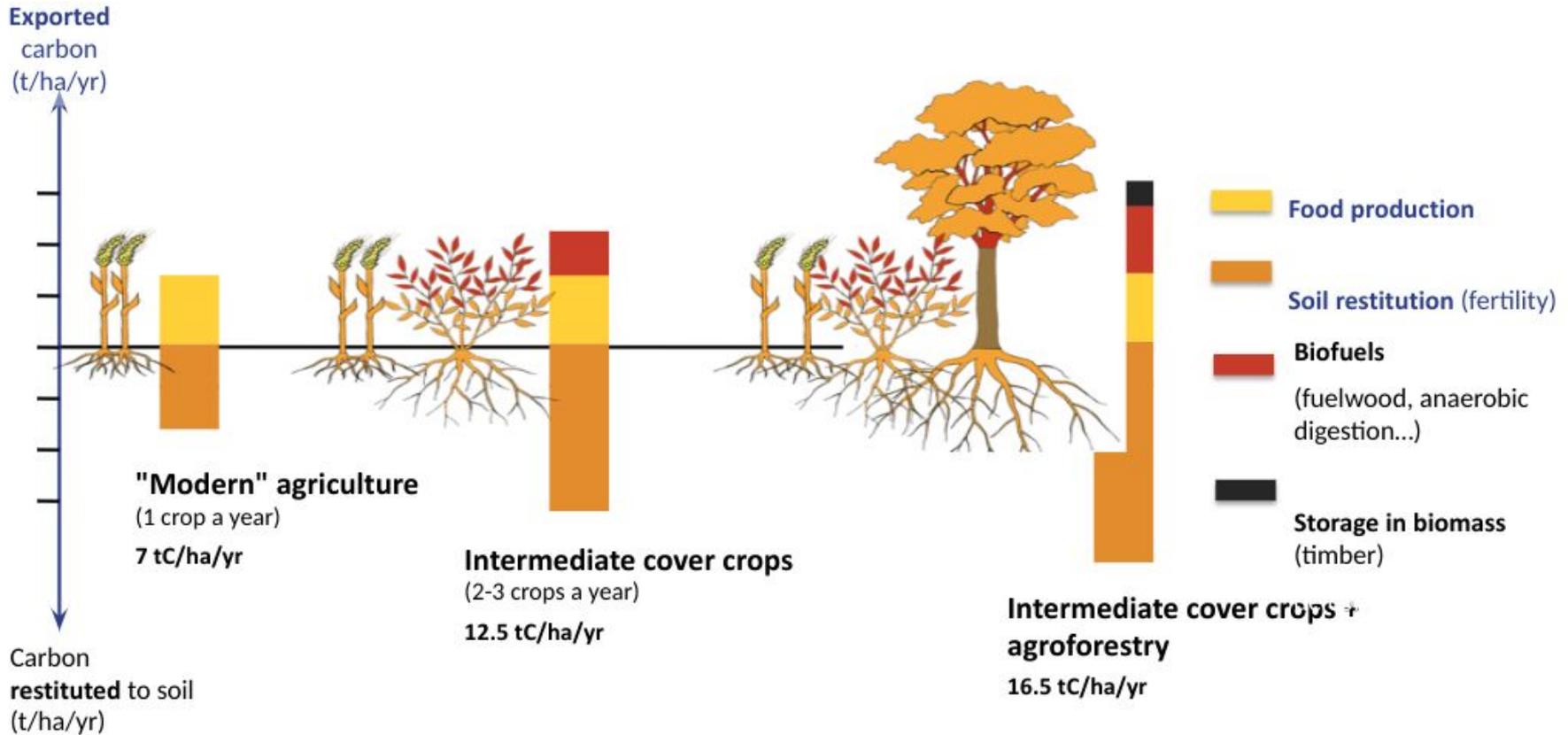
.. and shares climate policies ... AFOLU



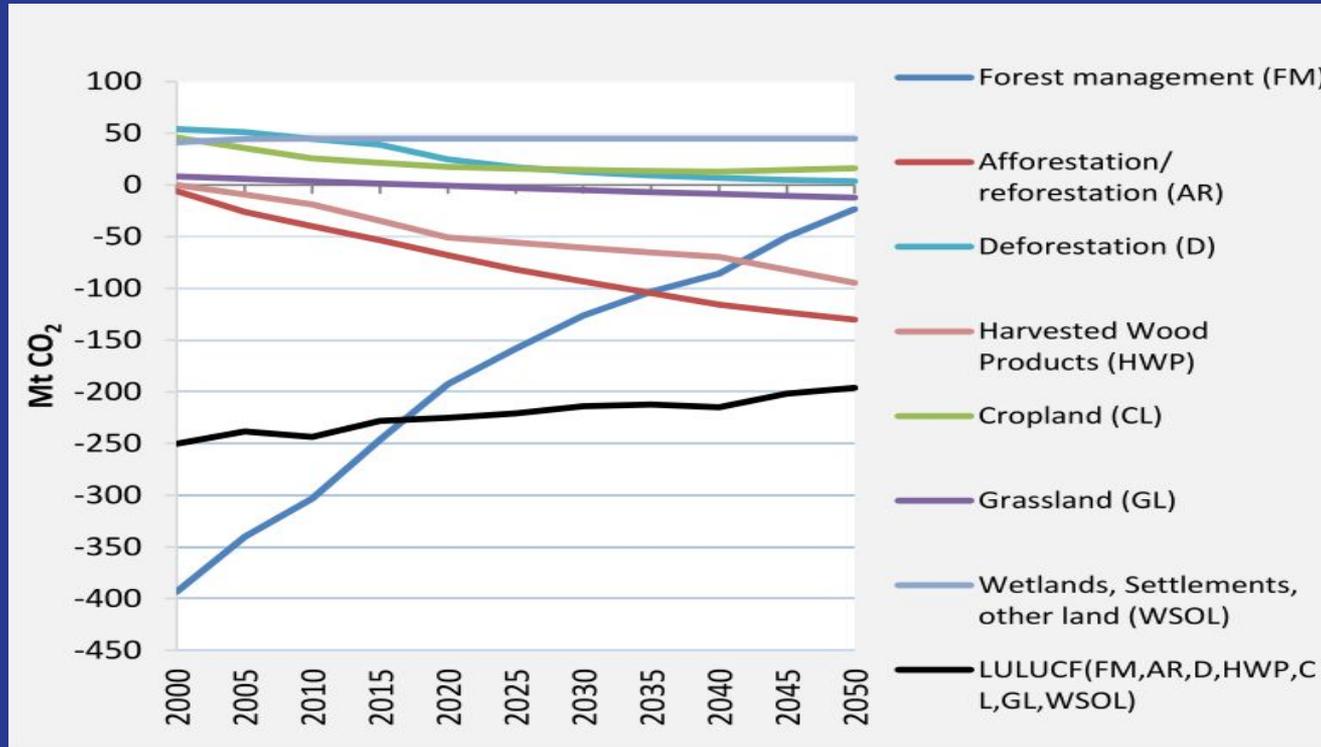
Trees are present on five of the six UNFCCC “Lands”



.. agroforestry and cover crops give high C-sequestration



LULUCF is decreasing. FM will stop being a sink by 2050. Does Europe have enough land for new afforestation? Croplands and Grasslands can play a part - e.g. through agroforestry



-214 Mt CO₂ yr⁻¹ in 2030
-196 Mt CO₂ yr⁻¹ in 2050

What is “forest land”?

UNFCCC Definition

*“An area of land defined by the minimum values for **area**, tree **crown cover** or an equivalent stocking level, and potential **tree height** at maturity at the place of growth of the trees.”*

This definition is used in the EU LULUCF Regulation (2018/841) - which sets the rules for GHG reporting by MS to the UNFCCC.

In practice, EU MS will report using their forest and agricultural cadastres

Carbon sequestered by trees on agricultural land will be reported as part of “Grassland Management (CM)” or “Cropland Management (CM)”

Member state	Crown cover (%)	Minimum area (ha)	Height (m)	Minimal width (m)
Croatia, Poland	10	0.1	2	10m for Poland
Bulgaria, Germany	10	0.1	5	
Romania, (Southern) Finland	10	0.25	5	20
Italy, Luxembourg	10	0.5	5	
Denmark, (Northern) Finland, France, Sweden	10	0.5	5	20 (10m for Sweden)
Portugal	10	1	5	20
Ireland, Latvia	20	0.1	5	20
United Kingdom	20	0.1	2	20
Slovakia	20	0.3	5	
Belgium, Netherlands	20	0.5	5	30m for Netherlands
Spain	20	1	3	25
Greece	25	0.3	2	
Lithuania	30	0.1	5	10
Slovenia	30	0.25	2	
Czech Republic, Estonia	30	0.5	2	20m for Czech Republic
Hungary	30	0.5	5	10
Austria	30	0.05	2	10

How to plan new agroforestry and landscape features?

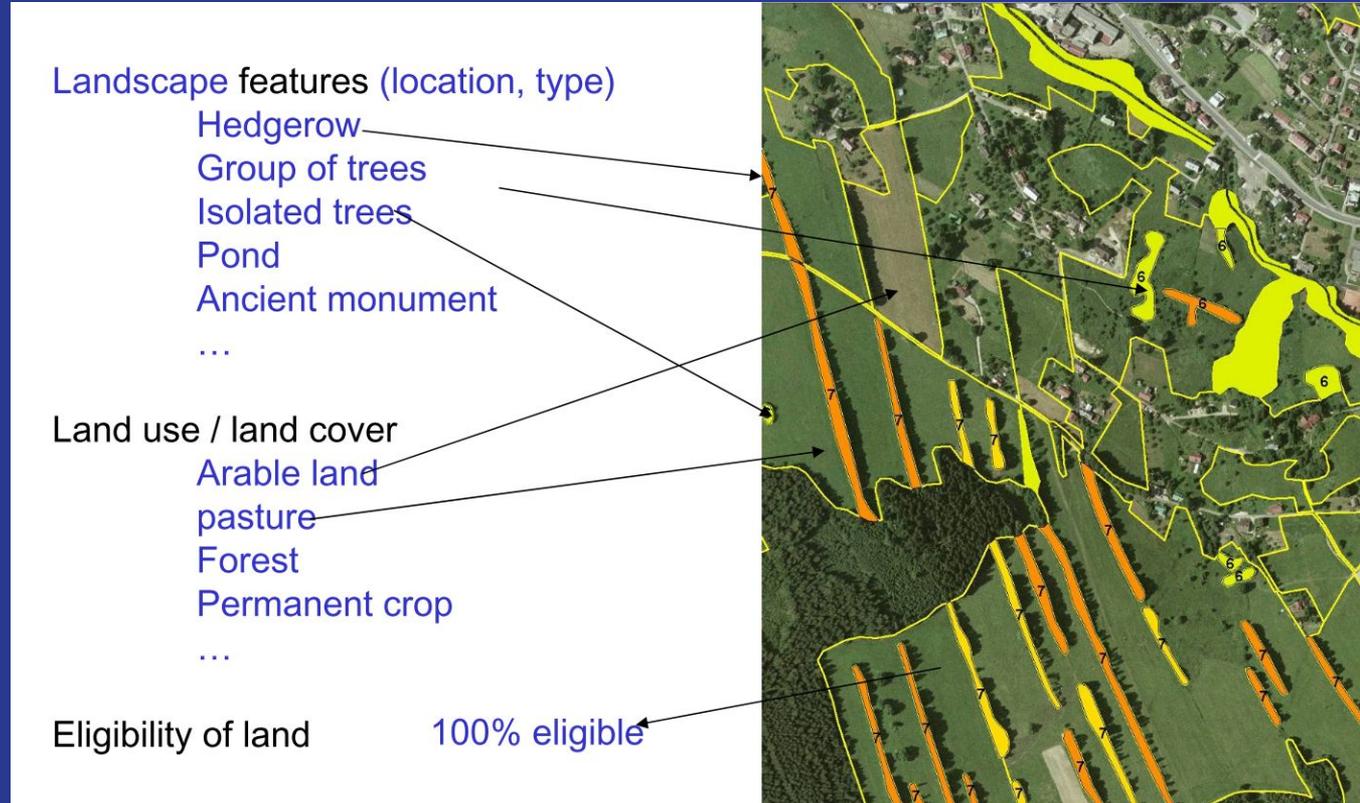
Answer: use the rapidly improving IACS/ LPIS Systems

Four overlapping layers:

1. Reference Parcels
2. Agricultural Parcels
3. Ecological Focus Areas
4. Landscape Features

Also info on statutory designations like Nitrate Sensitive Zones and Some Pillar II Grants Information.

Starting to be used for LULUCF Reporting



GAEC9 - Minimum % share of “non-productive and landscape features”

GAEC 9

- Minimum share of agricultural area devoted to non-productive features or areas
- Retention of landscape features
- Ban on cutting hedges and trees during the bird breeding and rearing season
- As an option, measures for avoiding invasive plant species

Maintenance of non-productive features and area to improve on-farm biodiversity

• Ecological Focus Areas are:

- Fallow Land
- Terraces
- Buffer Strips**
- Hectares of Agroforestry (ha)**
- Forest Edge Strips - non productive**
- Forest Edge Strips - productive**
- Short rotation coppice**
- Afforested areas**
- Cover or catch crops
- N-Fixing Crops
- Landscape features

• Landscape features are:

- Hedges or woody strips**
- Isolated Trees**
- Trees in Line**
- Trees in Groups/ Copses**
- Field Margins**
- Ponds
- Ditches
- Traditional Stone Walls

Ecoschemes for environment and climate action

Brussels, 1.6.2018 COM(2018) 392 final (p23 and p52 - Article 28)

- Member States should propose Ecoschemes as **direct payments** in the CAP Strategic Plan: they may set up ecoschemes for good practices (enhanced management of permanent pastures and landscape features, organic farming etc.).
- **Voluntary for farmers**, and fully coordinated with the other relevant interventions.
- Defined by Member States. Either:
 - a payment granted to **incentivise and remunerate** the provision of public goods by practices beneficial to the environment and climate
 - a **compensation** for the introduction of these practices.
- **AIM** - to boost environmental and climate performance of CAP and go beyond mandatory requirements of Enhanced Conditionality.
- **May** include 'entry-level schemes' as condition for more ambitious rural development commitments
- **Practices** should address one of more of:
 - help climate change mitigation, adaptation, and sustainable energy;
 - foster sustainable development and efficient management of natural resources (water, soil and air...)
 - Help protect biodiversity, boost ecosystem services and preserve habitats and landscapes;

EURAF Landscape Feature Eco-scheme Proposal

1. Calculate the ratio of Landscape Features/UAA (i.e. the **“Farm Landscape Ratio (FLR)”**) for each farm and compare with statistics for each NUTS-3 Region.

2. Introduce a **Landscape Feature Eco-scheme** which would be mandatory for farms not compliant with the GAEC-9 landscape feature threshold %.

3. Eco-scheme would give **payments for tree planting and managed regeneration** of tree lines or small groups, but below the “forest” threshold size. Also payments for ponds, berms/swales, walls & other Landscape Features.

4. Ecoscheme could be an **“entry-level requirement”** for eligibility to Pillar II “agri-environment-climate” schemes - e.g. agroforestry.

Farm Landscape Ratio (compare each farm with others in the Region)

Upper
Quartile
Farms
(25%)

Eco-scheme entry unlikely. These farms are already diverse and would be eligible for Agri- environment-climate schemes in Pillar II - e.g. **agroforestry**

Mid-Qua
rtile
Farms
(50%)

Eco-scheme entry is optional, and would be “entry-level” requirement for subsequent Pillar II schemes - e.g. **agroforestry**

--- GAEC-9 Landscape Feature Threshold % ---

Lower
Quartile
Farms
(25%)

Not compliant with GAEC-9 therefore entry to Eco-scheme is recommended to avoid a proportion (20%?) of BPS being lost.

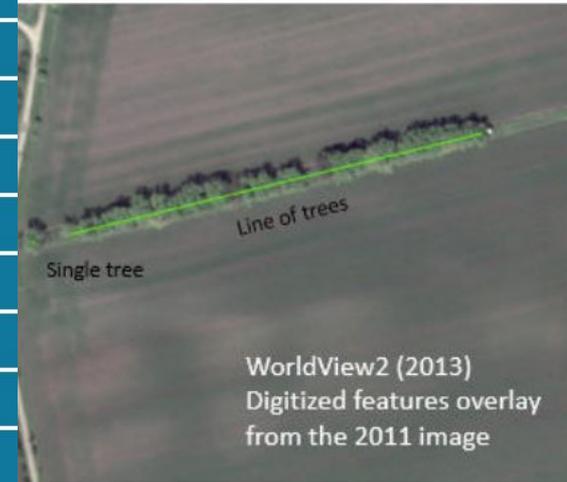
Extra Slides

Land Parcel Identification Systems

These are maintained by 55 MS or regions

- National/regional LPIS systems from 2016 onwards make ortho-images available to farmers at **1:5000 resolution** (i.e pixel size is 50 cm).
- This data is crucial for modelling and decision support but some countries do not make data available to researchers and commercial companies ... this is probably against the spirit of the EU INSPIRE Directive

GeoEye-1 (0.46m)	😊
GeoEye-2 (0.34m)	😊
WorldView-1 (0.46m)	😊
WorldView-2 (0.46m)	😊
WorldView-3 (0.31m)	😊
Pleiades-1A (0.5m)	😊
Pleiades-1B (0.5m)	😊
KOMPSAT-3A (0.55m)	
KOMPSAT-3 (0.7m)	
QuickBird (0.65m)	
Gaofen-2 (0.8m)	
TripleSat (0.8m)	
IKONOS (0.82m)	
SkySat-1 (0.9m)	
SkySat-2 (0.9m)	



EU CAP presentations increasingly show the role of trees

55 000 000 000 € / year
7 million farmers

climate change
Provides essential
carbon sinks

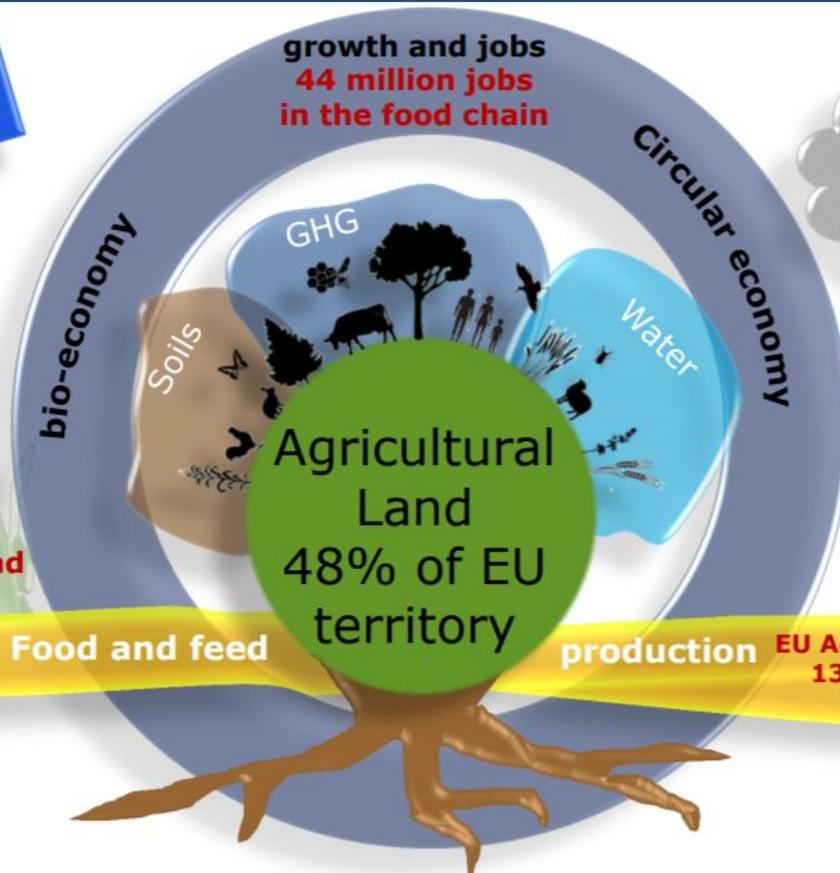
“Technology for CAP
Simplification and
Modernisation”
Vladimir ŠUCHA
Director General JRC

Environment
13% of EU arable land
suffer from erosion

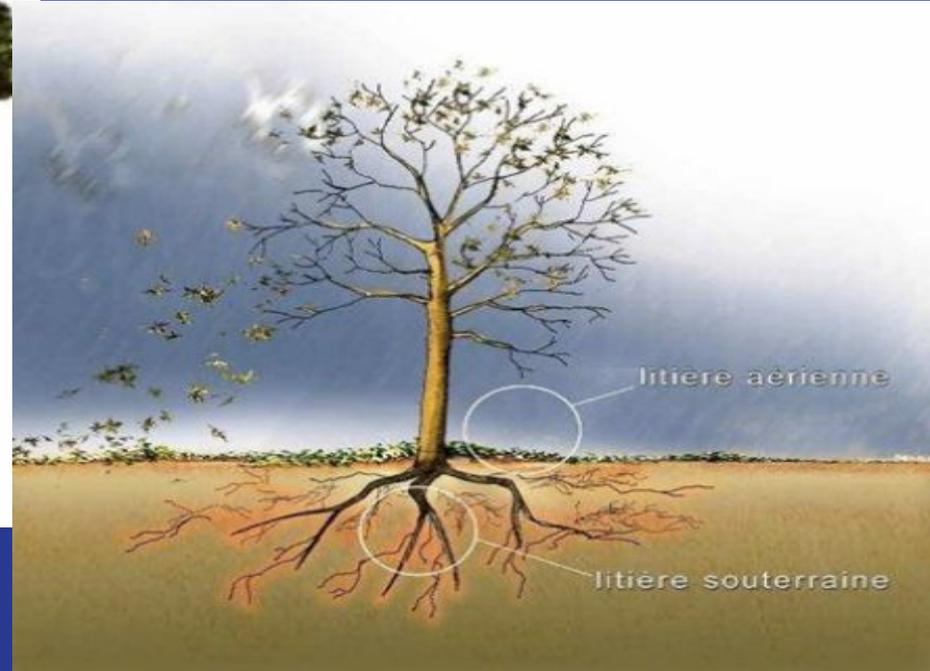
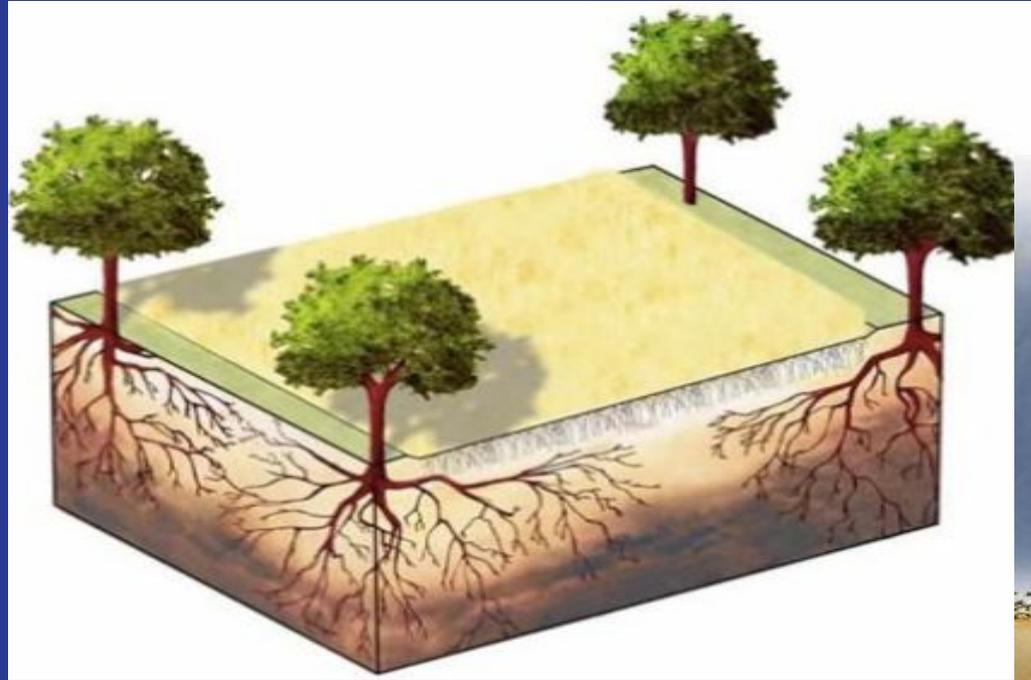
Food and feed

production EU Agri-food exports
131 billion euro
annually

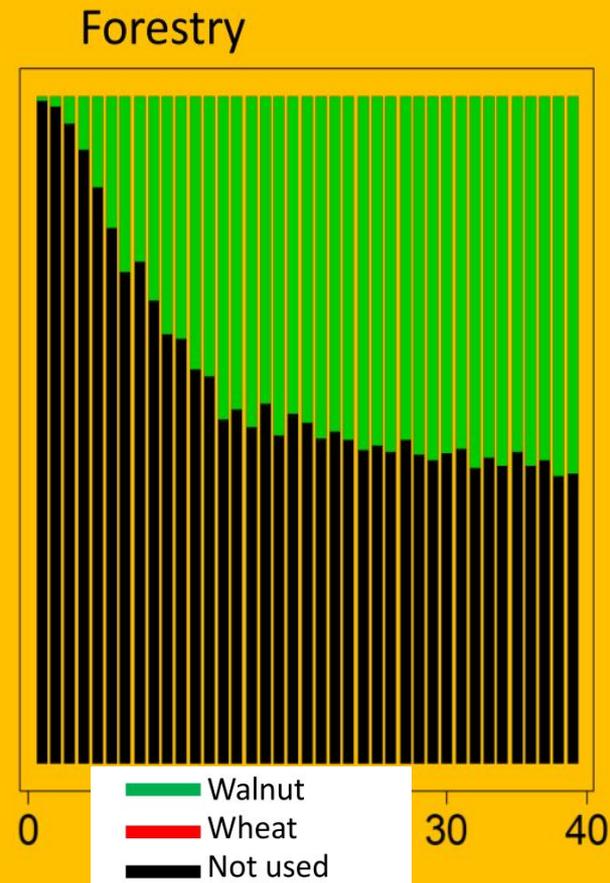
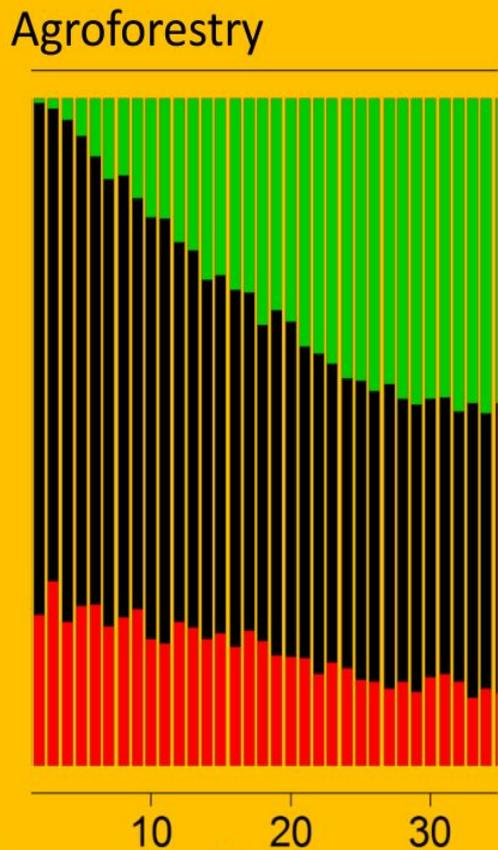
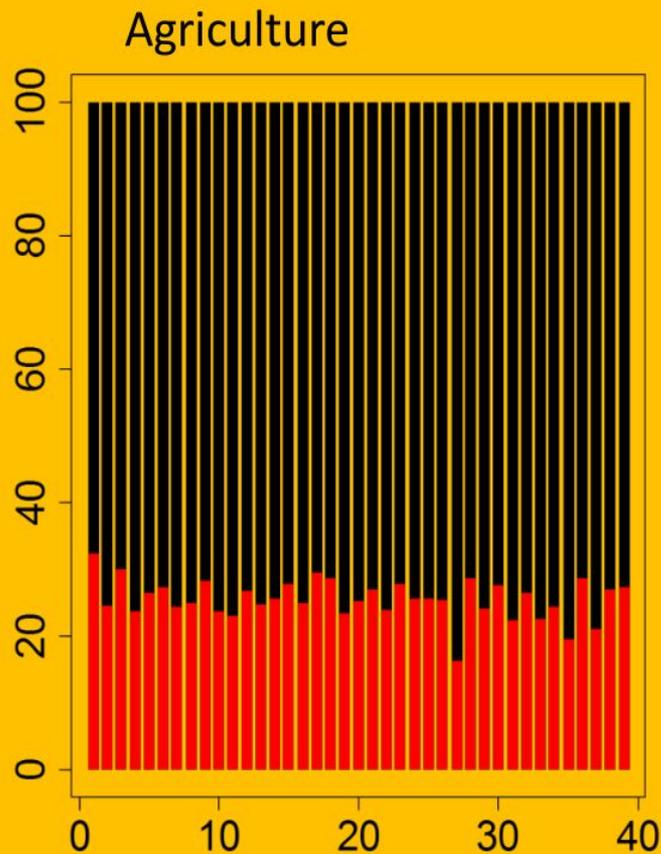
research & innovation



Agroforestry shares space below ground ...



.. and shares light above ground ..

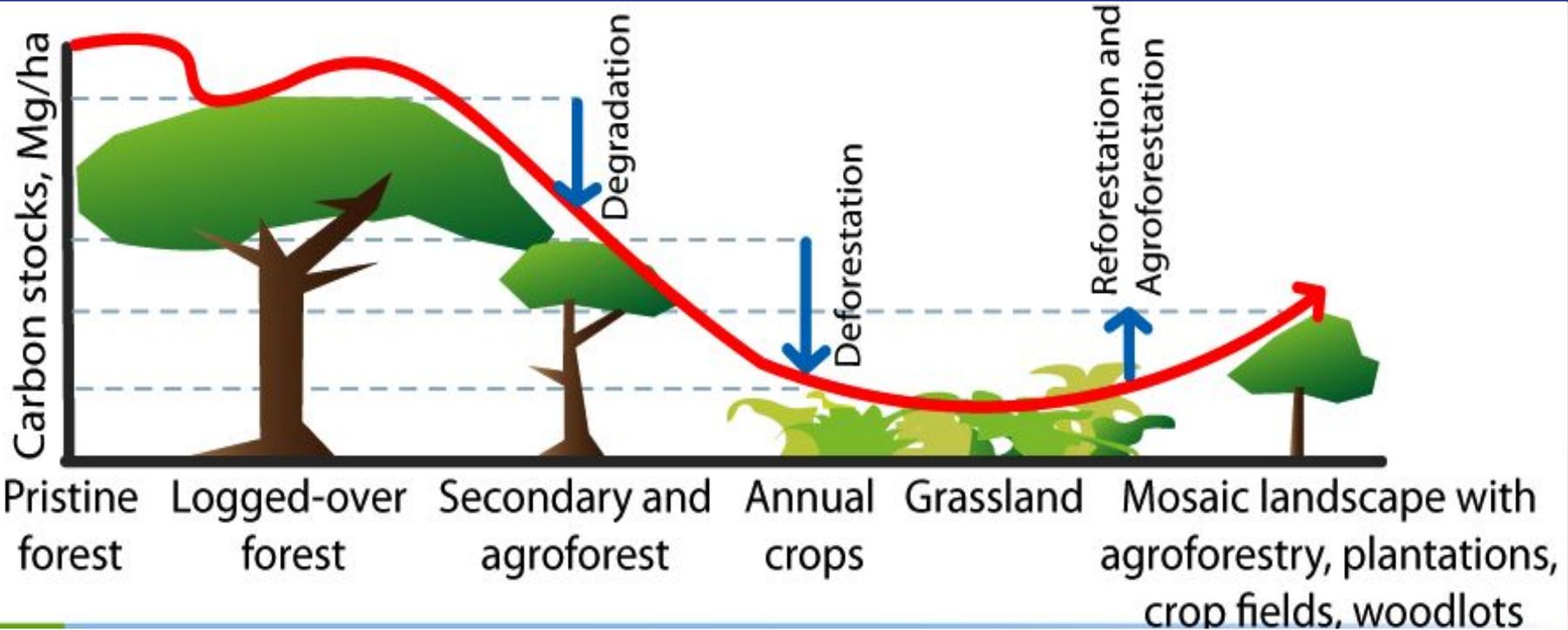


Light intercepted Walnut 0.93; wheat 0.66; light capture index 1.39

... and agroforestry can be found on both “Forest land” and “Agricultural land”

Tree Location	AF System	Official Land Use Classification (Cadastre/LPIS)		
		Forest Land	Agricultural Land	Other Land
Trees within parcels	Silvopastoral	Forest Grazing	Wood pasture Orchard grazing	n/a
	Silvoarable	Forest Farming	Alley Cropping Alley Coppice Orchard Intercropping	
Trees between parcels	Boundary Agroforestry	Forest Strips	Shelterbelt Networks Wooded Hedges Riparian Tree Strips	
Urban trees	Settlement Agroforestry	n/a		Home Gardens

Trees = locked up carbon



Clonal Mixes



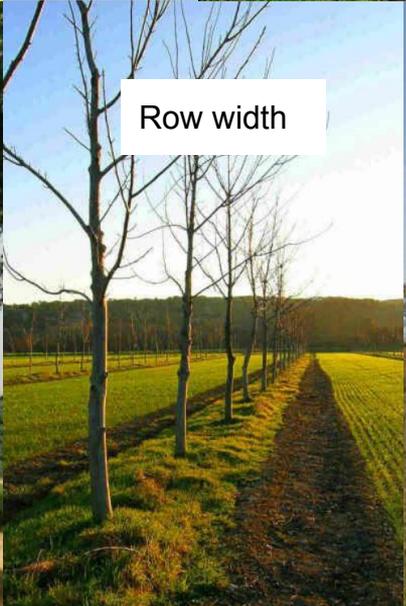
Pollarding



Alley width



Row width



Regular Pruning



... and catchment management to prevent flooding ...

Agroforestry in the Uplands - e.g. Pontbren, Wales

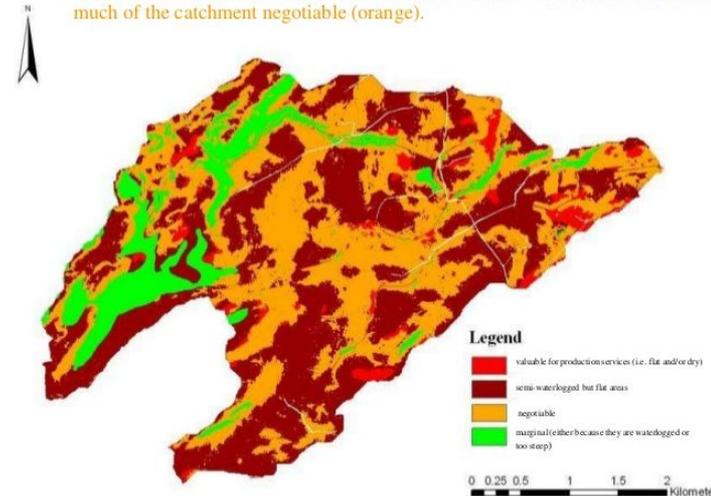
- Tree planting in hedges, shelterbelts, field margins, groups
- GIS mapping framework used for planning
- 1.5% tree cover up to 5%
- hydraulic conductivity increased
- overland flow decreased



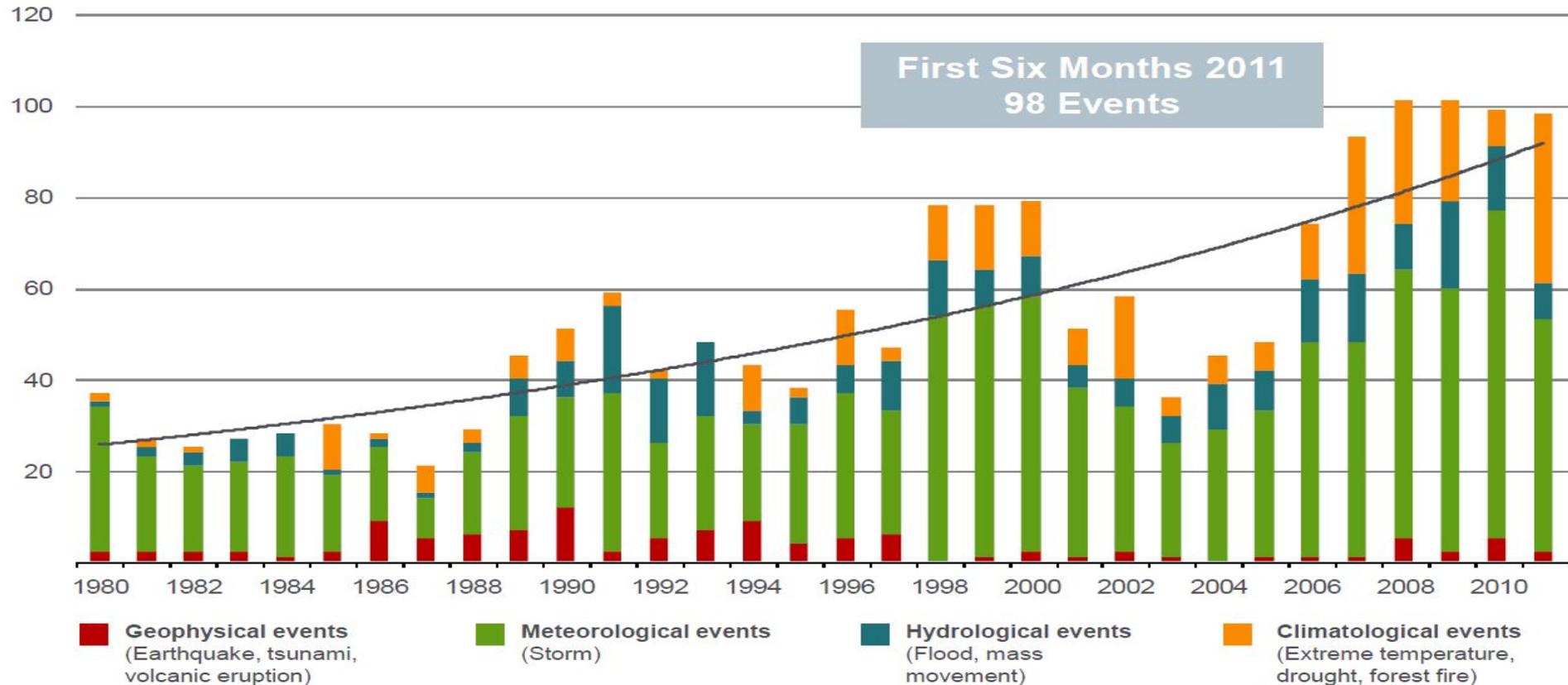
Pontbren farmers- congratulated in Welsh RDP



Farm impact – plant trees on wet and sloping areas (green) not flat and dry (red);
much of the catchment negotiable (orange).

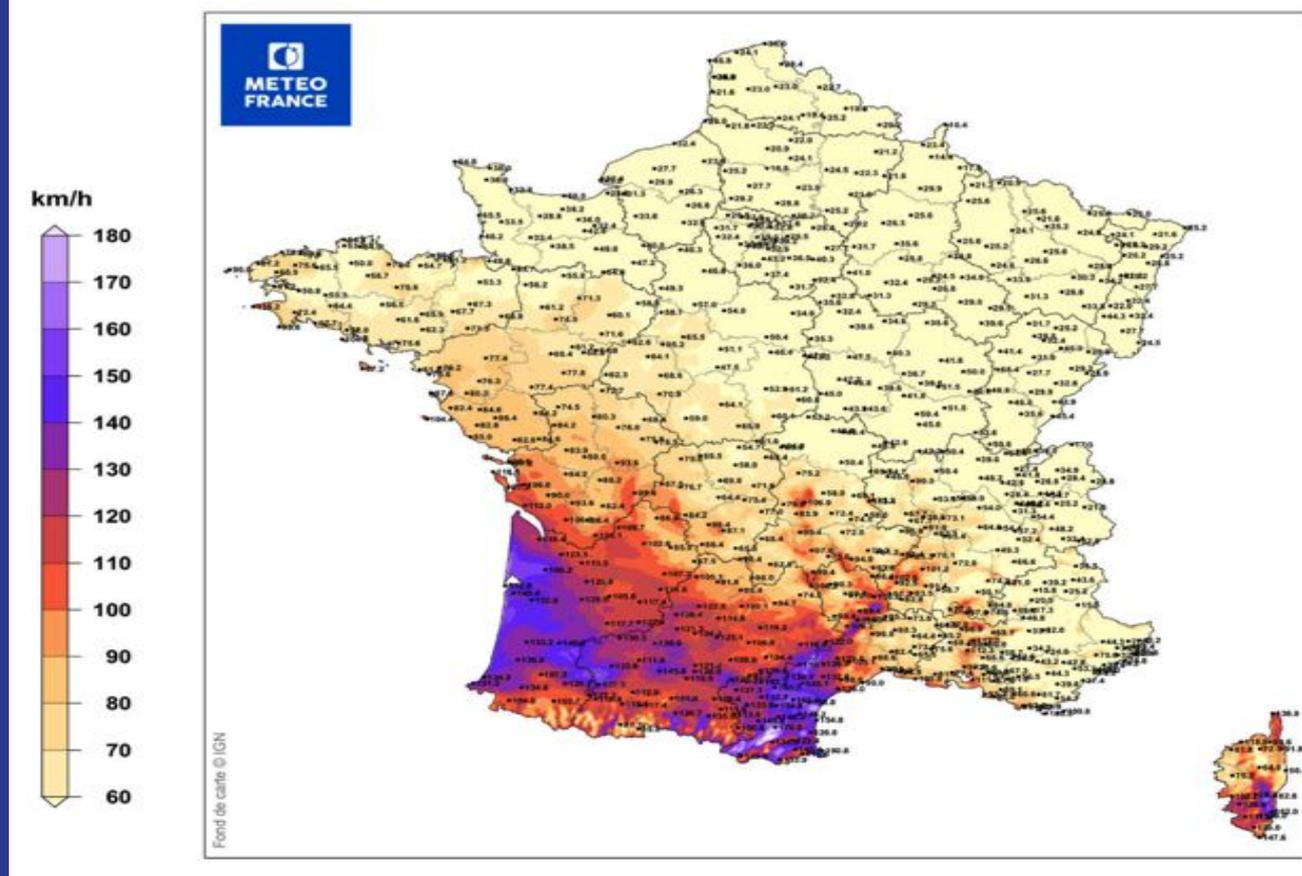


Planning for more extreme events (USA data) ...



... when storms like Klaus (2009) happen ...

... and they
are
becoming
more
frequent...



... Klaus felled 3000 million trees in the south of France ...



... but had almost no effect on agroforestry plots in its wake...

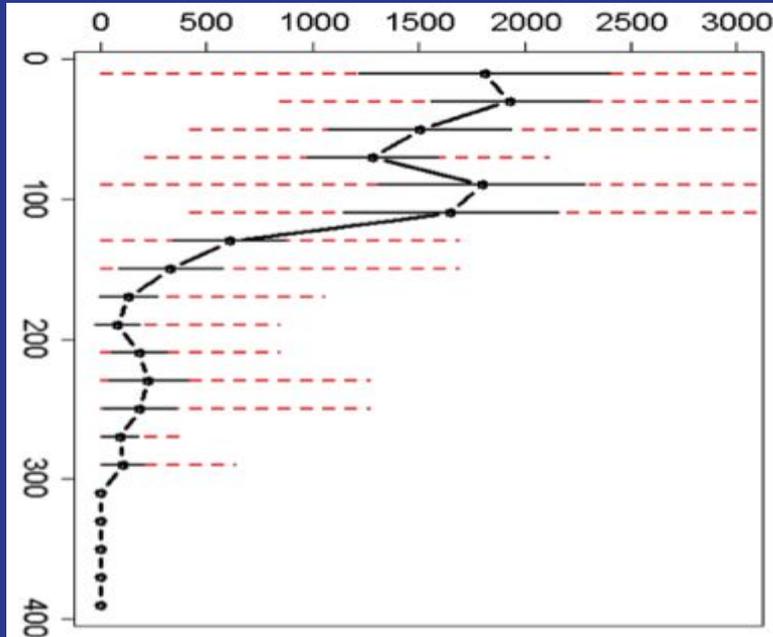


.. because of deeper rootstock and thicker stems

Forestry:

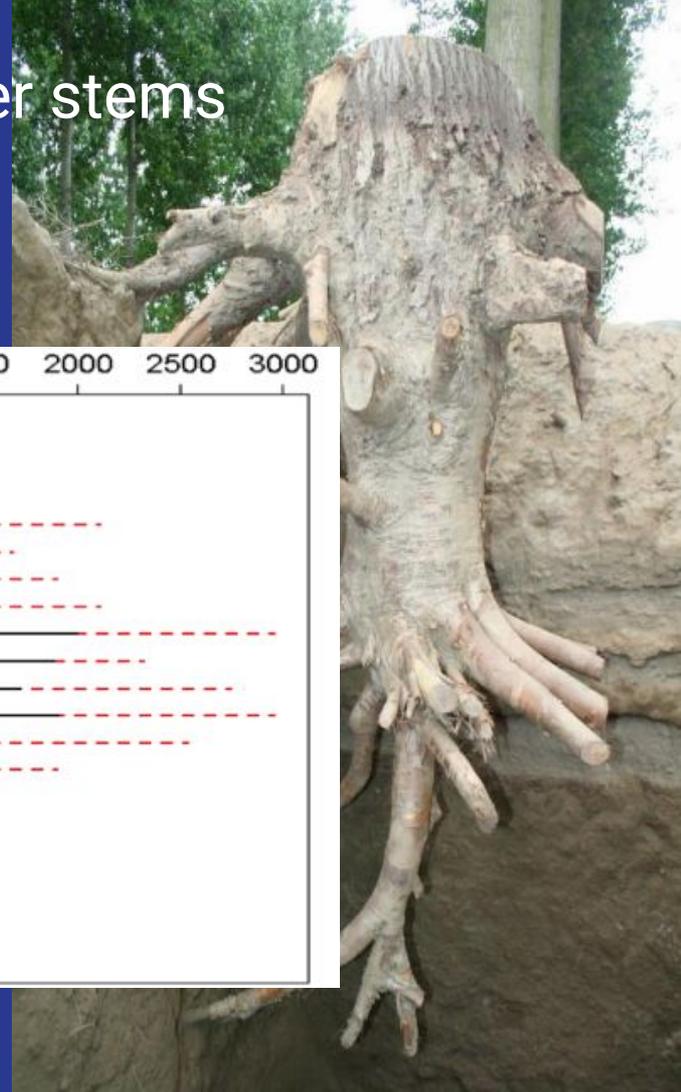
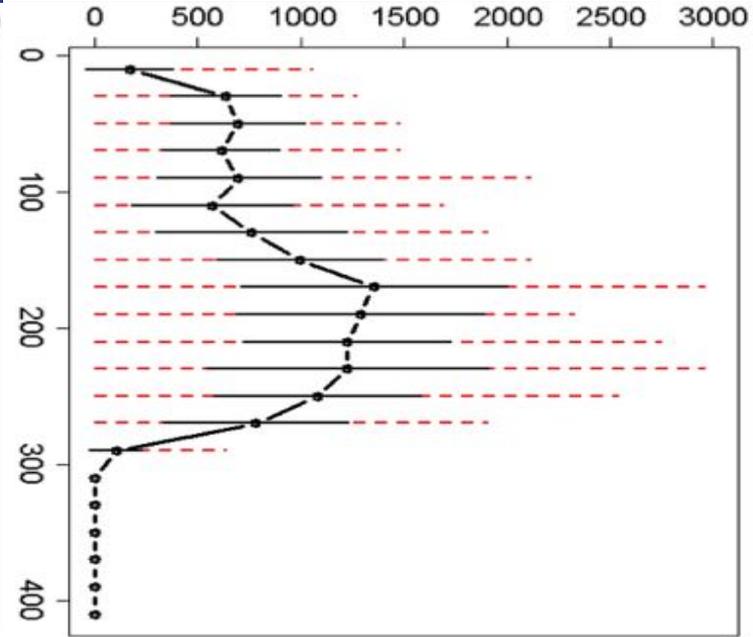
most roots close to surface

Root density: meters of rootlets /m³ of soil



Agroforestry:

most roots at depth



.. and these roots act as “nutrient safety nets” ...

Positive

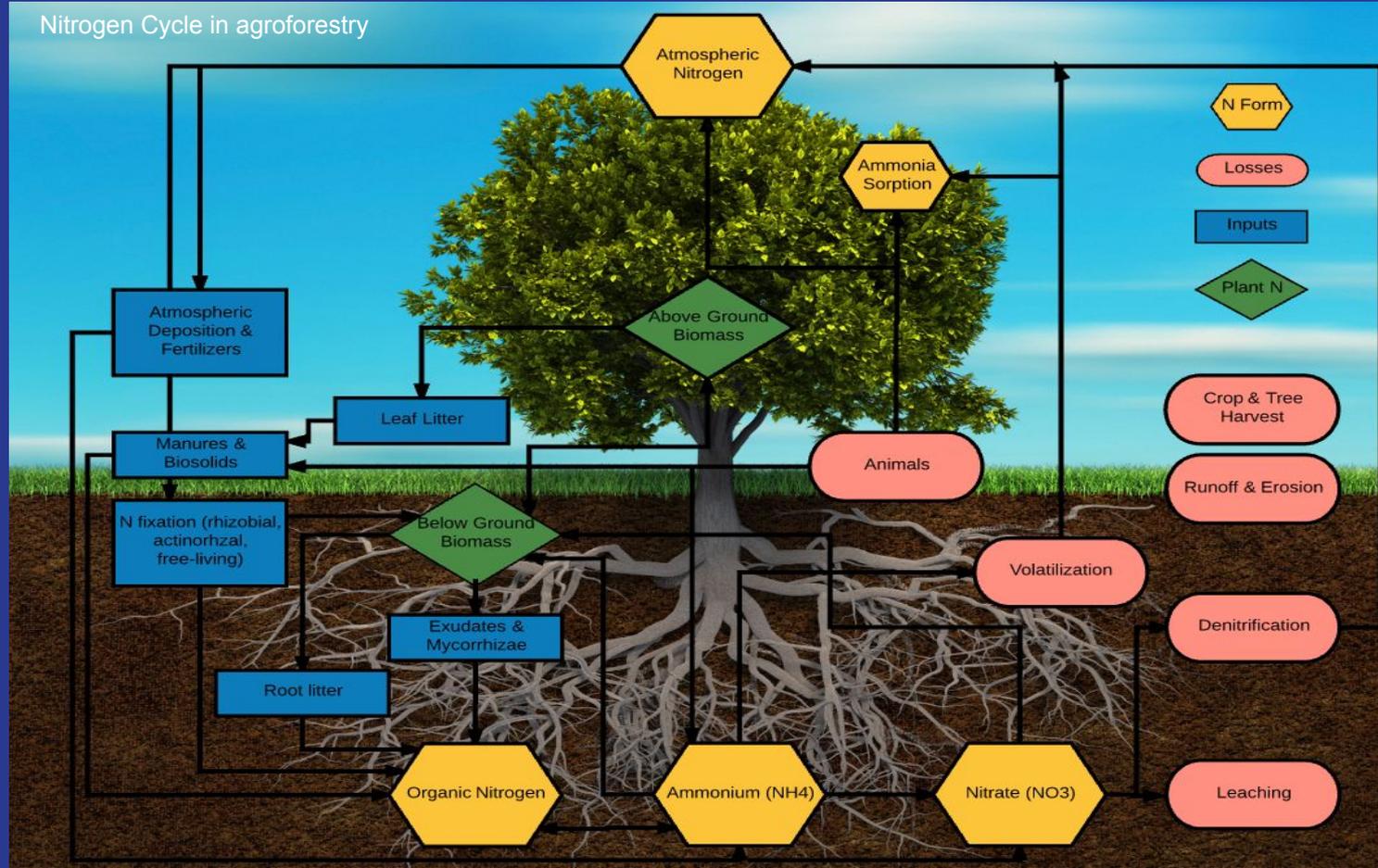
- Root “safety-net”
- Nitrogen fixation
- Shared mycorrhizae
- Soil structure/ SOM
- Enhanced soil carbon
- Root exudates
- Leaf and root litter
- Leaf forage/Manure
- Higher LER
- Hydraulic Conductivity
- Erosion control
- Reduced leaching
- Ammonia sorption
- Soil drying in summer
- Hydraulic lift
- Riparian bufferstrips
- Water breaks

Uncertain/Mixed

- N₂O emissions
- Methane absorption

Negative

- Water competition
- Nutrient competition
- Light competition
- Field drain blockage



Ammonia Control

Trees can can recapture from 20% (trees planted around housing systems), to 45% (livestock as understorey silvopastoral systems) of ammonia.

Tree planting in ammonia hotspots leads to reduced N deposition on nearby sensitive habitats.

Costs of planting and managing trees (ignoring future yields) were similar to other methods of abatement.

See Bealey, W. J., B. Loubet, C. F. Braban, D. Famulari, M. R. Theobald, S. Reis, D. S. Reay, and M. A. Sutton. 2014. "Modelling Agro-Forestry Scenarios for Ammonia Abatement in the Landscape." *Environmental Research Letters*: 9 (12): 125001.

