Global inventory of current policy contexts, instruments and operational means for the support of mixed farming and agroforestry systems

Deliverable 6.1

27 October 2021

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Deliverable 6.1	Global inventory of current policy contexts, instruments and operational means for the support of mixed farming and agroforestry systems and the assessment and evaluation of ecosystem services from these systems
Related Work Package	WP6
Deliverable lead	Jesse Donham, Agroecology Europe
Author(s) and Organisations	Jesse Donham, Rosemary Venn, Ulrich Schmutz, Paola Migliorini
Contact	Jessica.donham@agroecology-europe.org
Version	1.3
Grant Agreement Number	862993
Instrument	Horizon 2020 Framework Programe
Start date	1st November 2020
Duration	48 months
Type of Delivery (R, DEM, DEC, Other)[1]	R
Dissemination Level (PU, CO, CI)[2]	PU
Delivery date	27 October 2021
Website	www.agromix-project.net

[1] **R**=Document, report; **DEM**=Demonstrator, pilot, prototype; **DEC**=website, patent fillings, videos, etc.; **OTHER**=other
[2] **PU**=Public, **CO**=Confidential, only for members of the consortium (including the Commission Services), **CI**=Classified

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Revision no	Date	Description	Author(s)
0.1	13/10/2021	Internal review	All partners
0.2	20/10/2021	Internal review	Ulrich Schmutz, Paola Migliorini, Rosemary Venn, Sara Burbi
0.3	25/10/2021	Draft for submission	Sara Burbi

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Table of Contents

1 INTRODUCTION 1

1.1 CONTEXT 3
1.2 OBJECTIVES AND EXPECTED OUTCOMES 4

2 METHODOLOGY AND PROCESS 5

3 KEY DEFINITIONS USED 6

3.1 AGROFORESTRY 7
3.2 MIXED FARMING 8
3.3 ECOSYSTEM SERVICES 11
3.3.1 Ecosystem services within AF and MF systems: 12

4 GENERAL OVERVIEW OF THE POLICY SITUATION 16

4.1 EUROPE AND UK 16
4.2 NON-EUROPEAN COUNTRIES 17

5 POLICIES OF THE EUROPEAN UNION 19

5.1 BIODIVERSITY STRATEGY AND FARM TO FORK 19
5.1.1 Biodiversity Strategy 19
5.1.2 Farm to Fork Strategy 21
5.2 EUROPEAN GREEN DEAL 22
5.3 EU FORESTRY STRATEGY 2030 23
5.4 COMMON AGRICULTURAL POLICY 24
5.4.1 Pillar I 27
5.4.2 Pillar II 38
5.4.3 New CAP 62

6 POLICY SITUATION PER REGION 65

6.1 EUROPE (EU AND NON-EU) 65
6.1.1 Belgium 66
6.1.2 Bulgaria 72
6.1.3 Czech Republic 75
6.1.4 Estonia 78
6.1.5 Finland 80
6.1.6 France 81
6.1.7 Germany 88
6.1.8 Hungary 91
6.1.9 Ireland 97
6.1.10 Italy 102
6.1.11 Netherlands 110
6.1.12 Poland 113
6.1.13 Portugal 114
6.1.14 Romania 126
6.1.15 Serbia 128
6.1.16 Spain 130
6.1.17 Sweden 132
6.1.18 Switzerland 139
6.1.19 United Kingdom 140

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.2 NON-EUROPEAN COUNTRIES 144
6.2.1 Ecuador 144
6.2.2 Chile 147
6.2.3 India 151
6.2.4 USA 160
6.2.5 Ghana 163
6.3 INTERNATIONAL POLICIES AND CROSS-BORDER INITIATIVES 167
6.3.1 REDD+ 167
6.3.2 FLEGT 169
6.3.3 Africa Oil Palm Initiative 170
6.3.4 Nationally Determined Contributions 171
6.3.5 Trees on Farms for Biodiversity 173
6.3.6 Summary 173
7 CONCLUSION 175

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

List of tables:

Table Number	Title	Page number
1	Type of Farm: TF14 Grouping by the FADN for the EU.	8
2	Ecosystem services and their corresponding icons considered in this report.	13
3	Potential Agroforestry Priority Areas for Europe.	24
4	Tree density requirements by MS in the 2014-2020 CAP. Adapted from Horizon 2020 Project, AGFORWARD.	30
5	Ecological Focus Area activation by MS in the 2014-2020 CAP.	35
6	Measures found in the 2007-2013 RDPs that relate to agroforestry. Adapted from Horizon 2020 Project, AGFORWARD.	38
7	Measures found in the 2014-2020 RDPs that relate to agroforestry. Adapted from Horizon 2020 Project, AGFORWARD.	39
8	Measures related to forest farming found in the 2007-2013 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.	40
9	Measures related to forest farming found in the 2014-2020 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.	41
10	Measures related to forest strips and small stands found in the 2007-2013 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.	42
11	Measures related to forest strips and small stands found in the 2014-2020 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.	43
12	Measures related to hedgerows found in the 2007-2013 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.	45
13	Measures related to hedgerows found in the 2014-2020 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.	47
14	Noteworthy examples relating to hedgerows found in the 2007-2013 RDPs.	49
15	Noteworthy examples relating to hedgerows found in the 2014-2020 RDPs.	49
16	Measures related to isolated trees found in the 2007-2013 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.	50
17	Measures related to isolated trees found in the 2014-2020 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.	51
18	Noteworthy examples relating to isolated trees found in the 2014-2020 RDPs.	52
19	Measures related to forest grazing in the 2007-2013 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.	53
20	Measures related to forest grazing found in the 2014-2020 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.	54
21	Measures related to meadow orchards found in the 2014-2020 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.	55
22	Measures related to mountain pastoralism found in the 2007-2013 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.	57
23	Measures related to mountain pastoralism found in the 2014-2020 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.	58
24	Noteworthy examples relating to mountain pastoralism found in the 2007-2013 RDPs.	59
25	Noteworthy examples relating to mountain pastoralism found in the 2014-2020 RDPs.	59
26	European Policy Landscape for AF and MF.	64
27	Number of farms by Farm Type and Region 2016. Data taken from the National Farm Structure Survey of 2016.	97

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

28	Available funding for the establishment of agroforestry in Ireland - Afforestation Grant Premium Category 11.	97
29	Agroforestry support in the 2014-2020 RDPs of five Italian regions.	101

List of figures:

Figure number	Title	Page number
1	Classification of mixed farming and agroforestry systems used in AGROMIX (source Deliverable 1.1. AGROMIX)	7
2	Depiction of ecosystem services which support life on earth, Millennium Ecosystem Assessment 2005	11
3	Agroforestry area registered (*oppervlakte ingeschreven*) and area planted (*oppervlakte aangeplant)* by year within Flanders.]	66
4	Map of Agriculture within France. Blue areas signify landscapes devoted to *polyculture-élevage*.	84
5	A version of the 5-layer Palekar model for ZBNF, taken from BNNMurali	154
6	Phases of REDD+, UNFCC	163
7	Percentage of countries that refer to concrete policies and measures in agriculture by type of activity. Source: FAO analysis (2016)	167

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Abbreviations:

AECM	Agri-environmental climate measures
AF	Agroforestry
AOPI	Africa Oil Palm Initiative
CAP	Common Agricultural Policy
CCC	Climate Change Committee
CIFOR	Centre for International Forestry Research
DEFRA	Department for Food, Farming and Rural Affairs
EAGF	European Agricultural Guarantee Fund
EFA	Ecological Focus Area
ELM	Environmental Land Management
ELP	Established Local Practices
ES	Ecosystem Services
EU	European Union
FADN	Farm accountancy data network
FAO	The Food and Agriculture Organization of the United Nations
PFBs	Protected Forest Belts
FLEGT	Forest Law Enforcement, Governance and Trade
GAEC	Good Agricultural and Environmental Conditions
GDP	Gross Domestic Product
GHGE	Greenhouse gas emissions
ICRAF	World Agroforestry Centre
LULUCF	Land use, land-use change, and forestry
MEA	Millennium Ecosystem Assessment
MF	Mixed farming
MS	Member States
NDC	Nationally Determined Contributions
PES	Payments for ecosystem services
RDP	Rural Development Plan
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SDGs	Sustainable Development Goals
SFS	Sustainable Food Systems
SMR	Statutory Mandatory Regulations
TEEB	The Economics of Ecosystems and Biodiversity
TFA	Tropical Forest Alliance
TonF	Trees on Farms for Biodiversity
UNFCC	United Nations Framework Convention on Climate Change

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

1 Introduction

Background: Agroforestry (AF) and Mixed Farming (MF) are multifunctional systems. Both are not new inventions, they have been in use for centuries, but they may have much untapped potential for modern solutions. AF and MF were severely neglected in policy making during the last 50 years of further industrialisation in agricultural systems. The negative consequence of this industrialisation on biodiversity and pollution to water, soil and air (greenhouse gas emissions) are becoming more and more apparent to everyone. Despite many already known benefits of AF and MF systems, direct policies aimed at supporting and developing these systems remain in a minority, both in Europe and internationally. It is clear that with ongoing pollution, overshot of multiple planetary boundaries and serious deficits in domestic animal and farmer worker welfare, more radical re-designs of farming systems are needed. There is now more urgency then in the last 30 years since the EU started regulating environmental and welfare issues in agriculture and horticulture (the organic farming regulation in 1991). AF and MF systems could be at the centre of this transformation routed in a food systems approach and the principles of agroecology for Europe.

Methods: This report provides an inventory of AF and MF policies available, and serves as a baseline for future policy co-development in the AGROMIX project. The report is based on key documents: the priorities of the European Commission for the future Common Agricultural Policy (CAP) for the 2021–2027 period, and the European 'Green Deal' including the 'Farm-to-Fork' and 'Biodiversity Strategies' policies. The inventory gives an overview of current policy mechanisms and contrast this with approaches in 17 different European countries and 10 selected international examples. The research was undertaken desk-based (January-August 2021), using mixed methods (literature review, policy document analysis and expert interviews). The research was primarily secondary or tertiary data, with information coming from policy documents, government websites, civil society documents, academic papers and AGROMIX's partners. Policy and law databases such as FAOLEX and Scopus were also used to find relevant policies and legislation. Several interviews were conducted to complement the research and fill in gaps in the data. Over 100 policy documents where reviewed and all partner organisations of the AGROMIX consortium consulted. As such the data in each country has been sourced by the partner organisation. The authors have tried to supplement this information where possible. 17 European countries and 5 non-European are detailed. In addition. 5 international policies and cross-boarder initiatives are analysed.

Results show a need for joined-up policy connecting food systems, agriculture and rural development with animal and human health. A holistic vision on environmental, economic, social, cultural and political sustainability. We find that all countries have numerous national policy goals concerning health, the environment, economy and society. Despite concerns about policy inconsistencies, there is already a recognition of explicit connections between the overarching public policy goals (as also reflected in the sustainable development goals SDGs). As a result of these connections, food systems emerge as a potential common space for advancing co-benefits for all of

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

these policy goals efficiently and effectively. Despite this potential, policies and actions designed to address these challenges often conflict and may undermine each other.

We conclude that there are few rigorous studies on effect of policies to the -increased- use of agroecology practices and principles and the resulting impacts on economic and social aspects. The few policies that support directly MF and AF systems approach them with a specific technical/agronomic aspect and not with further agroecological principles. The non-European policy approaches to MF and AF are very interesting and give inspirations, but none of them are specific enough for European or EU conditions. In a global setting the EU policy process is unique. However, mutual exchange and learning especially regarding EU policy consequences outside Europe is important. Our mapping reveals a strong lack of financing for MF and AF. Only Belgium, France, Hungary, Ireland, Italy (some regions), Portugal, Spain (some regions), Switzerland, and UK have activated CAP measures on agroforestry. The potential for AF is seen in respect to carbon sequestering ecosystem service providers but not as major food system change driver. MF is not recognised within policy as having the potential to meet sustainability or food security goals. We think re-integrating crop and livestock (MF) has the potential to address many ecological, welfare and social objectives but little is known on the policy needs to achieve them. We find some Good Practices examples within current models in selected states and these can be improved, shared and adapted elsewhere in coming years.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

1.1 Context

Industrialised agriculture as it is today cannot continue, this is increasingly clear to everyone. Many inputs, conventional fertilisers and pesticides especially, are based on burning fossil fuels. This source is either getting more rare or highly taxed because of its contribution to pollution and climate breakdown. In both cases, it gets more expensive and will have to end at some point. Zero pollution from fertilisers and pesticides is becoming an EU policy aim, and clear commitments to reduce negative inputs and pollution from them are already in the 'Green Deal'. The critique of industrialised agriculture uses strong words e.g. industrial agriculture is seen by some as the 'greatest crime of humanity' committed against fellow species and planetary biodiversity. Even if this is debatable, the negative impact on the extinction of species, biodiversity loss and deforestation on a planetary scale is enormous. At the same time industrial agriculture produces too much food with up to 40% wasted and if crops suitable for human consumption are then used for animal feed would count in waste statistic this number would be even higher. High food waste increases a nation's GDP, hence it is desirable and encouraged with economic incentives within the current food system.

The AGROMIX research follows a radically different approach: exploring how to transform landscapes in Europe with agroforestry and mixed farming based on agroecological principles. It uses agroecology as defined by the FAO's 10 elements and further detailed by Agroecology Europe to create as specific definition applicable for Europe. By mixing crops with livestock (Mixed Farming, MF) and trees with both crops and livestock (Agroforestry, AF) AGROMIX develops a different farming system at a large scale. Agroforestry and Mixed Farming does not abandon all domesticated livestock, as vegan agriculture does, but it works with largely reduced livestock stocking-densities. In its most rigorous form, it is exclusively free-range and animals are not reliant on crops suitable for human consumption.

This policy inventory compiles the current European policy landscape for Agroforestry and Mixed Farming policy. We have selected mostly countries from the European Union, as well as non-EU countries and a few countries outside of Europe. While the report is focussed on Europe, it is contrasting the European policy landscape with selected global examples, to learn and exchange approaches.

The aim of this public deliverable report is to lay the groundwork to co-create policy that works for Mixed Farming and Agroforestry in other tasks of the AGROMIX project but also to inform EU policies like carbon farming, and farm and landscape diversification with agroforestry and mixed farming. This groundwork is also important when discussing 'lock-ins' from supply chains, corporations, well-indented but contra-productive policies, and incentives (e.g., to treat farmland as tax-shelter). All these could impact the success of any further Agroforestry and Mixed Farming policy development.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

1.2 Objectives and expected outcomes

This deliverable forms the basis for the Policy co-development work-package. Its aim is to transform Europe's physical and political landscapes with research into the current bottlenecks for AF and MF. We aim to co-develop policy options which can facilitate the uptake of these farming systems and a greater integration of the systems and synergies where 'mixedness' is found at farm, landscape and supply chain levels. This can contribute to policy development at federal-state, national and EU (post-2020 CAP) policy levels to overcome trade-offs and conflicts brought by specialisation scenarios. The specific objectives are: (a) providing an assessment of existing policies (EU and globally) and their role in national and regional implementation to support MF/AF systems; (b) identifying strategies for policy improvement; (c) identifying new and improved policy design and implementation options; (d) to collating a catalogue of MF/AF-adapted best practices and (e) providing a gender-balanced assessment of policy recommendations.

Key expected outcomes of this work are:

- Phasing out intensive specialised industrial livestock farming systems everywhere in Europe.
- Replacing them with MF and AF systems, which are area-bound and connected to the landscape and regional supply chains they are in.
- Increasing ecosystem services from AF and MF, especially carbon-negative farming (contributing to carbon drawdown).
- Ensure a significant contribution of MF and AF to an agroecological transition with sustainable diets, bio-economy non-food products and biodiversity in landscapes.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

2 Methodology and process

The research was undertaken as a desk-based activity, within the months of January to August 2021. The research was collected through a mixed methods approach including a literature review, policy document analysis and expert interviews. The goal of which is to provide an inventory of policy instruments and operational means for the support of MF and AF systems and the assessment and evaluation of ecosystem services from these systems.

The policy review is focused on Europe which makes up the majority of this document. However, the inventory also includes examples from non-European countries with a goal of learning from other examples and ideas around the world to ensure a solid baseline and understanding and potentially see what is transferable at a European context.

The research was primarily secondary or tertiary data, with information coming from policy documents, government websites, civil society documents, academic papers and AGROMIX's partner organisations. Policy and law databases such as FAOLEX and Scopus were also used to find relevant policies and legislation. Several interviews were conducted to complement the research and fill in gaps in the data. The interviews were conducted with AF or MF experts. These interviews were the only primary data collected for the policy review that follows below.

Over 100 policy documents where reviewed. This creates complexity and a challenging data set to coherently analyse, review, and draw conclusions from. The authors of the report have tried to break the data and research up into sections that look at country specific policy, and European wide policy, which is then contrasted with examples from non-European countries.

This task included all partner organisations of the AGROMIX consortium. Each partner organisation representing a different country was asked to contribute by detailing the relevant policies and legislation that impact on the uptake (or lack thereof) of AF and MF in their country. This was in part due to the language barrier and the intricacies of national policies within the CAP. As such the data detailed below each country has been sourced by the partner organisation of that country. The authors have tried to supplement this information where possible.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

3 Key definitions used

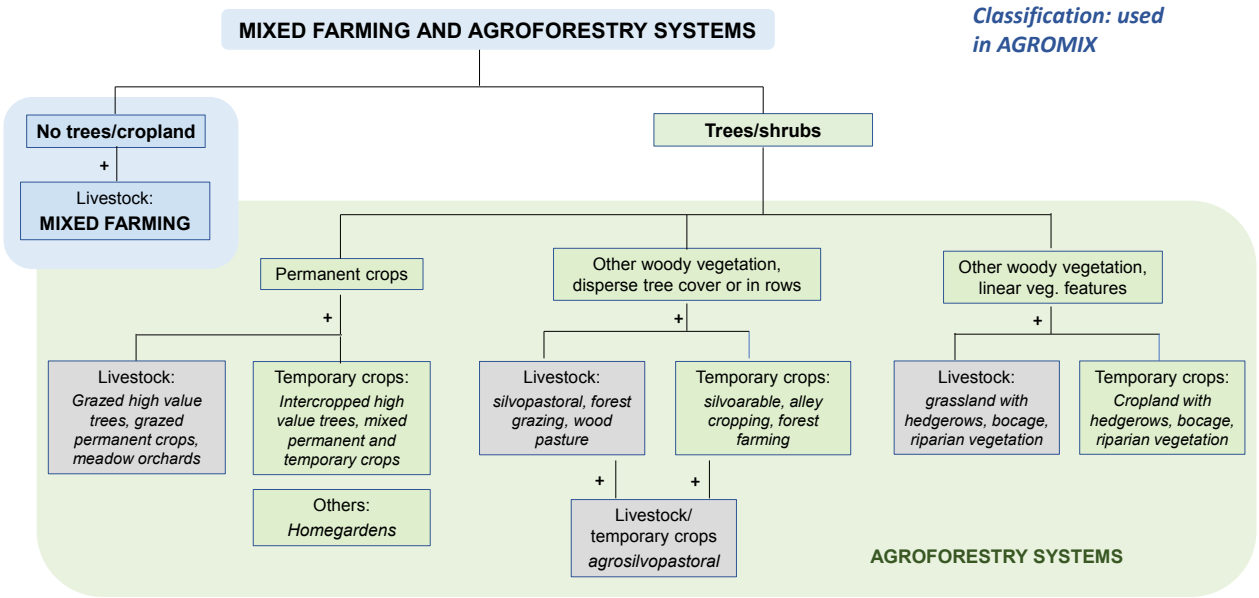
Agroecology is gaining traction as a potential transition pathway to sustainable food systems (SFS). Agroecology was defined by the FAO as "the application of the science of ecology to the study, design, and management of sustainable food systems, the integration of the diverse knowledge systems generated by food system practitioners, and the involvement of the social movements that are promoting the transition to fair, just, and sovereign food systems."[3] Agroecology For Europe defines agroecology as a science, a practice and a social movement. It encompasses the whole food system from the soil to the organisation of human societies. It is value-laden and based on core principles. As a science, it gives priority to action research, holistic and participatory approaches, and transdisciplinarity including different knowledge systems. As a practice, it is based on sustainable use of local renewable resources, local farmers' knowledge and priorities, wise use of biodiversity to provide ecosystem services and resilience, and solutions that provide multiple benefits (environmental, economic, social) from local to global. As a movement, it defends smallholders and family farming, farmers and rural communities, food sovereignty, local and short marketing chains, diversity of indigenous seeds and breeds, healthy and quality food."[4]

Nested within the practical application of agroecology and considered within AGROMIX are AF and MF. Deliverable 1.1 of AGROMIX has provided the below graphic which depicts the various forms both agroforestry and mixed farming can take. Their definitions are elaborated on in the sections below.

[3] https://www.fao.org/agroecology/knowledge/practices/en/
[4] https://www.agroecology-europe.org/our-approach/our-understanding-of-agroecology/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Figure 1: Classification of mixed farming and agroforestry systems used in AGROMIX (source Deliverable 1.1. AGROMIX)



3.1 Agroforestry

AF is a traditional and ancient form of farming, having been practiced for thousands of years. In the last 40 years the practice has been gaining further interest also among academia as a multifunctional land use approach that delivers environmental, social and economic benefits, whilst also both adapting to, and mitigating, climate change[5].

Defined as "the practice of deliberately integrating woody vegetation (trees or shrubs) with crop and/or animal systems to benefit from the resulting ecological and economic interactions"[6] AF has also been shown to contribute to food security, sustain livelihoods and alleviate poverty, though these studies are primarily focussed in the Global South[7]. This integration of crops and trees and/or

[5] Hernandez-Morcillo, M., Burgess, P., Mirck, J., Pantera, A., Plieninger, T., (2018) 'Scanning agroforestry-based solutions for climate change mitigation and adaptation in Europe'. Environmental Science and Policy 80, 44-52

[6] Burgess, P.J., Crous-Duran, J., den Herder M., Dupraz, C., Fagerholm, N., Freese, D., Garnett, K., Graves, A.R., Hermansen, J.E., Liagre, F., Mirck, J., Moreno, G., Mosquera-Losada, M.R., Palma, J.H.N., Pantera, A., Plieninger, T., Upson, M. (2015) AGFORWARD Project Periodic Report: January to December 2014. Cranfield University: AGFORWARD. http://www.agforward.eu/index.php/en/news-reader/id-27-february-2015.html (AGF1)

[7] Kuyah, S., Öborn, I., Jonsson, M., Dahlin, A.S., Barrios, E., Muthuri, C., Malmer, A., Nyaga, J., Magaju, C., Namirembe, S., Nyberg, Y., Sinclair, F.L., (2016) 'Trees in agricultural landscapes enhance provision of ecosystem services in Sub-Saharan Africa'. International Journal of Biodiversity Science, Ecosystem Services & Management 12 (4), 255-273

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

livestock in spatial or temporal arrangements leads to increased agrobiodiversity, complexity and thus resilience[8]. As such, AF is gaining more prominence as a potential pathway for sustainable food systems.

AF takes many forms both within and between countries. A simplified list of those 'types' of AF is:

- Silvopasture: combining woody vegetation with forage and animal production
- Silvoarable: woody vegetation intercropped with annual or perennial crops
- Hedgerows, windbreaks and riparian strips: lines of natural or planted perennial vegetations bordering croplands to protect livestock/crops and/or soil and water quality
- Forest farming: naturally occurring forested areas used for production or harvest of natural speciality crops (such as mushrooms or medicines)
- Home gardens: combining trees and/or shrubs with vegetable production in the built environment, includes allotments

See Figure 1 above for expanded practices.

As a multifunctional land-use, AF has the potential to work towards multiple SDGs and food system changes. As an agroecological approach, these impacts should be focussed on in the implementation, policy and legislation stages.

3.2 Mixed Farming

Mixed Farming (MF), although a traditional model of farming found all over the world, was de-incentivized within the last century for concepts of 'efficiency', uniformity and specialisation. Today, scientists, politicians and practitioners are realising the benefits of this system and the added resilience it adds economically, environmentally and socially. Nevertheless, when a traditional concept is defined, it finds itself in a plethora of definitions, leaving knowledge gaps in how we perceive such concepts. This is no different for MF.

[8] Jose, S. (2009) 'Agroforestry for ecosystem services and environmental benefits: an overview'. Agroforestry Systems 76, 1–10

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

The farm accountancy data network (FADN) is responsible for monitoring farms within Europe. They classify mixed farming with the following categories:

Table 1. Type of Farm: TF14 Grouping by the FADN for the EU. [9]

Mixed	Mixed livestock, mainly grazing livestock	Mixed livestock, mainly dairying
		Mixed livestock, mainly non-dairying grazing livestock
	Mixed livestock, mainly granivores	Mixed livestock: granivores and dairying combined
		Mixed livestock: granivores and non-dairying grazing livestock
	Field crops – grazing livestock combined	Field crops combined with dairying
		Dairying combined with field crops
		Field crops combined with non-dairying grazing livestock
		Non-dairying grazing livestock combined with field crops
	Various crops and livestock combined	Field crops and granivores combined
		Permanent crops and grazing livestock combined
		Apiculture
		Various mixed crops and livestock

Eurostat defines MF as:

A mixed-farming holding is an agricultural holding where neither livestock nor crop production is the dominant activity - an activity is called dominant if it provides at least two-thirds of the production or the business size of an agricultural holding.[10]

AGROMIX has defined MF as *the practice of deliberately integrating crop and livestock production to benefit from the resulting ecological and economic interactions*.

While both definitions describe this integrated crop and livestock system, they both carry their own weights and assumptions. In the definition of AGROMIX, MF is a system with both social and economic benefits, that could be considered agroecological according to Agroecology Europe's definition, and therefore includes the socio-economic and political aspects of food systems. The intention of this definition is not only to define a practice, but to also include academic data on why mixed farming is an essential practice that cannot be lost.

[9] Ec.europa.eu. 2021. *Agriculture - FADN : F. A. D. N. - TYPE OF FARM : TF14 GROUPING*. [online] Available at: <https://ec.europa.eu/agriculture/rica/detailtf_en.cfm?TF=TF14&Version=13185> [Accessed 11 August 2021].
[10] Ec.europa.eu. 2021. *Glossary: Farm typology*. [online] Available at: <https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Farm_typology> [Accessed 11 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

MF, as understood by the authors of this inventory, is not simply the integration of crop and livestock within a single farm, nor is it always ecological as a rule. MF can occur at the plot, farm, community or landscape level. Further, it also varies beyond the spatial, within the temporal.

Taking this into consideration, MF can be defined as the following:

1. The integration of crops and animals on a single farm.
    a. This system has clear signs of economic resilience for the farmers themselves, but the environmental benefits and ecosystem services vary based on the interaction between these two 'production lines'. For example, if the farm in question spreads itself over 16 ha of land, where 8 ha occur on one side of a freeway and 8 ha occur on another, and these systems never interact, the environmental benefits and ecosystem services would be marginal and no different than two different farms existing next to one another—one specialised in livestock and another in soy. This can be slightly remedied if the livestock manure is transported to the arable land, and if a percentage of the crops are fed to the animals, but these benefits occur primarily based on the reduction of transport emissions, and not on landscape benefits tied to the farm(s) in question.
2. The integration of crops and animals on one single farm, while sharing space either at the same time or in rotation.
    a. This system, unlike the previous option, creates deep interactions between the two agricultural modes of production, and carries all of the benefits MF has to offer—it can represent an agroecological system in its most rigorous form. The benefits of both spatial and temporal interaction provide environmental (ecosystem services) and social benefits (economic resilience).
3. Neighbouring farms working in collaboration with one another and allowing animals to graze on arable land.
    a. This provides many of the spatial and at times, temporal interactions that are of benefit and described above.
4. The exchange of resources like manure or straw between neighbouring farms.
    a. This type of exchange created regional autonomy and decreases the emissions related to transport. It also utilises materials that would otherwise create an excess or waste.

The lack of an agreed definition and profusion of definitions for MF cause the grey area that this term exists in. This may account for the lack of policy support that we have found for the practice, which will be displayed further in the inventory. While AF is supported in the CAP and will be explained on a country-by-country basis, MF will be left out of this section for its lack of presence within the CAP.

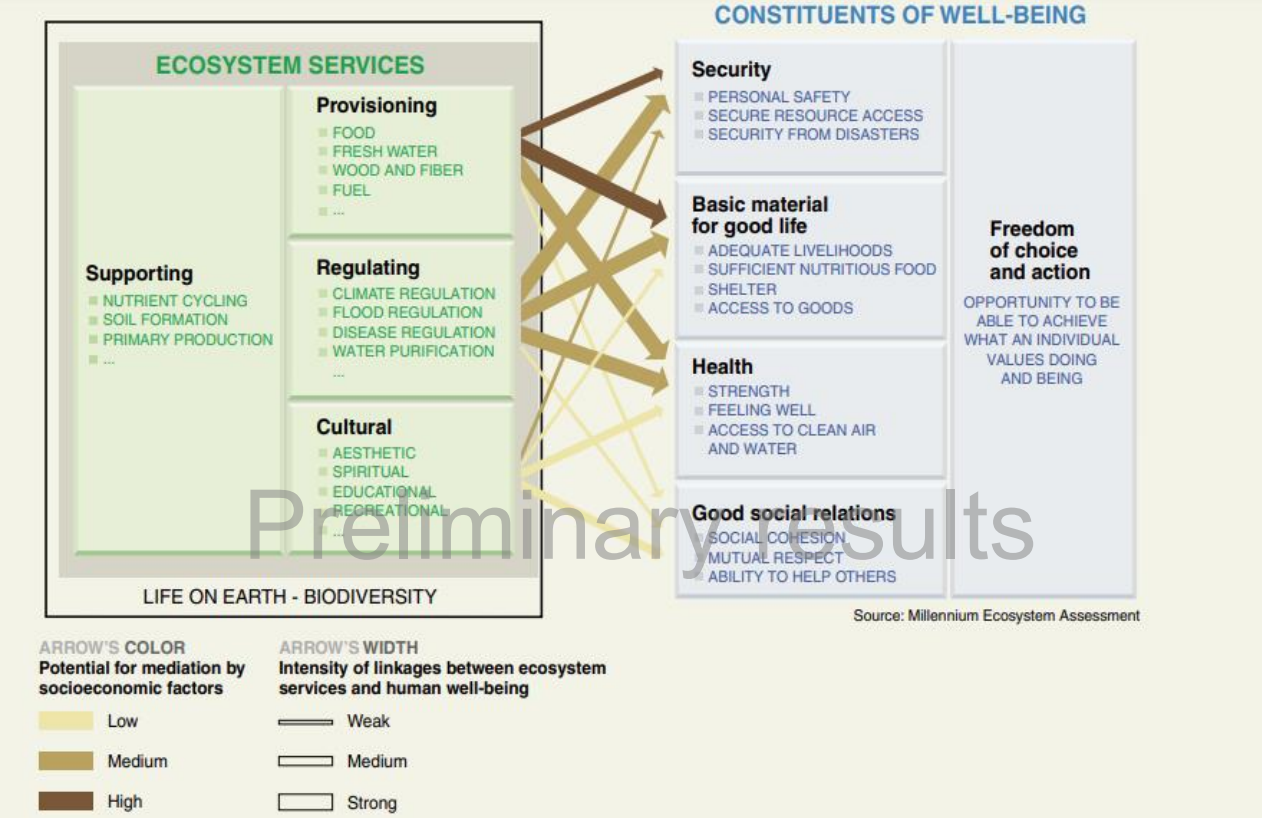
MF, like AF, is a system that deals with high complexity. It is this complexity that can make these systems, in their best forms, agroecological—providers of abundant ecosystem services and a method of resilience for farmers.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

3.3 Ecosystem services

Ecosystem services (ES) are defined as "the benefits humans derive from ecosystems"[11]. Clean air, water, food and space for recreation being examples. These benefits are commonly divided into supporting, provisioning, regulating and cultural services (see Figure 2 below).

Figure 2: Depiction of ecosystem services which support life on earth, Millennium Ecosystem Assessment 2005



Between 2001 and 2005, the Millennium Ecosystem Assessment (MEA) was carried out [12]. Since then, the MEA concept has proven popular among civil society, governments and academics as a way to assess, evaluate and communicate the complete dependence humans have on natural processes, freely given from the Earth. The valuation of ES has also proven popular with mainstream economics applying a monetary value to these services as a way of incorporating nature into society's balance sheets. This approach has been influential in environmental policy making and has provided a benchmark for many multilateral agreements and initiatives such as the Ecosystem Services for Poverty Alleviation and The Economics of Ecosystems and Biodiversity (TEEB). The

[11] Spangenberg, J. H. and Settele, J. (2010) 'Precisely incorrect? Monetising the value of ecosystem services', *Ecological Complexity*, 7(3), pp. 327–337. doi: 10.1016/j.ecocom.2010.04.007.

[12] Millennium Ecosystem Assessment (2005) 'Ecosystems and Human Well Being: General Synthesis' Available online:https://www.millenniumassessment.org/en/Synthesis.html

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

argument used is that in giving nature an economic value, conservation and reduced environmental degradation will follow.

3.3.1 Ecosystem services within AF and MF systems:

There are many studies analysing the relationship between ES and AF systems[13][14][15]. As a result, there is a growing body of evidence that shows how AF systems improve several regulating ES such as: erosion control; carbon sequestration; pest control; nutrient retention; reduced surface runoff; and improved soil organic carbon[16]. However, most studies focus on regulating and provisioning services, leaving cultural services aside due to the difficulties of measuring them quantitively. This is true throughout the literature for ES[17], not just agroecosystems. This often results in cultural ES not being incorporated into decision making tools[18].

In contrast to AF systems, there is very limited attention given to evaluating MF systems through an ES lens. This could be attributed to AGROMIX's definition of MF 'the practice of deliberately integrating crop and livestock to benefit from the crop livestock interactions' (D1.1), whereas terms such as 'mixed cropping' or 'integrated crop and livestock systems' for example, see much more research on how these systems improve regulating services. In the USA there are various studies highlighting the ecological benefits of integrated crop-livestock systems, which could perhaps be used as a proxy for provision services[19]. However, there is not the broad spectrum of provisioning, regulating and cultural service analysis that can be found for AF systems.

This lack of an accepted definition of MF in policy and or legislation makes it harder to assess the impact and or services provided by the system. However, given the higher levels of diversity in both AF and MF systems, one could assume there would be improved regulating ES.

The ES considered within WP1 can be seen in Table 2 below. For the purposes of this deliverable, three additional ES have been added (highlighted in yellow). Icons for each ES have been inserted

[13] Jose, S. (2009) 'Agroforestry for ecosystem services and environmental benefits: an overview'. *Agroforestry Systems* 76, 1–10;

[14] Kay, S. et al. (2019) 'Agroforestry is paying off – Economic evaluation of ecosystem services in European landscapes with and without agroforestry systems', Ecosystem Services, 36, p. 100896

[15] Kuyah, S., Öborn, I., Jonsson, M., Dahlin, A.S., Barrios, E., Muthuri, C., Malmer, A., Nyaga, J., Magaju, C., Namirembe, S., Nyberg, Y., Sinclair, F.L., (2016) 'Trees in agricultural landscapes enhance provision of ecosystem services in Sub-Saharan Africa'. *International Journal of Biodiversity Science, Ecosystem Services & Management* 12 (4), 255-273

[16] Torralba, M. Fagerholm, N., Burgess, P., Moreno, G., Plieninger, T., 2016. Do European agroforestry systems enhance biodiversity and ecosystem services? A meta-analysis. *Agriculture, Ecosystems and Environment*, 230(C), pp.150–161.

[17] Chan, K. M. A. *et al.* (2012) 'Where are Cultural and Social in Ecosystem Services? A Framework for Constructive Engagement', *BioScience*, 62(8), pp. 744–756. doi: 10.1525/bio.2012.62.8.7.

[18] De Groot RS, Wilson MA, Boumans RMJ. (2002) 'A typology for the classification, description and valuation of ecosystem functions, goods and services' *Ecological Economics* 41: 393–408.

[19] Sanderson, M. A. et al. (2013) 'Diversification and ecosystem services for conservation agriculture: Outcomes from pastures and integrated crop–livestock systems', Renewable Agriculture and Food Systems, 28(2), pp. 129–144. doi: 10.1017/S1742170512000312.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

and will act as a 'key' later on in the report to indicate which ES are more prevalent in which policy scenarios and contexts.

Table 2: Ecosystem services and their corresponding icons considered in this report

Ecosystem service type	Ecosystem service	Ecosystem service icon
Provisioning	Cultivated plants for nutrition (i.e. crops for consumption)	
	Cultivated plants for materials (i.e. crops for biomass)	
	Cultivated plants for energy (i.e. crops for fuel)	
	Reared animals for nutrition	
	Reared animals for materials or energy	
	Surface or groundwater used for nutrition, materials or energy	
Regulating and supporting	Carbon sequestration	
	Nitrogen fixation	
	Carbon cycling	
	Pest and disease control	
	Enhanced soil fertility	

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

	Reduced erosion	
	Hydrological cycle and water flow regulation	
	Improved water quality	
	Smell and or noise reduction	
	Wind protection	
	Fire protection	
	Pollination and or seed dispersal	
	Regulation of temperature, light, humidity, and transpiration	
	Increased animal welfare	
	Grassland Management	
	Biodiversity	
Cultural	Aesthetic value	

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

	Recreation	
	Educational value	
	Spiritual enrichment	
	Recovery of marginal areas	

Preliminary results

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

4 General Overview of the Policy Situation

This section provides a broad overview and summary of the findings that follow in sections 7 and 8.

4.1 Europe and UK

4.1.1 EU summary

The policy landscape for AF has been incrementally growing in Europe in the last few years. The primary source of support has been found within the CAP during the 2007-2013 and 2014-2020 periods but many state and local policies have also been reflecting this change.

Within the 2007-2013 periods only five EU Member States (Belgium, France, Hungary, Italy and Portugal) supported AF in the CAP, while it was supported by eight Member States (Belgium, France, Hungary, Italy, Portugal, Spain, UK and Greece) in the 2014-2020 CAP. Some Member States like Hungary supported this policy within the entirety of the country, while in places like the UK and Italy it was only supported by certain regions. Nevertheless, there has been very little farmer uptake in most of the countries that created CAP AF programs, leaving most Member States (MS) with large leftover budgets that should have been allocated to AF.

AF will continue to find support within the new CAP, as well as major EU legislations such as the Biodiversity Strategy, Farm to Fork Strategy and the European Green Deal which will all be described in detail in Section 5.

MF on the other hand has very rare policy support and was not found anywhere within the CAP or other major EU legislation reviewed. Even within promising programs as the one found in La Grande Région (that will be described in Section 6) has now ended. While MF seems to be the primary agricultural system in a few countries, the lack of policy support risks that these systems will follow the wave of industrial, intensive farming that has been occurring throughout most of Europe.

4.1.2 UK summary

Both AF and MF systems have great potential in the UK. There is legislative ‘space’ as the Environmental Land Management (ELM) scheme is developed and greater public support for more sustainable agricultural practices (and tree planting) than before. The UK’s carbon neutral target for 2050, alongside an ambition to increase tree cover from its current 3.3% means that establishing AF systems can work towards many current targets. Not only this but interest from farmers in more mixed systems, particularly for AF, has increased greatly in the last 10 years.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement 862993.

There is still great uncertainty around the changes that will be made to agricultural policy in the UK. Research by the Organic Research Centre highlights a keen interest from farmers to know more about AF systems but highlights the knowledge and funding gaps that are found to establish these systems. Payment mechanisms must be reflective of the long-term nature of investing in AF systems and these systems need to be integrated into other land-use policies.

4.2 Non-European countries

The authors of this review have chosen to include countries outside of Europe as a comparison tool for current EU policy, as well as using this data to learn from any novel approaches or successes. It was challenging to identify specific policies for MF and AF systems in many parts of the Global South as these forms of agriculture are often traditional and embedded in practice (and not in policy). Nevertheless, policies were found by using database such as FAOLEX and government websites. A larger policy landscape was found for AF than MF, which is perhaps unsurprising given the work that bodies such as World Agroforestry (ICRAF) and many other non-profits do to increase uptake of AF systems.

Currently, there is a trend for governments to include AF policies within their national programs which can be exemplified by the Government of India launching its national agroforestry policy in 2014. As payments for ecosystem services (PES) and other carbon offsetting initiatives become more popular, it will be important for countries to have strong legislation in place for these types of systems.

Key findings are as follows:

- Ambiguous land tenure and ownership of trees on tenanted land are a key barrier to farmers wanting to establish agroforestry systems.
- Fragmented coordination between different ministries, government bodies and organisations lead to unclear legislation and funding opportunities.
- Funding available for agroecology is dwarfed by contemporary agricultural funding; 85% of projects funded by the Bill and Melinda Gates Foundation and more than 70% of projects by Kenyan research institutes supported industrial agriculture, with only 3% of projects going towards agroecological system redesign[20].
- Cross border collaborations for bioregions are in their infancy, though they could provide a sustainable and innovative approach.

[20] Biovision Foundation for Ecological Development & IPES-Food. 2020. Money Flows: What is holding back investment in agroecological research for Africa? Biovision Foundation for Ecological Development & International Panel of Experts on Sustainable Food Systems.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

- AF and MF need to be rooted in agroecological principles if they are going to have any hope in addressing access to land and resources and food justice as issues; the current use of these terms and systems appear to be far from their agroecological roots.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

5 Policies of the European Union

The following chapter gives an overview of the primary policies found in the EU at the time of writing that impact agriculture, and especially the success or failure of agroecology, agroforestry and mixed farming. The bulk of this section will be devoted to the Common Agricultural Policy and how each country has used these legislations to support AF and MF. This section will build upon the work of previous Horizon 2020 projects funded by the EU commission in order to ensure that the research builds upon each other.

5.1 Biodiversity Strategy and Farm to Fork

5.1.1 Biodiversity Strategy

The European Union's Biodiversity Strategy for 2030 is a framework of actions and commitments to ensure that measures of protection are created for nature and to stop and reverse the degradation of our ecosystems.[21]

Within the Biodiversity Strategy AF is mentioned three times:

- Measure 2.2.2. Bringing nature back to agricultural land
    - *To support the long-term sustainability of both nature and farming, this strategy will work in tandem with the new Farm to Fork Strategy and the new Common Agricultural Policy (CAP), including by promoting eco-schemes and result-based payment schemes. In implementing the Biodiversity and the Farm to Fork Strategies, the Commission will closely monitor progress and improvements in terms of food security and farmers income. The Commission will ensure that the CAP Strategic plans are assessed against robust climate and environmental criteria, and that Member States set explicit national values for the relevant targets set in this strategy, as well as in the Farm to Fork Strategy. These plans should lead to sustainable practices such as precision agriculture, organic farming, agro-ecology,* ***agro-forestry****, low-intensive permanent grassland, and stricter animal welfare standards.*[22]

[21] Environment. 2021. *Biodiversity strategy for 2030*. [online] Available at: <https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en> [Accessed 9 August 2021].
[22] European Commission, 2020. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. EU Biodiversity Strategy for 2030: Bringing nature back into our lives. [online] Available at: <https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en> [Accessed 11 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

- *The uptake of agroforestry support measures under rural development should be increased as it has great potential to provide multiple benefits for biodiversity, people and climate.*[23]

- 2.2.4. Increasing the quantity of forests and improving their health and resilience

  - *To make this happen, the Commission will propose a dedicated EU Forest Strategy in 2021 in line with our wider biodiversity and climate neutrality ambitions. It will include a roadmap for planting at least 3 billion additional trees in the EU by 2030, in full respect of ecological principles. This will create substantial job opportunities linked to the collecting and cultivating of seeds, planting seedlings, and ensuring their development. Tree planting is particularly beneficial in cities, while in rural areas it can work well with* ***agroforestry, landscape features*** *and increased carbon sequestration. At the same time, the Commission will continue to work with Member States to ensure that the EU is sufficiently equipped to prevent and respond to major forest fires, which can inflict significant damages on forest biodiversity.*[24]

Finally, while the next measure does not mention AF by name, it includes the landscape elements that are also part of agroforestry:

- Measure 2.2.2. Bringing nature back to agricultural land also includes a commitment

  - *Farmland birds and insects, particularly pollinators, are key indicators of the health of agroecosystems and are vital for agricultural production and food security. Their alarming decline must be reversed. As set out in the Farm to Fork Strategy, the Commission will take action to reduce by 50% the overall use of – and risk from – chemical pesticides by 2030 and reduce by 50% the use of more hazardous pesticides by 2030. This must be supported by the full implementation of the EU Pollinators initiative. By the end of 2020, the Commission will review the initiative and propose additional measures if necessary. To provide space for wild animals, plants, pollinators and natural pest regulators, there is an urgent need to bring back at least 10% of agricultural area under* ***high-diversity landscape features****. These include, inter alia,* ***buffer strips****, rotational or non-rotational fallow land,* ***hedges****,* ***non-productive trees****, terrace walls, and ponds. These help enhance carbon sequestration, prevent soil erosion and depletion, filter air and water, and support climate adaptation. In addition, more biodiversity often helps lead to more agricultural production. Member States will need to translate the 10% EU target to a lower geographical scale to ensure*

[23] European Commission, 2020. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. EU Biodiversity Strategy for 2030: Bringing nature back into our lives. [online] Available at: <https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en> [Accessed 11 August 2021].
[24] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

> *connectivity among habitats, especially through the CAP instruments and CAP Strategic Plans, in line with the Farm to Fork Strategy, and through the implementation of the Habitats Directive. The progress towards the target will be under constant review, and adjustment if needed, to mitigate against undue impact on biodiversity, food security and farmers' competitiveness.*[25]

The mention of AF and landscape elements within this document is positive and shows a recognition by policy makers of the benefits of this practice. Nevertheless, it is important to mention that while the goal found in Measure 2.2.4 of planting 3 billion trees is an ambitious and worthy objective, how and where those trees are planted is of utmost importance. If those trees are planted in commercial monocultural forestry systems, the benefits derived from them environmentally would be very limited. Similarly, large-scale tree planting with the aim to create forests in habitats of already high conservation value would be counterproductive to the aims of the strategy. Therefore, it is important that these trees are planted not in isolation but to create and support ecosystems. This will ensure that these trees are providing ecosystem services rather than creating 'green deserts' where little else grows. Sustainable forestry and AF standards need to be high to ensure maximum benefits.

It is interesting to note that MF is not mentioned anywhere within this document, and neither is there any mention of any other interactions between crops and livestock.[26]

5.1.2 Farm to Fork Strategy

The European Union's Farm to Fork Strategy for a fair, healthy and environmentally friendly food system is part of the Biodiversity Strategy although it stands alone to accentuate the necessary measures for a healthy food system. This strategy creates both regulatory and non-regulatory measures to adapt agricultural and fishery policies as tools for a just transition that has a positive environmental impact, mitigates climate change, reverses the loss of biodiversity, and ensures food security and affordability.[27]

Within the Farm to Fork Strategy, AF is mentioned only once:

- 2.1. Ensuring sustainable food production

[25] European Commission, 2020. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. EU Biodiversity Strategy for 2030: Bringing nature back into our lives. [online] Available at: <https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en> [Accessed 11 August 2021].
[26] Ibid.
[27] Environment. 2021. *Biodiversity strategy for 2030*. [online] Available at: <https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

- "The new 'eco-schemes' will offer a major stream of funding to boost sustainable practices, such as precision agriculture, agro-ecology (including organic farming), carbon farming and ***agro-forestry***. Member States and the Commission will have to ensure that they are appropriately resourced and implemented in the Strategic Plans. The Commission will support the introduction of a minimum ring-fencing budget for eco-schemes."[28]

MF is not mentioned within this document.

5.2 European Green Deal

The European Green Deal is the European Union's (EU's) strategy to tackle climate change and environmental degradation. It aims to transform the EU into a system that is sustainable while remaining competitive. A few of its key aims are to create no net emissions of greenhouse gases by 2050, decouple economic growth from resource use and to create a just transition where no one is left behind.[29]

Within the European Green Deal, AF is mentioned once:

- *The Commission will ensure that Strategic Plans are assessed against robust climate and environmental criteria. These plans should lead to the use of sustainable practices, such as precision agriculture, organic farming, agroecology,* ***agroforestry*** *and stricter animal welfare standards. By shifting the focus from compliance to performance, measures such as eco-schemes should reward farmers for improved environmental and climate performance, including managing and storing carbon in the soil, and improved nutrient management to improve water quality and reduce emissions.*[30]

MF is once again not mentioned.

[28] European Commission, 2020, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system [online] Available at: <https://ec.europa.eu/food/horizontal-topics/farm-fork-strategy_en> [Accessed 11 August 2021].
[29] European Commission - European Commission. 2021. *A European Green Deal*. [online] Available at: <https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en> [Accessed 9 August 2021].
[30] European Commission, 2019, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. The European Green Deal. [online] Available at: <https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF> [Accessed 11 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

5.3 EU Forestry Strategy 2030

The EU Forestry Strategy is a new European initiative that compliments the measures set out in the European Green Deal and Biodiversity Strategy in order to reduce greenhouse gas emissions and reach climate neutrality. It recognises the central and multifunctional role of forests, and highlights AF as a measure to help achieve the 3 billion trees by 2030 target set out in the Biodiversity Strategy.

Within the EU Forestry Strategy, AF is mentioned multiple times[31]:

- 3.2. Ensuring forest restoration and reinforced sustainable forest management for climate adaptation and forest resilience

    - *This concerns mainly urban and peri-urban areas (including e.g. urban parks, trees on public and private property, greening buildings and infrastructure, and urban gardens) and agricultural area (including e.g. in abandoned areas as well as through **agroforestry** and silvopastures, landscape features and the establishment of ecological corridors). It is important to capitalise on this potential, as enhanced afforestation is also among the most effective climate change and disaster risk mitigation strategies in the forest sector, and can create substantial job opportunities, e.g. in relation to collecting and cultivating of seeds, planting seedlings, and ensuring their development, as well as providing socio-economic benefits to local communities. Also, exposure to green and forested areas can greatly benefit people's physical and mental health.*

- 3.4. Financial incentives for forest owners and managers for improving the quantity and quality of EU forests

    - *In light of the increased climate and biodiversity ambition of the EU, the Member States are specifically encouraged, as relevant to their national circumstances, to set up a payment scheme for ecosystem services for forest owners and managers, in order to cover for costs and income foregone similarly to exemplary national schemes such as the Finnish METSO programme. Member States are also encouraged to accelerate the roll out of carbon farming practices, for instance via **eco-schemes on agroforestry** or rural development interventions to cover biodiversity-friendly re- and afforestation investments, **agroforestry** and other non-productive investments for environment- and climate-related objectives. To support Member States, the*

[31] European Commission, 2020. COMMISSION STAFF WORKING DOCUMENT. The 3 Billion Tree Planting Pledge For 2030 Accompanying the document COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. [online] Available at: <https://ec.europa.eu/environment/pdf/forests/swd_3bn_trees.pdf> [Accessed 22 October 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Commission will provide advice and technical guidance on the development of payment scheme for ecosystem services.

- 5. A strong research and innovation agenda to improve our knowledge on forests
    - *The multiple benefits from forest ecosystem services and their interdependencies will be further addressed in an interdisciplinary and integrative manner aiming to add more value on sustainable and multifunctional forests and to maximise their benefits for society. Research and innovation on **agroforestry** systems and other trees outside the forests will be reinforced.*

Within the Commission Staff Working Document, The 3 Billion Tree Planting Pledge For 2030, made to accompany the EU Forestry Strategy, AF is mentioned dozens of times with a specific section highlighting the possible priority areas within Europe. Table 3 highlights the key findings.

Table 3. Potential Agroforestry Priority Areas for Europe.[32]

HIGHLIGHTS

- Table 2 shows the calculated 'priority' and 'possible' areas for agroforestry to be planted or regenerated before 2030. Planting density is based on a selective thinning rate of 3-4:1 to reach final stocking[114].

Table 2: 'Priority' and 'possible' areas for agroforestry to be planted or regenerated before 2030

Scenario	Agroforestry System	Calculated Area (ha)	Planting Density/ha	Total trees (billion)
Priority Areas (4-5 environmental threats)	Silvoarable	9,959,142	200	1.99
	Silvopastoral	2,844,592	400	1.14
	Total			**3.13**
Possible Areas (1 environmental threat)	Silvoarable	95,890,000	200	19.18
	Silvopastoral	24,000,000	400	9.60
	Total			**28.78**

- 61% of the potential for total natural canopy restoration in the EU is found in land that is currently used for agriculture[115].

5.4 Common Agricultural Policy

The Common Agricultural Policy (CAP) is one of the most fundamental structures of the European Union (EU), as well as being a vital driver of agricultural development within Member States (MS). The CAP's policies directly impact 14 million farmers and indirectly, another 4 million working in the food sector. As it represents around 40 % of the EU budget, it has immense potential in driving the

[32] European Commission, 2020. COMMISSION STAFF WORKING DOCUMENT. The 3 Billion Tree Planting Pledge For 2030 Accompanying the document COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. [online] Available at: <https://ec.europa.eu/environment/pdf/forests/swd_3bn_trees.pdf> [Accessed 22 October 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

sustainability and ecological foundations of MS. The CAP was originally created in 1962 but AF did not enter the CAP until 1992, while MF is still not included in the CAP. In 1992, it included the first measures to support the planting of forest trees on agricultural land, but it was not until 2013 that AF was truly represented.

The CAP has been traditionally divided into two pillars, direct payments for farmers based on hectares or herd size, or through rural development measures. The first pillar is funded by the European Agricultural Guarantee Fund (EAGF), while Pillar II is funded by the EAGF and in part, by governments (around 50 to 85 % depending on the MS in question).

In order to receive any funding from the EU there are basic rules that need to be met, known as conditionality or cross-compliance. Conditionality or cross-compliance are characterized by two sets of rules: the Statutory Mandatory Regulations (SMRs) which are decided by the European Commission, and the Good Agricultural and Environmental Conditions (GAEC's) which are selected by the MS from suggestions the European Commission has made, some of which are compulsory and others voluntary.

For each programming period, new SMRs are selected. In the 2014-2020 period, the SMRs were related to the environment, climate change and the condition of agricultural land under the categories of water, biodiversity, food and feed law, animal hormones, plant health, food safety, and animal welfare.[33] The SMRs were categorized as follows:

- SMR 1 Protection of water against pollution caused by nitrates
- SMR 2 Conservation of wild birds
- SMR 3 Conservation of natural habitats and of wild flora and fauna
- SMR 4 Food and feed law
- SMR 5 Restrictions on the use of substances having hormonal or thyrostatic action and beta-agonists in farm animals
- SMR 6 Pig identification and registration
- SMR 7 Cattle identification and registration
- SMR 8 Sheep and goat identification and registration
- SMR 9 Prevention and control of transmissible spongiform encephalopathy's (TSEs)
- SMR 10 Plant protection products (PPPs)
- SMR 11 Minimum Standards for the Protection of Calves
- SMR 12 Minimum Standards for the Protection of Pigs
- SMR 13 Protection of Animals kept for Farming Purposes

[33] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

AF can help fulfil many of these SMRs—directly as in the case of the first four, and indirectly to SMR 11, 12 and 13.[34]

GAEC's, which for the 2014-2020 period were conditions included within Pillar I and part of the 'greening' measures, were divided by water; soil and carbon stock; and landscape minimum level of maintenance and food safety, they are listed below:

- GAEC 1 – Establishment of buffer strips along water courses
- GAEC 2 – Where use of water for irrigation is subject to authorisation, compliance with authorisation procedures
- GAEC 3 – Protection of ground water against pollution: prohibition of direct discharge into groundwater and measures to prevent indirect pollution of groundwater through discharge on the ground and percolation through the soil of dangerous substances, as listed in the Annex to Directive 80/68/EEC in its version in force on the last day of its validity, as far as it relates to agricultural activity
- GAEC 4 – Minimum soil cover
- GAEC 5 – Minimum land management reflecting site specific conditions to limit erosion
- GAEC 6 – Maintenance of soil organic matter level through appropriate practices including ban on burning arable stubble, except for plant health reasons
- GAEC 7 – Retention of landscape features, including where appropriate, hedges, ponds, ditches, trees in line, in group or isolated, field margins and terraces, and including a ban on cutting hedges and trees during the bird breeding and rearing season and, as an option, measures for avoiding invasive plant species[35][36]

Landscape features, which are a part of AF and will be explained in further detail below, have also been included as possibilities for Ecological Focus Areas (EFA) in Pillar I. This protection of woody vegetation includes trees in line, in group or isolated; and hedgerows and buffer strips composed of trees or shrubs. Both isolated trees and hedges can be combined with arable or grazing lands. While isolated trees are extremely important to ecosystems, hedges, multipurpose trees and riparian buffers have been shown to have even more extensive ecological benefits. The highest proportions of landscape elements are found in the following:

- Isolated trees – Bulgaria, France, Italy, Ireland, Northern Ireland, Lithuania, Portugal, Spain, Romania
- Hedgerows – France, Italy, Ireland and the UK
- Avenue Trees – France and Portugal

[34] Ibid.

[36] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

- Conifer edges – Australia, Estonia, France, Italy and Scotland[37]

Isolated trees are primarily found within Western and Southern Europe, and in smaller quantities in North-Eastern and Central Europe. The total amount of ha that was found by AGFORWARD in their LUCAS 2012 analyses was that these trees make up almost 300,000ha across all of Europe.[38]

Hedgerows, which can be considered to include avenue trees, conifer hedges, bush and tree hedges visibly managed, or bush and tree hedges not managed and abandoned, were found by AGFORWARD to encompass 1.78 million ha, or 0.42% of the territorial area of the EU.[39]

5.4.1 Pillar I

5.4.1.1 Basic Payments

While traditionally Pillar I of the CAP gave a single payment per farm, in the 2014-2020 CAP the 'Single Payment Scheme' was replaced by three compulsory and four voluntary payments.

Compulsory:

1. Basic payment per hectare

2. Greening
    a. This payment aims to support farmers in their efforts to engage in climate and environmentally friendly farming practices, and to reimburse them for the public goods they are providing to society. Greening provides an additional payment per hectare and represents 30% of Pillar I spending for each MS.

3. Young Farmers
    a. This payment gives young farmers funding for five years and compromises 1-3 % of Pillar I funds.

Voluntary:

1. Income support for areas with specific natural constraints.

2. A redistributive payment to support farmers with their first hectares of farmland.

[37] Ibid.
[38] Ibid.
[39] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

3. Coupled support for production given in certain cases when an area or type of farming needs to be supported for economic and/or social reasons.

4. Simplified scheme for small farmers. [40]

The voluntary payments were activated infrequently by MS, with only Denmark activating the first payment; eight MS adopting payment two (Belgium, Bulgaria, France, Germany, Hungary, Latvia, Poland and Romania); all MS except for Germany adopting payment three; and Latvia and Portugal implementing the last payment.[41]

Eligible Hectares

In order to receive funding under the basic payment scheme, the CAP has specific definitions of what constitutes an "eligible hectare" or an "agricultural area."

In the 2014-2020 CAP an eligible hectare is:

(a) any agricultural area of the holding, including areas that were not in good agricultural condition on 30 June 2003 in Member States acceding to the Union on 1 May 2004 that opted upon accession to apply the single area payment scheme, that is used for an agricultural activity or, where the area is also used for non-agricultural activities, is predominantly used for agricultural activities; or

(b) any area which gave a right to payments in 2008 under the single payment scheme or the single area payment scheme laid down, respectively, in Titles III and IVA of Regulation (EC) No 1782/2003.

and

(a) where an agricultural area of a holding is also used for non- agricultural activities, that area shall be considered to be used predominantly for agricultural activities provided that those agricultural activities can be exercised without being significantly hampered by the intensity, nature, duration and timing of the non-agricultural activities; [42]

---

[40] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

[41] Ibid.

[42] European Commission, 2013. REGULATION (EU) No 1307/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 december 2013; establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1307&from=EN> [Accessed 11 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Within the CAP regulations 1306/2013 and 1307/2013, an agricultural area is defined as any area that is taken up by arable land, permanent grassland or pasture, or permanent crops. There is a tendency for farmers to declare arable lands instead of permanent pastures since they are able to receive a higher market return. [43]

Arable land, permanent grassland or pasture, and permanent crops all have their own specific definitions within the CAP.

5.4.1.1.1 Arable Land

Arable land is all land that is either currently being cultivated for crop production or areas that are available for crop production that are lying fallow (unproductive for a time).

After an area is determined to meet the requirements of 1307/2013, the eligible land then has to fulfil Cross-compliance requirements. For AF this includes the maintenance of landscape features such as hedgerows, isolated trees and trees in lines or groups. The maximum density of trees is also detailed in the CAP by Delegate Act 640/2014 which states that for land to be eligible the tree density cannot be above 50 trees per hectare in the 2007-2013 CAP and 100 trees per hectare in the 2014-2020 CAP. Fortunately, this requirement for maximum density has now been removed from the CAP.[44]

The uptake of AF was significantly limited by this rule, as it complicated the farmers' ability to plant trees on arable land, especially small-scale farmers. Further, it clearly displayed the inconsistencies found within the CAP, because while AF was supported by Measure 8.2 and 222 which will be discussed later on, it was equally curtailed by this rule. While MS could adopt a different maximum tree density requirement, it always had to fall below the 100 trees per hectare rule.[45] Direct correlation is found between this rule and the deforestation of pasture and arable land, as well as the reluctance of farmers to plant trees on farmland due to the uncertainty about possible changes of rules and regulations in the future.

This rule does not apply to Articles 28 and 30 of Regulation (EU) No 1305/2013 which apply to agri-environment, Natura 2000 and water framework directive payments. [46]

Further, trees also had to meet crown requirements. Delegated Act 639/2014 defines isolated trees as those that have a minimum crown diameter of 4m. If trees are grouped together, rather than

[43] Ibid.
[44] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].
[45] Ibid.
[46] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

isolated, the maximum allowed is smaller. Regulation Act 639/2014 (EU 204b) protects existing hedges that are up to 10m in width but only 2m of them are eligible for CAP funding.[47] Another inconsistency is found here because although mature trees are protected, in order for a tree to become mature, protections need to exist for when they are below 4m in width. Further, it leaves trees that do not reach this diameter even in maturity, unprotected.

Finally, forest land cannot receive Pillar I payments even if there is a profitable agricultural activity occurring within this land. It is established that land that has more than 10% of tree cover is considered a forest, and therefore cannot receive Pillar I payments. This is significantly limiting to many agroforestry systems. This also does not match up to the rules in many countries where up to 30% of tree cover is required in order for a parcel of land to be considered a forest.[48] Table 4 goes into the diversity of requirements found within the 2014-2020 CAP.

Table 4. Tree density requirements by MS in the 2014-2020 CAP. Adapted from Horizon 2020 Project, AGFORWARD.[49]

Country	Area (ha)	Tree crown cover (%)	Tree height (m)
Austria	0.05	30	2
Belgium	0.5	20	5
Bulgaria	0.1	10	5
Czech Republic	0.05	30	2
Denmark	0.5	10	5
Estonia	0.5	30	2
Finland	0.5	10	5
France	0.5	10	5
Germany	0.1	10	5
Greece	0.3	25	2
Hungary	0.5	30	5
Ireland	0.1	20	5
Italy	0.5	10	5
Latvia	0.1	20	5
Lithuania	0.1	30	5
Luxembourg	0.5	10	5
Netherlands	0.5	20	5
Poland	0.1	10	2

[47] Mosquera-Losada, M., Santiago-Freijanes, J., Pisanelli, A., Rois-Díaz, M., Smith, J., den Herder, M., Moreno, G., Ferreiro-Domínguez, N., Malignier, N., Lamersdorf, N., Balaguer, F., Pantera, A., Rigueiro-Rodríguez, A., Aldrey, J., González-Hernández, M., Fernández-Lorenzo, J., Romero-Franco, R. and Burgess, P., 2018. Agroforestry in the European common agricultural policy. *Agroforestry Systems*, 92(4), pp.1117-1127.

[48] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

[49] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Portugal	1	10	5
Romania	0.25	10	5
Slovenia	0.25	30	2
Slovakia	0.3	20	5
Spain	1.0	20	3
Sweden	0.5	10	5
UK	0.1	20	2

5.4.1.1.2 Permanent crops

Regulation 1307/2013 defines permanent crops as:

non-rotational crops other than permanent grassland and permanent pasture that occupy the land for five years or more and yield repeated harvests, including nurseries and short rotation coppice [50]

For permanent crops, the tree densities forementioned for arable land do not apply, and they are allowed to combine them with crops or grassland. If fruit trees are combined with grazing, this is once again considered a permanent crop and no restrictions are applied to tree density.

If grazing occurs under productive fruit trees, this land is considered a permanent crop area. In order for this apply, trees have to be specific varieties - either apple, apricot, peach, pear, nectarine, orange, small citrus, lemon, olive trees or vineyards. Different rules apply to cherry, plum and berries.[51]

5.4.1.1.3 Permanent grassland

The definition found within Regulation 1307/2013 of the CAP for permanent grassland and pasture states that:

permanent grassland and permanent pasture" (together referred to as "permanent grassland") means land used to grow grasses or other herbaceous forage naturally (self- seeded) or through cultivation (sown) and that has not been included in the crop rotation of the holding for five years or more; it may include other species such as shrubs and/or trees which can be grazed provided that the grasses and other herbaceous forage remain predominant as well as, where Member States so

[50] European Commission, 2013. REGULATION (EU) No 1307/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 december 2013; establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1307&from=EN> [Accessed 11 August 2021].

[51] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

decide, land which can be grazed and which forms part of established local practices where grasses and other herbaceous forage are traditionally not predominant in grazing areas [52]

The inclusion of annual self-seeded species and woody vegetation through permanence allows plants and ecosystems to be resistant and overcome summer droughts; gives animals farm produced forage; protects soils; stores carbon; increases fertility; increases resilience to heavy rains and heat; avoids erosion throughout the year; land and systems becomes more resilient to climate change which will have more impact on southern European countries. Permanent grassland can still be ploughed and reseeded though, which changes the meaning of both permanent and the conservation benefits. Further, whether a whole area of permanent grassland is eligible under Pillar I of the CAP depends on if the MS has decided to adopt a pro-rata system or not. [53]

Established local practices (ELP) was a label that could be attached to grassland under EU Regulation 1307/2013. ELP are practices that are traditionally used in the area for livestock grazing and/or practices which are important for the conservation of habitats (Annex I to Council Directive 92/43/EEC, Directive 2009/147/EC, Regulation 639/2014).[54]

The Omnibus Regulation altered the definition of permanent grassland which expanded the number of areas receiving Pillar I payments.[55]

From 2018, MS can decide whether land that has been ploughed in the last five years remains arable land, even if used for cultivating grasses for more than five consecutive years.

5.4.1.2 Greening

Greening was a concept which was included in the 2014-2020 CAP which was similar to cross-compliance but took it one step further. It made up 30% of the Pillar I direct payment value and was given to those whose agricultural practices were considered beneficial to the environment and climate. Greening is paid automatically to all organic farmers. While greening is a compulsory multipurpose payment, it is not compulsory when:

---

[52] European Commission, 2013. REGULATION (EU) No 1307/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 december 2013; establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1307&from=EN> [Accessed 11 August 2021].

[53] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

[54] Ibid.

[55] Augère-Granier, M.-L. (2020). Agroforestry in the European Union Briefing. *European Parliamentary Research Service*.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

(a) where more than 75 % of the arable land is used for the production of grasses or other herbaceous forage, is land lying fallow, or is subject to a combination of these uses, provided that the arable area not covered by these uses does not exceed 30 hectares;

(b) where more than 75 % of the eligible agricultural area is permanent grassland, is used for the production of grasses or other herbaceous forage or for the cultivation of crops under water for a significant part of the year or for a significant part of the crop cycle, or is subject to a combination of these uses, provided that the arable area not covered by these uses does not exceed 30 hectares;

(c) where more than 50 % of the areas of arable land declared were not declared by the farmer in his aid application of the previous year and, where based on a comparison of the geo- spatial aid applications, all arable land is being cultivated with a different crop compared to that of the previous calendar year;

(d) that are situated in areas north of 62nd parallel or certain adjacent areas. Where the arable land of such holdings covers more than 10 hectares, there shall be at least two crops on the arable land, and none of these crops shall cover more than 75 % of the arable land, unless the main crop is grasses or other herbaceous forage, or land lying fallow. [56]

While cross-compliance (SMRs and GAECs) tried to promote certain practices, greening was focused on preservation, through protecting permanent pasture (including woody vegetation), crop diversification and to establish 5% of eligible land as an EFA.[57]

5.4.1.3 Ecological Focus Area

An Ecological Focus Area (EFA) is land where biodiversity is prioritised and agricultural practices that are environmentally friendly and beneficial for the climate are used in order to accomplish this aim. It is stated by Regulation 1307/2013 that:

Ecological focus areas should be established, in particular, in order to safeguard and improve biodiversity on farms. The ecological focus area should therefore consist of areas directly affecting biodiversity such as land lying fallow, landscape features, terraces, buffer strips, afforested areas and agro-forestry areas, or indirectly affecting biodiversity through a reduced use of inputs on the farm, such as areas covered by catch crops and winter green cover. The obligations laid down in

[56] European Commission, 2013. REGULATION (EU) No 1307/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 december 2013; establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1307&from=EN> [Accessed 11 August 2021].

[57] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

respect of the ecological focus area should be applied in a way that avoids putting a disproportionate burden on smaller farms in comparison to the additional enhanced environmental benefit. Exceptions should be provided for farms that already fulfil the objectives of ecological focus areas by being covered to a significant extent by grassland or fallowland. Exceptions should also be provided, in the case of predominantly forested Member States, for farmers that pursue an agricultural activity in areas facing natural constraints in certain predominantly forested areas where there is a significant risk of land abandonment. In addition, provision should be made for the possibility for Member States and farmers to implement at a regional or collective level the obligation in order to obtain adjacent ecological focus areas that are more beneficial for the environment. For the sake of simplification, Member States should have the option to standardise the measurement of the ecological focus areas.

and

In order to ensure the that ecological focus areas are established in an efficient and coherent way, while taking into account Member States' specific characteristics, the power to adopt certain acts should be delegated to the Commission in respect of laying down further criteria for the qualification of areas as ecological focus areas; recognising other types of ecological focus areas; establishing conversion and weighting factors for certain types of ecological focus area; establishing rules for the implementation, by Member States, of a part of the ecological focus area at regional level; laying down rules for collective implementation of the obligation to keep ecological focus areas by holdings in close proximity; establishing the framework for the criteria, to be defined by Member States, for identifying such close proximity; and establishing the methods of determination of the ratio of forest to agricultural land. When adding other types of ecological focus area, the Commission should ensure that they aim to improve the general environmental performance of the holding, in particular as regards biodiversity, the improvement of soil and water quality, the preservation of landscape and meeting the climate change mitigation and adaptation objectives.[58]

All countries are required to meet the following EFA rules other than the Netherlands and Poland; and Finland, Latvia, Estonia, and Sweden who have activated the 'forest exemption rule' which states that MS can opt out of these rules if they have above 50% of land allocated to forests.[59]

[58] European Commission, 2013. REGULATION (EU) No 1307/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 december 2013; establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1307&from=EN> [Accessed 11 August 2021].

[59] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Rules:

1. If a farm exceeds 15 hectares (excluding permanent grassland) then 5% of arable land needs to become an EFA (this was increased to 7% in 2017).

2. Ecological focus areas can include:
    a. Field margins
    b. Hedges
    c. Trees
    d. Fallow land
    e. Landscape features
    f. Biotopes
    g. Buffer strips
    h. Afforested areas
    i. Agroforestry
    j. Green cover
    k. Catch crops

3. States can choose not to implement this rule only if 50% of their land is forest.

4. The first step in greening is made by the MS when they make their choice of at least one of the following EFA measures:
    a. land lying fallow
    b. terraces
    c. landscape features
    d. buffer strips, including buffer strips covered by permanent grassland, provided that these are distinct from adjacent eligible agricultural area
    e. hectares of agroforestry that receive, or have received, support under Article 44 of Regulation (EC) No 1698/2005 and/or Article 23 of Regulation (EU) No 1305/2013
    f. strips of eligible hectares along forest edges
    g. areas with short rotation coppice with no use of mineral fertiliser and/or plant protection products
    h. afforested areas referred to in point (b)(ii) of Article 32(2) of this Regulation
    i. areas with catch crops, or green cover established by the planting and germination of seeds, subject to the application of weighting factors referred to in paragraph 3 of this Article
    j. areas with nitrogen-fixing crops [60]

[60] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Table 5 shows how many MS have chosen to activate each of these EFA measures.

Table 5. Ecological Focus Area activation by MS in the 2014-2020 CAP.[61]

Ecological Focus Area feature	Number of Member States
Nitrogen fixing crops	27 MS
Land lying fallow	26 MS
Landscape features (at least one)	24 MS
Landscape features (trees in groups)	17 MS
Landscape features (field margins)	16 MS
Landscape features (trees in line)	16 MS
Landscape features (ditches)	15 MS
Landscape features (hedges)	13 MS
Landscape features (isolated trees)	13 MS
Landscape features (ponds)	12 MS
Landscape features (traditional stone walls)	7 MS
Landscape features (other)	12 MS
Landscape features (9 features)	3 % of MS
Landscape features (1-3 features)	29 % of MS
Landscape features (4-6 features)	29 % of MS
Landscape features (7-8 features)	16 % of MS
Short rotation coppice	20 MS
Short rotation coppice (willow)	20 MS
Short rotation coppice (poplar)	17 MS
Short rotation coppice (alder)	14 MS
Short rotation coppice (birch)	11 MS
Short rotation coppice (ash)	11 MS
Catch crops	19 MS
Buffer strips	17 MS
Afforested areas	14 MS
Agroforestry	11 MS
Strips along forest edges (with production)	7 MS
Strips along forest edges (without production)	9 MS
Terraces	8 MS

5.4.1.3.1 Agroforestry

While it is positive that AF is presented as an option when choosing EFAs, it is only for AF practices that fit into Rural Development Measure 222 (2007-2013) and Rural Development Measure 8.2 (2014-2020), measures that will be discussed in detail later in this inventory. Practically, this means that any AF practices already existing or defined outside these measures, will not be recognised as an EFA, no matter the ecological benefits.

[61] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

5.4.1.4 Crop Diversification

Crop diversification is an important part of creating complex, ecological and agroecological systems. Regulation 1307/2013 states that:

The obligations relating to crop diversification should be applied in a way that takes into account the difficulty for smaller farms to diversify, while continuing to make progress towards enhanced environmental benefit, and in particular the improvement of soil quality. Exceptions should be provided for farms that already fulfil the objectives of crop diversification as a result of being covered to a significant extent by grassland or fallowland, for specialised farms rotating their parcels each year or for farms that because of their geographical localisation would have excessive difficulties in introducing a third crop. In order to ensure that the obligations referred to in the crop diversification measure are applied in a proportionate and non-discriminatory way and lead to an enhanced environmental protection, the power to adopt certain acts should be delegated to the Commission in respect of recognising further genera and species and laying down rules concerning the application of the precise calculation of shares of different crops.[62] The rules related to crop diversification are as follows:

1. If a farmer's land exceeds 10 hectares, at least two different crops must be cultivated.
    a. The primary crop should not exceed more than 75% of the arable land in question
2. If the land exceeds 30 hectares, then three different crops must be cultivated.
    a. The primary crop should not exceed more than 75% of the arable land in question and the two main crops combined should not cover more than 95% of the arable land
3. In order to be considered 'crop diversification' a crop needs to be of a different classification either:
    a. the botanical classification of crops;
    b. a culture of any of the species in the case of *Brassicaceae*, *Solanaceae* and *Cucurbitaceae*;
    c. land lying fallow;
    d. grasses or other herbaceous forage[63]

[62] European Commission, 2013. REGULATION (EU) No 1307/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 december 2013; establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1307&from=EN> [Accessed 11 August 2021].

[63] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Exceptions can apply when the forage or land lying fallow are part of the arable land. Permanent crops are not included in the crop diversification measure since it is intended for arable land.[64]

5.4.1.5 Conclusion

Although there are many schemes within the CAP which are built to support sustainable and ecological practices, the many inconsistencies and lack of continuity that exists, continue to encourage farmers to remove AF systems and woody vegetation from farmland.

In the 2007-2013 CAP this was primarily caused by the 50 trees per hectare limit and because the definition of permanent pasture only included pastures with a dominant herbaceous component forcing farmers that wished to receive Pillar I funding to remove trees and shrubs from agricultural landscapes, especially in small plots.

Within the 2014-2020 CAP these limits went from 50 to 100 and included self-seeded species for permanent pasture, but this is only marginally better.

Although hedgerows up to 10 m are protected, those any wider than 2 m were not considered eligible for direct payments, even if they are protected in the country in question, which makes farmers see them as a loss of income, and not as vital systems delivering ecosystem services. Further, while alley cropping and short rotation coppices (AF systems) are allowed in the 2014-2020 CAP, they are never explicitly mentioned within the CAP.

5.4.2 Pillar II

Pillar II is the component of the CAP that is designed to support rural development through an economic, environmental and societal lens. The possibilities for a MS Rural Development Plan (RDP) are created by the Commission. These RDPs represent either individual regions or an entire country. Further, each specific measure can be activated or not depending on the agricultural aims of each MS. While some RDP's budget many of the measures, others choose to be more targeted, activating only a few but devoting deep attention and spending to each one.[65]

The 2007-2013 RDP had four axes that it focused on—improving competitiveness; environment and countryside; quality of life in rural areas and diversification of rural economy; and the implementation of the leader approach.[66] The measures found that related to agroforestry are shown below in Table 6.

[64] Ibid.
[65] Ibid.
[66] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Table 6. Measures found in the 2007-2013 RDPs that relate to agroforestry.
Adapted from Horizon 2020 Project, AGFORWARD.[67]

Measure	Aim
111	Vocational training and information actions, including diffusion of scientific knowledge and innovative practices, for persons engaged in the agricultural, food and forestry sectors
112	Setting up of young farmers
114	Use of farm and forestry advisory services
121	Modernisation of agricultural holdings
122	Improving the economic value of forests
123	Adding value to agricultural and forestry products
125	Infrastructure related to the development and adaptation of agriculture and forestry
126	Restoring agricultural production potential damaged by natural disasters and introducing appropriate prevention actions
132	Participation of farmers in food quality schemes
133	Information and promotion activities
211	Natural handicap payments to farmers in mountain areas
212	Payments to farmers in areas with handicaps, other than mountain areas
213	Natura 2000 payments and payments linked to Directive 2000/60/EC
214	Agri environment payments
215	Animal welfare payments
216	Support for non-productive investments
221	First afforestation of agricultural land
222	First establishment of agroforestry systems on agricultural land
223	First afforestation of non-agricultural land
225	Forest environment payments
226	Restoring forestry potential and introducing prevention actions
227	Support for non-productive investments
311	Diversification into non-agricultural activities
312	Support for the creation and development of micro enterprises
322	Village renewal and development
323	Conservation and upgrading of the rural heritage
412	Local development strategies. Environment/land management

The 2014-2020 RDP was divided into 16 measures with numerous sub measures. While Measures 8.2, 10.1, and 4 are the primary measures that were used in the 2014-2020 CAP to support AF systems and landscape elements, there are further measures that were used in the RDPs of various regions and countries to support AF which are shown in Table 7 below.[68]

[67] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].
[68] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Table 7. Measures found in the 2014-2020 RDPs that relate to agroforestry.
Adapted from Horizon 2020 Project, AGFORWARD.[69]

Measure	Aim
1	Knowledge transfer and information actions
2	Advisory services, farm management and farm relief services
4	Investment in physical assets
5	Restoration of agricultural potential damaged by natural disasters
6	Supporting farm and business development
7.4	Support for investments in the setting-up, improvement or expansion of local basic services for the rural population including leisure and culture, and the related infrastructure
7.6	Support for studies/investments association with the maintenance, restoration and upgrading of the cultural and natural heritage of villages, rural landscapes and high nature value sites including related socio-economic aspects, as well as environmental awareness actions
8.1	Support for afforestation/creation of woodland
8.2	Support for establishment and maintenance of agroforestry systems
8.3	Support for prevention of damage to forests from forest fires and natural disasters and catastrophic events
8.4	Support for restoration of damage to forests from forest fires and natural disasters and catastrophic events
8.5	Support for investments improving the resilience and environmental value of forest ecosystems
8.6	Support for investments in forestry technologies and in processing, mobilising and marketing of forest products
9.1	Setting up of producer groups and organisation in the agriculture and forestry sectors
11.1	Payment to convert to organic farming practices and methods
11.2	Payment to maintain organic farming practices and methods
12.1	Compensatory payments for the arable land in NATURA 2000
13.2	Compensation payment for other areas facing significant constraints
15.1	Payment for forest-environmental and climate commitments
15.2	Support for the conservation and promotion of forest genetic resources
16.5	Support for joint action undertaken with a view to mitigating or adapting to climate change, and for joint approaches to environmental projects and ongoing environmental practices

The following data on forest farming, forest strips and small stands, hedgerows, isolated trees, forest grazing, permanent crops, meadow orchards and mountain pastoralism is sourced from the Horizon 2020 AGFORWARD project which examined 88 RDPs in the 2007-2013 CAP and 90 out of 118 RDPs in the 2014 2020 CAP.

5.4.2.1 Forest Farming

Forest farming is any activity that takes place in woodland or forest land that can be considered productive such as mushrooms, medicinal and aromatic plants, and honey. Honey production is the primary activity supported by RDPs for both the 2007-2013 and 2014-2020 CAP, and to a smaller scale, mushroom cultivation.

[69] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Apiculture was primarily promoted by Measures 121 and 214 in 2007-2013 and Measure 10.1 in 2014-2020. Most support for forest farming outside of apiculture is found within Measures 122 and 123 in 2007-2013 and Measure 8.6 in 2014-2020. These measures related to processing and marketing of forest products, and to inoculate trees in forests to increase mushroom production.[70]

Table 8 and 9 show the measures used within the 2007-2013 and 2014-2020 CAP excluding apiculture.[71]

Table 8. Measures related to forest farming found in the 2007-2013 RDPs.
Adapted from Horizon 2020 Project, AGFORWARD.[72]

Country or Region	Measures related to forest farming					
	121	122	123	221	223	227
Thüringen						
Estonia						
Galicia						
Euskadi						
Navarra						
Castilla-La Mancha						
Andalucía						
Abruzzo						
Molise						
Basilicata						
Sardegna						
Toscana						
Umbria						
Continente						
Madeira						
Romania						

[70] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].
[71] Ibid.
[72] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Table 9. Measures related to forest farming found in the 2014-2020 RDPs.
Adapted from Horizon 2020 Project, AGFORWARD.[73]

Country or Region	Measured related to forest farming							
	1.2	2.1	4.1	4.2	4.4	8.1	8.6	9.1
Andalucía								
Hrvatska								
La Rioja								
Castilla-La Mancha								
Extremadura								
València								
Abruzzo								
Campania								
Sardegna								
Trento								
Emilia-Romagna								
Toscana								
Umbria								
Marche								
Continente								
Madeira								
Wales								

5.4.2.2 Silvoarable

Silvoarable systems are where arable crops and agriculturally producing trees are grown in symbiosis with one another. Within the CAP, silvoarable practices are supported by the promotion of forest strips, small stands, isolated trees and hedgerows on arable land.[74]

5.4.2.2.1 Forest strips and small stands

The promotion of forest strips and small stands were mainly supported through Measure 214 (maintenance) and 216 (establishment) in the 2007-2013 CAP. The most interesting examples found within the RDPs were measures in Berlin und Brandenburg to introduce these practices, especially copses, as a way to control floods and soil erosion losses; in the Azores Islands (Portugal) where Measure 227 was used to establish these activities and compensate non-productive investments; and Measure 323 used in various RDPs to restore copses and other landscape elements as the conservation of rural heritage.[75]

[73] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].
[74] Ibid.
[75] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Within the 2014-2020 period Measure 4 (maintenance and restoration) and 10 (maintenance and conservation) were used most frequently. Nevertheless, many other measures were used to support hedgerows which can be found in Tables 10 and 11 below.[76]

Table 10. Measures related to forest strips and small stands found in the 2007-2013 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.[77]

Country or Region	Measures related to forest strips and small stands								
	126	214	216	221	222	223	225	227	323
Österreich									
Vlaams									
Wallonia									
Bayern									
Berlin und Brandenburg									
Mecklenburg-Vorpommern									
Sachsen									
Thüringen									
Estonia									
Euskadi									
Navarra									
Andalucía									
Murcia									
Mainland									
Hexagone									
Piemonte									
Liguria									
Abruzzo									
Molise									
Campania									
Puglia									
Basilicata									
Calabria									
Sicilia									
Sardegna									
Trento									
Veneto									
Friuli-Venezia Giulia									
Emilia-Romagna									
Toscana									
Umbria									

[76] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

[77] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Marche									
Lazio									
Luxembourg									
Nederland									
Continente									
Azores									
Wales									
Northern Ireland									

Table 11. Measures related to forest strips and small stands found in the 2014-2020 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.[78]

Country or Region	Measures related to forest strips and small stands										
	4.4	7.4	7.6	8.2	8.5	8.6	10.1	12.1	13.2	15.1	16.5
Österreich											
Vlaams											
Wallonia											
Baden-Wurttemberg											
Bayern											
Berlin und Brandenburg											
Bremen und Niedersachsen											
Rheinland-Pfalz											
Sachsen-Anhalt											
Thüringen											
Castilla-La Mancha											
Ile-de-France											
Champagne-Ardennes											
Picardie											
Haute Normandie											
Centre-Val de Loire											
Basse-Normandie											
Bourgogne											
Nord-Pas-de-Calais											
Lorraine											
Alsace											
Franche-Comte											
Pays de la Loire											
Poitou-Charentes											
Midi-Pyrénées											

[78] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Limousin							■				
Rhône-Alpes							■				
Auverne							■				
Languedoc-Roussillon							■				
Provence-Alpes-Cote Azur							■				
Ireland	■						■				
Piemonte	■						■				
Liguria	■										
Abruzzo	■										
Molise	■						■				
Campania	■						■				
Calabria	■										
Sicilia	■							■			
Sardegna										■	
Bolzano					■						
Trento											■
Veneto	■						■				
Friuli-Venezia Giulia							■				
Emilia-Romagna	■						■				
Toscana					■						
Umbria										■	
Lazio					■						
Continente		■		■							
Madeira					■						
England	■						■				
Wales	■										
Scotland							■				

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

5.4.2.2.2 Hedgerows

The establishment, maintenance and management of hedgerows were mainly supported through Measure 214 (maintenance) and 216 (establishment) in the 2007-2013 CAP and Measure 4.4 (plant and restore) and 10.1 (maintenance and conservation) in the 2014-2020 CAP. Nevertheless, many other measures were used to support hedgerows which can be found in Tables 12 and 13 below.[79]

Table 12. Measures related to hedgerows found in the 2007-2013 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.[80]

Country or Region	Measures related to hedgerows												
	121	122	213	214	216	221	222	227	311	312	322	323	412
Österreich												■	
Vlaams				■									
Wallonia				■									
Czech Republic				■									
Baden-Württemberg												■	
Bayern				■	■							■	
Berlin und Brandenburg												■	
Bremen und Niedersachsen												■	
Hamburg													
Hessen													
Mecklenburg-Vorpommern				■								■	
Nordrhein-Westfalen				■									
Sachsen												■	
Schleswig-Holstein and Hamburg												■	
Thüringen				■									
Denmark					■						■		
Estonia					■								
Galicia					■								
Euskadi				■									
La Rioja													■
Aragón				■									
Castilla y León				■									
Extremadura					■								

[79] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

[80] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

València				■									
Illes Balears								■					
Andalucía					■			■					
Murcia					■								
Canarias				■									
Hexagone	■			■	■							■	
Corsica				■									
Magyarország					■								
Ireland				■	■								
Piemonte				■	■								
Valle d'Aosta			■										
Liguria					■								
Lombardia				■	■					■			
Abruzzo					■								
Molise				■	■								
Campania					■								
Puglia					■	■							
Basilicata				■	■								
Sicilia				■	■		■					■	
Sardegna	■			■									
Bolzano				■								■	
Trento				■									
Veneto				■	■			■					
Friuli-Venezia Giulia				■	■								
Emilia-Romagna				■	■								
Toscana				■	■			■					
Umbria				■	■								
Marche			■	■	■		■		■				
Lazio			■										
Lithuania				■									
Luxembourg				■								■	
Netherlands				■									
Continente					■								
Azores				■								■	
Madeira		■											
Romania						■							
Slovenia				■									
England				■	■								
Wales				■	■								
Scotland				■									
Northern Ireland				■	■								

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Table 13. Measures related to hedgerows found in the 2014-2020 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.[81]

Country or Region	Measures related to hedgerows																
	1.1	1.2	2.1	2.3	4.3	4.4	5.1	7.4	7.6	8.2	8.5	10.1	11.1	11.2	12.1	13.2	16.5
Vlaams						■						■					
Wallonia												■				■	
Baden-Württemberg						■						■					
Bayern						■											
Berlin und Brandenburg									■								
Bremen und Niedersachsen						■			■			■					
Mecklenburg-Vorpommern						■											
North Rhine-Westphalia												■					
Rheinland-Pfalz									■								
Sachsen-Anhalt						■											
Thüringen																	
Galicia						■											
Asturias						■											
Euskadi												■					
Navarra											■						
Castilla y León												■					
Castilla-La Mancha												■					
Extremadura						■											
Catalunya												■					
Andalucía						■					■	■					
Murcia						■											
Canarias												■					
Mainland												■					
Ile-de-France						■			■			■					
Champagne-Ardennes												■					
Picardie												■					
Haute Normandie												■					
Centre-Val de Loire												■					
Basse-Normandie	■	■	■	■					■			■					
Bourgogne						■						■					
Nord-Pas-de-Calais												■					
Lorraine									■			■					
Alsace						■			■			■					
Franche-Comte												■					

[81] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Pays de La Loire						■						■					
Bretagne					■	■						■					
Poitou-Charentes												■					
Aquitaine												■					
Midi-Pyrénées												■					
Limousin												■					
Rhône-Alpes						■						■					
Auverne						■						■			■		
Languedoc-Roussilon												■					
Provence-Alpes-Cote Azur												■					
Corse												■					
Hrvatska						■											
Ireland						■						■					
Piemonte						■						■					
Liguria						■											
Lombardia						■						■					
Abruzzo						■											
Molise						■						■	■	■			
Campania						■						■					
Puglia						■											
Basilicata						■						■					
Calabria						■											
Sicilia						■									■		
Bolzano						■											
Trento						■											■
Veneto						■						■					
Friuli-Venezia Giulia						■						■			■		
Emilia-Romagna						■						■					
Toscana						■											
Umbria						■											
Marche						■											
Lazio						■						■					
Malta												■					
Continente								■		■							
Azores							■			■		■					
Madeira											■						
Slovenia												■					
England						■						■					
Wales						■						■					
Scotland												■					
Northern Ireland						■						■					

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Further, interesting examples are shown in Table 14 and 15:

Table 14. Noteworthy examples relating to hedgerows found in the 2007-2013 RDPs.[82]

Hedgerows Rural Development Programs of the 2007-2013 CAP	
Measure	Implementation
121	France – Planting vegetation in sensitive areas
	Sardegna (Italy) – Protecting water and recovering landscapes in Sardegna
122	Madeira (Portugal) – Improve the economic value of forests through promoting hedgerows
213	Marche (Italy) – Create hedgerows for bird conservation
221	Romania – Establishment of wooded edges as forest belts
	Puglia (Italy) – Establishment of wooded edges as forest belts
311	Marche (Italy) – Inclusion of hedgerows in open spaces used for agritourism
312	Lombardia (Italy) - Adaptation, construction and purchase of equipment and machinery for pruning hedgerows
322	Denmark – Promoting hedgerows through village renewal and development
323	13 RDPs used this measure to conserve and upgrade, restore or improve rural heritage

Table 15. Noteworthy examples relating to hedgerows found in the 2014-2020 RDPs.[83]

Hedgerows Rural Development Programs of the 2014-2020 CAP	
Measure	Implementation
4.3	Bretagne (France) – Improve existing hedgerows
5.1	Azores (Portugal) – Use hedgerows as a preventative action against natural disasters, climate change, wind and rain erosion
7.4	Portugal (mainland) – Hedgerow support
8.5	Navarra (Spain) – Promotion of hedgerows
	Andalucía (Spain) – Promotion of hedgerows
	Madeira (Portugal) – Promotion of hedgerows
11	Marche (Italy) – Hedgerows are included as a potential method to convert and maintain land under organic farming
12.1	Auvergne (France) – Promoting hedgerows as a source of economic activity and biodiversity conservation
13.2	Wallonia (Belgium) – Maintain holdings with favourable agricultural activities as a way to protect landscape features for the environment and as tradition
16.5	Trento (Italy) – Development, management and recovery of agroecosystems to mitigate and adapt to climate change

When examining the 2007-2013 and 2014-2020 CAP there is a clear increase in hedgerow support across the EU.[84]

[82] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].
[83] Ibid.
[84] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

5.4.2.2.3 Isolated Trees

Isolated Trees were protected primarily through Measure 214 (maintenance) and 216 (establishment) of the 2007-2013 CAP and Measure 4.4 (establish) and 10.1 (maintenance) of the 2014-2020 CAP. Nevertheless, many other measures were used to support isolated trees which can be found in Table 16 and 17 below.[85]

Table 16. Measures related to isolated trees found in the 2007-2013 RDPs. Adapted from Horizon 2020 Project, AGFORWARD. [86]

Country or Region	Measures related to isolated trees				
	214	216	222	227	323
Österreich					
Wallonia					
Bayern					
Hamburg					
Mecklenburg-Vorpommern					
Nordrhein-Westfalen					
Sachsen					
Cantabria					
Euskadi					
La Rioja					
Aragón					
Extremadura					
Catalunya					
Illes Balears					
Andalucía					
Murcia					
Mainland					
Hexagone					
Corsica					
Ireland					
Piemonte					
Sicilia					
Sardegna					
Trento					
Emilia-Romagna					
Toscana					
Umbria					
Marche					

[85] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

[86] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Lazio					
Luxembourg					
Continente					
England					
Wales					
Northern Ireland					

Table 17. Measures related to isolated trees found in the 2014-2020 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.[87]

Country or Region	Measures related to isolated trees						
	4.4	7.6	8.5	10.1	12.1	13.2	16.5
Wallonia							
Berlin und Brandenburg							
Bremen und Niedersachsen							
Mecklenburg-Vorpommern							
Castilla-La Mancha							
Catalunya							
Andalucía							
Canarias							
Ile-de-France							
Champagne-Ardennes							
Picardie							
Haute Normandie							
Centre-Val de Loire							
Basse-Normandie							
Bourgogne							
Nord-Pas-de-Calais							
Lorraine							
Alsace							
Franche-Comte							
Pays de La Loire							
Bretagne							
Poitou-Charentes							
Aquitaine							
Midi-Pyrénées							
Limousin							
Rhône-Alpes							
Auvergne							
Languedoc-Roussilon							
Provence-Alpes-Cote Azur							

[87] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Piemonte	■						
Liguria	■						
Sicilia					■		
Bolzano	■						
Trento							■
Veneto				■			
Emilia-Romagna	■			■			
Umbria	■						
Lazio				■			
Malta				■			
England	■			■			
Wales	■			■			
Scotland				■			
Northern Ireland	■						

Further, interesting examples are shown in Table 18:

Table 18. Noteworthy examples relating to isolated trees found in the 2014-2020 RDPs. [88]

Isolated Trees Rural Development Programs of the 2014-2020 CAP	
Measure	Implementation
7.6	Berlin und Brandenburg (Germany) – Maintenance and restoration of cultural and natural heritage of villages through isolated trees
8.5	Andalucía (Spain) – Enhance and restore isolated trees
12.1	Champagne-Ardennes – Maintenace of isolated trees through Natura 2000
	Auvergne (France) – Maintenace of isolated trees through Natura 2000
	Sicily (Italy) – Maintenace of isolated trees through Natura 2000
13.2	Wallonia (Belgium) – Maintain holdings with favourable agricultural activities as a way to protect landscape features for the environment and as tradition
16.5	Trento (Italy) – Development, management and recovery of agroecosystems to mitigate and adapt to climate change

The number of regions supporting isolated trees in 2014-2020 CAP increased from the 2007-2013 CAP in Western but not in Eastern Europe, where isolated trees are still generally unprotected.[89]

5.4.2.3 Silvopasture

Silvopasture is defined as the integration of trees, forage and grazing animals in a way that that benefits all systems involved. It is supported within the CAP by the promotion of forest grazing and meadow orchards.

[88] Mosquera Losada, R., Santiago Freijanes, J. and Pisanelli, A., 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].
[89] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

5.4.2.3.1 Forest Grazing

Within the 2007-2013 CAP, forest understory grazing was supported primarily by Measure 214, in 30% of the RDPs. Measure 214 was focused on conserving and managing forestland, and enhancing forest grazing through the maintenance or establishment of pasture in forestland. The most interesting examples found within the RDPs were in Spain, where three RDPs used Measure 226 to restore forest grazing as a preventative action against climate change; and Measure 227 which was used in Denmark and in Trento (Italy) to support the non-productive investment of preparing areas for forest grazing. Nevertheless, many other measures were used to support forest grazing which can be found in Table 19 below.[90]

Table 19. Measures related to forest grazing in the 2007-2013 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.[91]

Country or Region	Measures related to forest grazing					
	214	216	225	226	227	323
Österreich			■			
Baden-Württemberg	■					
Bayern	■					
Berlin und Brandenburg	■					
Niedersachsen und Bremen						■
Mecklenburg-Vorpommern			■			
Schleswig-Holstein and Hamburg	■					
Denmark			■		■	
Aragón				■		
Extremadura	■					
Illes Balears				■		
Canarias				■		
Åland	■	■				
Hexagone	■					
Corsica	■					
Molise	■					
Puglia	■					
Bolzano	■					
Trento					■	
Lazio	■					
Continente	■		■			
Sweden	■	■				
Slovenia	■					

[90] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

[91] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

England						
Wales						
Scotland						
Northern Ireland						

The 2014-2020 CAP had more variation in the measures that supported forest grazing which can be found in Table 20 below. Some of the most interesting measures were found in Aragon (Spain), where forest grazing is supported through Measure 8.4 in order to restore forests that have been damaged by forest fires or natural disasters; in Basilicata (Italy) and Scotland where Measure 8.5 was used to improve the resilience and environmental value of forest ecosystems; in Italy where Measure 10.1 used forest grazing to maintain soil cover and preserve organic matter; in Castilla-La Mancha (Spain) and Lombardia (Italy) where Measure 4.3 was used to create infrastructure that simplifies production under trees and; 13 RDPs used Measure 8.3 as preventative action against wildfire (10 of which were in Spain).[92]

Table 20. Measures related to forest grazing found in the 2014-2020 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.[93]

Country or Region	Measures related to forest grazing						
	4.3	8.1	8.2	8.3	8.4	8.5	10.1
Galicia							
Asturias							
Navarra							
Aragón							
Madrid							
Castilla y León							
Castilla-La Mancha							
Catalunya							
Illes Balears							
Andalucía							
Murcia							
Alsace							
Corsica							
Liguria							
Lombardia							
Basilicata							
Calabria							
Sicilia							
Sardegna							
Bolzano							
Veneto							

[92] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

[93] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Toscana							
Umbria							
Lazio							
Continente							
England							
Wales							
Scotland							
Northern Ireland							

While the support for forest grazing is increasing, it is uneven across regions and MS, with Scotland, Portugal and Spain implementing the most measures that supported this practice in the 2014-2020 CAP.[94]

5.4.2.3.2 Meadow Orchards

Meadow orchards, which are silvopasture systems with permanent crops, were primarily supported through Measure 214 in the 2007-2013 CAP. This measure was used to promote the creation of grassland while conserving and restoring traditional orchards. The other main measures used were Measure 121 to modernize meadow orchards and other permanent cultures; 216 to restore traditional orchards (in the case of Murcia, Spain, for example, to protect slopes to combat erosion); and 323 for conserving and upgrading rural heritage through the management and conservation of meadow orchards.[95]

In the 2014-2020 CAP, Measure 10.1 was the most popular measure used to promote meadow orchards, which focused on conserving and maintaining orchards while upkeeping grasslands, especially in autumn and winter to mitigate soil erosion. Measure 4 was also used to a lesser degree by some RDPs, including in Slovenia, Austria, and some Spanish regions.[96]

While Ireland, Spain and Germany increased the number of measures devoted to meadow orchards in the 2014-2020 CAP, France kept the same amount and Italy reduced theirs. Further details can be found in Table 21 below.[97]

Table 21. Measures related to meadow orchards found in the 2014-2020 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.[98]

Country or Region	Measures related to meadow orchards					
	4.1	4.3	4.4	7.6	10.1	11.1

[94] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

[95] Ibid.

[96] Ibid.

[97] Ibid.

[98] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Österreich						
Wallonia						
Baden-Württemberg						
Bayern						
Berlin und Brandenburg						
Bremen und Niedersachsen						
Mecklenburg-Vorpommern						
North Rhine-Westphalia						
Rheinland-Pfalz						
Saarland						
Sachsen						
Sachsen-Anhalt						
Thüringen						
Euskadi						
Castilla y León						
Extremadura						
Andalucía						
Ile-de-France						
Champagne-Ardennes						
Picardie						
Haute Normandie						
Centre-Val de Loire						
Basse-Normandie						
Bourgogne						
Nord-Pas-de-Calais						
Lorraine						
Alsace						
Franche-Comte						
Pays de La Loire						
Bretagne						
Poitou-Charentes						
Aquitaine						
Midi-Pyrénées						
Limousin						
Rhône-Alpes						
Auverne						
Languedoc-Roussilon						
Provence-Alpes-Cote Azur						
Croatia						
Ireland						
Piemonte						
Abruzzo						
Calabria						
Sicilia						
Bolzano						
Friuli-Venezia Giulia						

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Luxembourg						
Malta						
Continente						
Azores						
Madeira						
Romania						
Slovenia						
England						
Wales						
Northern Ireland						

5.4.2.3.3 Mountain Pastoralism

Mountain pastoralism, which is often based on transhumance or summer pastures, is a silvopasture practice due to its reliance on grazing through forest and woodland. While Measure 214 was the most popular measure to support landscape management through mountain pastoralism, many others were used in the 2007-2013 CAP found in Table 22 below. Mainland Portugal promoted mountain pastoralism the most during this period, with Measure 214, 216, 225, 227 and 323.[99]

Table 22. Measures related to mountain pastoralism found in the 2007-2013 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.[100]

Country or Region	Measures related to mountain pastoralism											
	111	122	125	211	212	213	214	216	225	226	227	323
Bulgaria												
Galicia												
Asturias												
Cantabria												
Navarra												
La Rioja												
Castilla y León												
València												
Andalucía												
Murcia												
Canarias												
Piemonte												
Valle d'Aosta												
Lombardia												
Bolzano												
Trento												

[99] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

[100] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Veneto												
Marche												
Continente												
Madeira												
Sweden												

Within the 2014-2020 CAP Measure 10.1 was the most commonly used measure to support mountain pastoralism. The other measures used to support mountain pastoralism can be found in Table 23 below.[101]

Table 23. Measures related to mountain pastoralism found in the 2014-2020 RDPs. Adapted from Horizon 2020 Project, AGFORWARD.[102]

Country or Region	Measures related to mountain pastoralism					
	4.1	4.3	4.4	7.6	10.1	11.1
Ösrerreich						
Bayern						
Bremen und Niedersachsen						
Asturias						
Cantabria						
Euskadi						
Navarra						
La Rioja						
Madrid						
Castilla y León						
Canarias						
Franche-Comte						
Croatia						
Piemonte						
Valle d'Aosta						
Lombardia						
Abruzzo						
Bolzano						
Trento						
Veneto						
Friuli-Venezia Giulia						
Continente						
Slovenia						

[101] Ibid.

[102] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Further, interesting examples are shown in Table 24 and 25:

Table 24. Noteworthy examples relating to mountain pastoralism found in the 2007-2013 RDPs. [103]

Mountain Pastoralism Rural Development Programs of the 2007-2013 CAP	
Measure	Implementation
111	Galicia (Spain) – Vocational training to improve silvopasture use
	Sardegna (Italy) – Protecting water and recovering landscapes in Sardegna
122	Madeira (Portugal) – Improve the economic value of forests through promoting mountain pastoralism (e.g. introducing meadows in forests)
	Galicia (Spain) – Improve the economic value of forests through promoting mountain pastoralism (improve infrastructure and service facilities in forestry)
125	Cantabria (Spain) – Improve infrastructure for mountain pastoralism in communal pastures
	Piemonte (Italy) – Improve infrastructure for mountain pastoralism in public pastures
	Veneto (Italy) – Improve infrastructure for mountain pastoralism in alpine traditional farms in Malga
211	Murcia (Spain) – Natural handicap payments to farmers in mountain areas
212	Murcia (Spain) – Natural handicap payments to farmers in difficult areas (other than mountains)
226	Valencia (Spain) – Promoting pastoralism for fire prevention
	Andalucía (Spain) - Promoting pastoralism for fire prevention
311	Marche (Italy) – Inclusion of hedgerows in open spaces used for agritourism

Table 25. Noteworthy examples relating to mountain pastoralism found in the 2014-2020 RDPs.[104]

Mountain Pastoralism Rural Development Programs of the 2014-2020 CAP	
Measure	Implementation
4.3	Friuli-Venezia-Giulia (Italy) – Create mountain pastures
7.6	Franche-Comte (France) – Restore mountain pastures for the maintenance, restoration and upgrading of cultural and natural heritage
	Piemonte (Italy) – Restore mountain pastures for the maintenance, restoration and upgrading of cultural and natural heritage
	Valle d'Aosta (Italy) – Restore mountain pastures for the maintenance, restoration and upgrading of cultural and natural heritage
	Austria – Restore mountain pastures for the maintenance, restoration and upgrading of cultural and natural heritage
11.1	Valle d'Aosta (Italy) – Organic livestock practices (focus on maintaining the *alpeggio* system)

[103] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].
[104] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Unfortunately, measures supporting mountain pastoralism have decreased from the 2007-2013 to 2014-2020 periods. Further, conflicting policies are also harming the maintenance of traditional herding. For example, the high subsidies given to mowing motivate farmers to use industrial systems of cutting grass rather than grazing.[105]

5.4.2.4 Agroforestry

AF was directly supported in both the 2007-2013 and 2014-2020 CAP through Measure 222 and Measure 8.2, respectively. These two measures aimed to establish trees on arable land. The definition of AF in the CAP is defined as a "land use system in which trees are grown in combination with agriculture on the same land."[106] This definition does not include the other types of woody vegetations that have been discussed above. Additionally, AF systems could also be supported under Measure 221 (2007-2013), 223 (2007-2013) and 8.1 (2014-2020).[107]

According to the study carried out by the Horizon 2020 Project, AGFORWARD, Measure 221 afforested and reforested 260,579 ha, with the most significant changes in the UK (143,635 ha); Spain (35,050ha); Hungary (25,900 ha); Poland (25,296ha); Italy (12,472) and at most, 5,000 ha in Lithuania, Portugal, Denmark, Germany and the Czech Republic.[108]

While Measure 222 supported only the establishment of AF systems, Measure 8.2 also supported the maintenance for a period of five years.

Although all MS had the possibility to activate all agroforestry related measures, many did not. More specifically, while Measure 221 (62 RDPs) and 223 (34 RDPs) were widely adopted and budgeted in the 2007-2013 periods, Measure 222 (10 RDPs) was implemented in a limited number of plans. Further, even the regions that budgeted for these measures, did not necessarily open the calls for individuals to apply which meant that 221 was opened in 62 regions, 222 in 5, and 223 in 29 for the 2007-2013 period and in the 2014-2020 period, 46 RDPs budgeted Measure 8.1, and 8.2 was budgeted in 22. [109]

---

[105] Nori, S., and M. Gemini. 2011. The common agricultural policy vis-`a-vis European pastoralists: principles and practices. Pastoralism: Research, Policy and Practice 1:27.

[106] European Commission, 2013. REGULATION (EU) No 1305/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 december 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32013R1305> [Accessed 11 August 2021].

[107] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

[108] Ibid.

[109] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

When looking at Measure 222 and 8.2, it was included in the RDPs of five and eight countries, respectively. Further, although Measure 222 was implemented in all five countries, only spent 6% of the project budget was spent.[110]

Measure 8.2, on the other hand, was implemented in the RDPs of eight countries and 35 regions - France (15 of 27 regions: Auvergne, Basse-Normandie, Guadeloupe, Guyane, Haute-de-France, Limousin, Lorraine, Martinique, Nord-Pas-de Calais, Pays de la Loire, Picardie, Poitou-Charentes, Rhône-Alpes); Spain (6 of 17 regions: Andalucia, Asturias, Extremadura, Galicia, Pais Vasco, Communidad Valenciana); Italy (5 of 21 regions: Basilicata, Marche, Puglia, Umbria, Veneto); Portugal (3 of 3 regions: Continente, Azores, Madeira); United Kingdom (3 of 4 regions: Northern Ireland, Scotland, Wales); Belgium (1 of 2 regions: Flanders); Hungary (single RDP for whole MS); Greece (single RDP for whole MS) - but Greece did not implement the Measure although it budgeted for it, and Spain had no farmer uptake.[111]

Further, the Omnibus Regulation expanded the definition of Measure 8.2 to include the regeneration and renovation of existing AF systems, rather than just the establishment of them. The new definition was the "Establishment, regeneration or renovation of agroforestry systems" found in Regulation (EU) No 1305/2013.[112]

5.4.3 New CAP

The European Commission's new CAP proposal for 2023-2027 still holds the structure of previous CAPs (with two pillars of support to EU farmers) but with a new political approach that favours results and performance rather than rules and compliance. Practically, this means that instead of giving strict diameters that each MS has to adhere to, each country will have the ability to decide their own CAP Strategic Plans. These will be based on the priorities determined for their particular agricultural needs that take into consideration local landscapes both environmental and social.[113]

[110] EURAF. 2020. *EURAF Policy Briefing 6. Agroforestry and Pillar II of the new CAP*. [online] Available at: <http://europeanagroforestry.eu/news/policybriefing6> [Accessed 11 August 2021].
[111] EURAF. 2020. *EURAF Policy Briefing 6. Agroforestry and Pillar II of the new CAP*. [online] Available at: <http://europeanagroforestry.eu/news/policybriefing6> [Accessed 11 August 2021].
[112] Augère-Granier, M.-L. (2020). Agroforestry in the European Union Briefing. *European Parliamentary Research Service*.
[113] European Commission. (2021). The new common agricultural policy: 2023-27. [online] Available at: https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/new-cap-2023-27_en [Accessed 11 Aug. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

The new CAP will contain 16 SMRs and 10 GAECs, with more rigorous standards for both. Within the GAECs a few new commitments have been added including:

- GAEC 2: Appropriate protection of wetland and peatland
- GAEC 5: Nutrient management planning
- GAEC 8: Crop rotation
- GAEC 9: Minimum share devoted to non-productive areas, retention of landscape features, on all agricultural land
- GAEC 10: Ban on converting permanent grassland in Natura 2000 sites

Specifically, GAEC 9 is of interest for AF, as it can be used for woody elements that make up the landscape features aspect of AF. GAEC 9 can also count towards EFAs and non-productive areas that include AF. Nevertheless, AF has the potential to contribute to all GAEC conditions.[114] Landscape features will continue to be supported in the new CAP and must be protected, regrown or replaced.

The green architecture for the new CAP will include a 20-30% allocation of Pillar I direct payments (eco-schemes) and 30% of the Pillar 2 envelope for agri-environment-climate schemes.

5.4.3.1 Eco-schemes

The CAP has great potential to direct the transition towards an ecological food system that protects the environment and climate, while providing healthy and nutritious food for all of Europe. The eco-schemes are a new tool that the European Commission is using to make a meaningful contribution to these priorities. Eco-schemes are voluntary programs linked to the first pillar, that will be available to farmers with the hope to incentivize ecological farming practices.[115] AF is one of the ten practices listed as a potential eco-scheme.

The eco-schemes will need to include interventions that make meaningful contributions to the nine specific objectives laid out by the CAP, especially:

d. Contribute to climate change mitigation and adaptation, as well as sustainable energy
e. Foster sustainable development and efficient management of natural resources such as water, soil and air
f. Contribute to the protection of biodiversity, enhance ecosystem services and preserve habitats and landscapes

[114] EURAF. (2020). EURAF Policy Briefing 4. Agroforestry and Enhanced Conditionality. [online] Available at: https://euraf.isa.utl.pt/news/policybriefing4 [Accessed 11 Aug. 2021].
[115] European Commission. (2021). The new common agricultural policy: 2023-27. [online] Available at: https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/new-cap-2023-27_en [Accessed 11 Aug. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

i. Improve the response of EU agriculture to societal demands on food and health, including safe, nutritious and sustainable food, food waste, as well as animal welfare[116]

While 'greening' initiatives have been part of the CAP for quite some time, they have always been under Pillar 2, which focuses on rural development, rather than on direct ecological payments. This has the potential to truly transform the EU landscape towards eco-friendly farming, as there are no restrictions on the amount of allotted budget that MS can decide to pay farmers that take part in the voluntary schemes.[117]

Additionally, while Pillar 2 agri-environmental climate measures (AECMS) require national or regional co-funding, eco-schemes will be funded entirely by the EU. Eco-schemes will be funded on an annual basis, while AECMS will continue to be funded on a multi-annual basis.[118]

All MS will be required to determine their needs, establish interventions and develop programs that meaningfully contribute to an ecological transition within agriculture. These schemes are required to go beyond what is already required of farmers within EU policy. While the Commission is not going to enforce any particular practices, they have given a comprehensive list of potential eco-schemes that can be part of national programs.[119]

Each MS CAP's Strategic Planning model has to meet all mandatory requirements already in existence within the EU, as well as showing how these programs will fit in with other EU objectives such as those laid out in the Green Deal; the Biodiversity and Farm to Fork Strategies; their Prioritised Action Framework for Natura 2000 2021-2027, their National Climate and Energy Plans 2021-2030 as well as National Action Plans for the Sustainable Use of Pesticides.[120]

Each year, all MS will be required to review whether they have met their goals. This will be done by both the responsible parties and a monitoring committee of national stakeholders. MS will submit this performance report to the Commission who will ensure that all goals have been met with possible interventions or repercussions if they have not.[121]

[116] European Commission - European Commission. (n.d.). Commission publishes list of potential eco-schemes. [online] Available at: https://ec.europa.eu/info/news/commission-publishes-list-potential-eco-schemes-2021-jan-14_en [Accessed 11 Aug. 2021].
[117] Lampkin et al. (n.d.). USING ECO-SCHEMES IN THE NEW CAP A GUIDE FOR MANAGING AUTHORITIES. [online] Organics Europe. Available at: https://www.organicseurope.bio/content/uploads/2020/06/ifoam-eco-schemes-web_compressed-1.pdf?dd.
[118] Lampkin et al. (n.d.). USING ECO-SCHEMES IN THE NEW CAP A GUIDE FOR MANAGING AUTHORITIES. [online] Organics Europe. Available at: https://www.organicseurope.bio/content/uploads/2020/06/ifoam-eco-schemes-web_compressed-1.pdf?dd.
[119] Ibid.
[120] Ibid.
[121] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6 Policy Situation per Region

6.1 Europe (EU and non-EU)

The following section will give an overview of the agricultural landscape of 19 European countries (Belgium, Bulgaria, Czech Republic, Estonia, Finland, France, Germany, Hungary, Italy, Ireland, Netherlands, Poland, Portugal, Romania, Serbia, Spain, Sweden, Switzerland and the UK), three of these being countries that do not belong to the EU. The overview will specifically focus on the policy landscape for AF and MF through the lens of the CAP and State policies. The explanation on the CAP for each country will focus only on AF, since MF is not supported in the CAP. Lastly, the study will examine CAP periods 2007-2013, 2014-2020 and the new CAP for the period of 2021-2027, which will now enter into force on January 1, 2023, due to ongoing negotiations. At the time of writing, a transitional regulation was in place for the years 2021 and 2022 which bridged the gap between the 2014-2020 policies and new legislation.

The authors of this inventory have chosen to include non-EU countries in order to identify any variance in policy that has led to either stronger or weaker policy support. Further, a brief selection of case studies will be explored to have a deeper dive into specific policies or policy landscapes that have upheld a practice that has been particularly beneficial to the provision of ecosystem services either through AF or MF systems.

Table 26 gives a snapshot to the current policy landscape of AF and MF systems per country.

Table 26. European Policy Landscape for AF and MF. The yellow represents CAP support; green is national support; while grey is for countries where the CAP doesn't apply. The lighter green found within National Policies represents places that only have AF support when it comes to reindeer husbandry.

Title				
Country	CAP implementation of Measure 8.2	Farmer Uptake	National Policies for Agroforestry	National Policies for Mixed Farming
Belgium (Flanders)				
Belgium (Wallonia)				
Bulgaria				
Czech Republic				
Estonia				
Finland				
France				
Germany				
Hungary				
Ireland				

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Italy				
Netherlands				
Poland				
Portugal				
Romania				
Serbia				
Spain				
Sweden				
Switzerland				
UK				

6.1.1 Belgium

Although the total extent of AF in Belgium is still moderate, the variety in types of AF systems is quite high, both traditionally and as new phenomena, ranging from alley cropping, alley coppice, tree lines surrounding fields, orchards, hedges and riparian buffers. Silvopastoral systems, with trees on grazing land for cows, are also making a comeback. Silvopasyoral systems with free range poultry, pigs, deer and goats are also increasingly being recognized and implemented. Within the province of Western Flanders, there is a local focus on livestock farms of cattle or pigs, at times paired with intensively grown vegetables in rotation with fodder crops. Some specialized vegetable farms even collaborate with livestock farms in order to broaden their rotations. During the last eight years, around 650ha of new AF systems have been planted (often within alley cropping systems) particularly in the northern part of the country, where there is an increase in interest in fruit and nut producing trees, community support agriculture and short-chain markets. During the last five years, hundreds of kilometres of mixed hedgerows have been planted in agricultural contexts, most often in the southern part of Belgium. MF, on the other hand, is widely popular in Wallonia, while less prominent in Flanders.

In the past, traditional AF elements existed on farms, primarily willow or poplar trees on the edge of parcels, fruit tree orchards with grazing sheep or cows, and poplar meadows with grazing animals. However, due to the incentives to specialize and scale up, the traditional knowledge on how to manage such systems has largely disappeared. Nevertheless, plot sizes remain small in Flanders, with most farms being only a few hectares.

There are two main AF associations in Belgium, Agroforestry Vlaanderen in the North and AWAF in the South.

6.1.1.1 CAP

Belgium is a country divided into very distinct policy areas and this is no different when it comes to agriculture. While Flanders has been implementing AF measures related to the CAP since 2011, Wallonia has not implemented any.

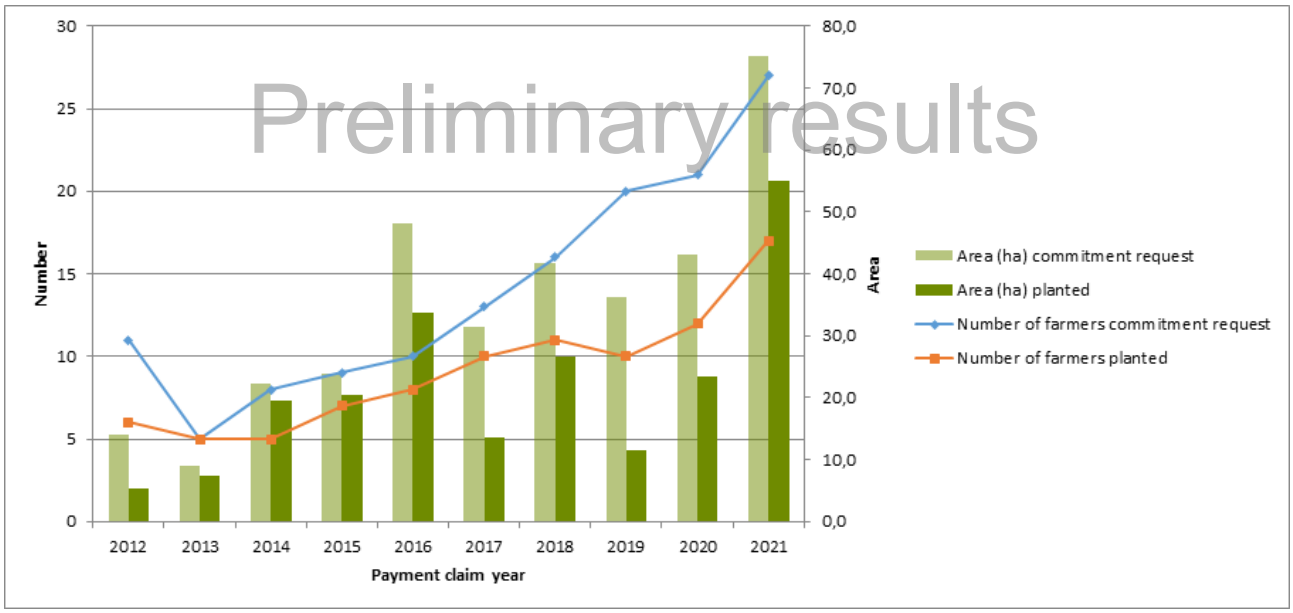
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Flanders is currently implementing Measure 8.2 of the 2014-2020 CAP, as well as previously implementing Measure 222 of the 2007-2013 CAP. Since 2011 80% of total plantation costs have been refunded. Figure 3 illustrates the amount of land that has been planted for AF since 2012. There are several rules for implementing Measure 8.2 which are as follows:

1. There has to be a minimum of 30 trees and a max of 200 trees per hectare, on a minimum land parcel of 0.5 ha.
2. Trees must remain for a minimum of 10 years, any trees that die must be replaced by the farmer. There are no subsidies for maintenance costs.
3. The land must be registered as agricultural land each year.
4. Coniferous trees, invasive exotics and low standard fruit trees are not included within this measure.

AF systems can also be eligible as EFAs, which are part of Pillar I of the CAP, but this only applies if this system is established with the support of Measure 8.2.

Figure 3. Agroforestry area (in hectares) registered (left y-axis, *oppervlakte ingeschreven*) and area planted (right y-axis, *oppervlakte aangeplant)* by year within Flanders.[122]



Thus far (until planting season 2020-2021), Measure 8.2 has been used by about 60 farmers in 150ha of land. The average parcel size of the farms that have had uptake are between 1.5 and 2ha (with .5 being the smallest and 11.5 the largest). Further, the average tree density is between 50 to 80 trees per hectare.

[122] Source: Flanders Department of Agriculture and Fisheries.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

On parcels where Measure 8.2 has been implemented, there are on average at least three different tree species planted, but ranging from 1 to over 30. Some of the typical trees that have been chosen are walnut, cherries, poplar, oak, chestnut and hazelnut within silvopastoral, silvoarable and food forest systems.

The current proposal for the new CAP is to maintain a subsidy for AF with small changes, including a higher flexibility regarding tree density on a case-by-case basis.[123] On top of the subsidy for installing the AF system, the proposal is to provide also a support measure (AEM) for maintenance of the trees and tree strips.

Wallonia, as mentioned above, is not implementing Measure 8.2 currently, and did not implement Measure 222 in the previous CAP. There are no discussions currently to include AF in the new CAP Strategic Plan for Wallonia.

While the maintenance of trees, hedges, short rotation coppices and orchards are supported under agri-environmental and climate measures (GAEC's) in Wallonia, AF systems are not eligible for an EFAs in its entirety. For example, short rotation coppices are only eligible as EFAs on the surface they occupy. Nevertheless, Wallonia has had a recent increase in political support for hedges and only in 2021 around 200 km have been planted. Support for high-branching apple and pear orchards for cider production which incorporate sheep or cattle underneath them, has also been increasing recently. This system, called *Preverger à haute valeur biologique*, has agri-environmental support within the CAP of 450 euro/ha in addition to the price cider producers pay to mechanically harvest the apples and pears the farmers have grown.

6.1.1.2 National Policies

6.1.1.2.1 Agroforestry

There are a few national policies that support AF in both Flanders and Wallonia. In Flanders, there is the Immovable Heritage Decree (*Onroerenderfgoeddecreet*) policy that supports the installation of tree orchards and other woody landscape elements with related subsidies.[124] There are also some community related subsidies for similar initiatives, but this is not a Flanders-wide policy. While in Wallonia there are subsidies for establishing tree rows, orchards, hedges, short rotation coppices and pollard trees. [125] Nationwide, there has been a small growing interest for silvoarable trees and nut orchards which has had some success, especially since the establishment aid is significantly simplified since it is outside of the CAP. As AF is a relatively new theme from an administrative and legal point of view, the existing regulations for both the concept itself, and trees in general, are

[123] Association pour l'agroforesterie en Wallonie et à Bruxelles. "Les Aides En Agroforesterie." AWAF Asb, 16 Sept. 2016, awafinfo.wixsite.com/awaf/fiches-techniques.
[124] Onroerenderfgoed.be. 2021. [online] Available at: <https://www.onroerenderfgoed.be/sites/default/files/2018-09/20150605_MB_forfaitaire_lijst_Bijlage_zonder_premiepercentages2.pdf> [Accessed 31 July 2021].]
[125] Association pour l'agroforesterie en Wallonie et à Bruxelles. "Les Aides En Agroforesterie." AWAF Asb, 16 Sept. 2016, awafinfo.wixsite.com/awaf/fiches-techniques.[not harvard].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

varied and at times contradicting. In recent years, there have been some changes to this but here are just a few of the regulations for trees on farms.[126]

Forest Decree

Within this document it is explicitly stated that any AF systems in Flanders installed after 1 June 2012 with CAP subsidies and/or registered with the Department of Agriculture and Fisheries, do not fall under the Forest Decree. On the other hand, trees on farms, or any AF systems installed earlier than 1 June 2012, and/or those that are not registered, may fall under the Forest Decree. This means that permits might be needed for cutting down trees.

Flemish Codex Spatial Planning (Codex Ruimtelijke Ordening)

Felling trees outside a forest context is subject to spatial planning legislation. The spatial planning codex stipulates that trees that have a trunk circumference of one meter (or diameter about 30 cm), at a height of one meter above ground level, may not be cut without an environmental permit for urban development activities. One must apply for this permit with the specific municipal government in question, who then decides on whether the license is granted. The license may be granted in full, with conditions, or not at all. However, since July 15, 2016, an exception has been created that allows the felling of trees that are part of AF systems without an environmental permit for urban development activities.

Nature Decree

The Nature Decree in Flanders could have important implications for both the construction, management and removal of AF systems. For example, the decree protects small landscape elements (SLEs) stating that removing trees in most cases requires permission. A nature permit can be obtained from the municipality in question, but preconditions are often set, such as the obligation to plant new trees elsewhere on the farm or in the vicinity, with the possibility of certain tree species being mandatory to use. From August 2018, the 'environmental permit for changing vegetation' replaces the Nature Decree but in most cases the municipality remains the licensing authority.

A nature permit may also be required for the installation of AF systems in Natura 2000 Areas (i.e. Habitats Directive or Birds Directive area), in open-space destinations from spatial planning and dune areas protected by the Dunes Decree. This is especially relevant if the construction of the AF system brings about a change in vegetation (e.g. planting on a historically permanent grassland). At times there may even be a "vegetation forbidden to be modified" clause, (e.g. vegetations associated with hollow roads). An exemption from this prohibition can be requested through the Agency for Nature and Forests. In the Flemish Ecological Network (VEN) there is a general

[126] Agroforestry Vlaanderen (Nederlands). 2021. *Wetgeving - Agroforestry*. [online] Available at: <https://www.agroforestryvlaanderen.be/nl/nieuws/wetgeving> [Accessed 25 October 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

prohibition on changing vegetation, removing permanent grassland and using non-native plants. The latter prohibition does not apply in the case of cultivated crops on cultivated land and if it concerns standard tree orchards.

Lease Act (Pachtwet)

AF systems are considered agricultural and are thus subject to the Belgian tenancy law. There are some important points of interest specifically for the planting of trees found with this legislation.

For the tenant:

The Lease Act states that to plant trees, the tenant requires a written approval from the lessor. Tenants wishing to install an AF system must obtain this written permission before starting. For any plantings that replace existing trees, and which are necessary for the preservation of the leasehold, no written permission from the lessor is required.

For the lessor:

The lessor may not plant trees on leased property unless it concerns replacement of fruit trees, forest trees in meadows, or any other plantations necessary for the preservation of the property. If a lease is terminated at the initiative of the lessor, before the planting by the lessor has reached the age of 18, and this has resulted in an increase in property value, the lessor is entitled to compensation equal to the increase in value. If the lease is terminated on the initiative of the tenant, the tenant is entitled to compensation that may not exceed the total rent paid by the tenant during the last five years for the joint property he had leased from the same owner. If such a plantation has led to a depreciation of the leased property, the lessor is entitled to compensation from the leaseholder equal to that depreciation. A lessor can unilaterally terminate the lease with a view to personal exploitation (agricultural cultivation) or when the leaseholder retires and has no successor(s). In the nine years following the repossession, the planting of trees or shrubs is not considered a personal exploitation. In practice, the lessor cannot install an AF system in the first nine years. An amendment to this rule or an exception for trees in an AF system is desirable. If the lease is terminated by mutual agreement, the above does not apply and trees or shrubs may be planted.

Immovable Heritage Decree (Onroerenderfgoeddecreet)

The Immovable Heritage Decree which has been in force since January 2015, regulates the protection of non-movable heritage in Flanders. For AF systems, this means that farmers who want to start such systems on plots located in a "protected cultural-historical landscape", a "protected archaeological site" or a "protected town or village view" must apply for an authorization from the Immovable Heritage Agency. If a nature permit is required for the planting (e.g. in the Flemish Ecological Network), the permit issuer (i.e. the municipality) must obtain advice from the Agency. This provision also applies to the felling of trees in AF systems. If plots are included in an established

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

inventory (i.e. Landscape Atlas) of the Immovable Heritage Agency, the farmer does not have to engage in any additional activities (neither planting nor felling). If a nature permit is required for these plots (which is almost always the case for felling), the permit issuer must also obtain advice from the Immovable Heritage Agency.

6.1.1.2.1.2 Forest Farming

In Flanders, all activities in forests are almost always prohibited—for example grazing animals, fertilizing, installing barbed wire and pruning are not allowed. An exception to the Flemish Forest Decree is required for the effective application of forest grazing management (Art. 97). This exception is best requested in the context of an approval of a forest or nature management plan (*goedgekeurd natuurbeheerplan*) by the Agency for nature and forests of the Flemish Government, but it can also be requested as a separate authorization. Grazers are often used for nature conservation, in wet pastures, meadows, moors and dry grasslands. In nature areas other than forests, a grazing plan is needed. This plan must always be drawn up in consultation with the site manager. In addition, stricter fertilisation standards also apply in nature reserves. Nature management is mainly done with sheep and cows that are adapted to the more difficult conditions that are present in nature reserves, such as Soay, Mergellan and Roux ardennais for sheep; West-Vlaamse roodbont, Galloway and Aberdeen for cattle; Konik horses or Shetland ponies. Sites under management agreements with farmers are generally grazed by productive breeds (non-lactating cows, young bulls or calves) but sometimes hardy breeds are used as well.

In Wallonia, the *Code Forestier* doesn't allow animals in the forest, only in open areas where pastoralists can do environmental maintenance. Although there is a lot of demand to have animals in the forest, there is a fear with policy makers that forests will be damaged and will have to be converted to agriculture.[127]

6.1.1.2.2 Mixed Farming

No current funding was found for MF in Flanders, although it is common for small- and medium-scale farms to be mixed in Belgium.

In Wallonia, the term for MF is called *polyculture-élevage.* This term covers the integration of crop growing and animal husbandry on one farm; the place-bound cooperation between crop growing farms and animal husbandry farms; and exchanges of straw and manure between crop growing farms and animal husbandry farms. The preservation of the system of *polyculture-élevage* was supported by an interregional cooperation (La Grande Région, covering 2,700 million hectares in France, Belgium, Germany and Luxembourg) where all agricultural ministers signed an agricultural charter. They have done so because they believe that the preservation of polyculture-élevage is

[127] Agroforestry Vlaanderen (Nederlands). 2021. *Wetgeving - Agroforestry*. [online] Available at: <https://www.agroforestryvlaanderen.be/nl/nieuws/wetgeving> [Accessed 25 October 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

optimal for farm autonomy, is capable of withstanding economic shocks, favours the maintenance of permanent grasslands, and has many environmental benefits including soil fertility, biodiversity, quality of water and air, and the diversity of cultures and landscapes. This charter was created to supplement the rules already existent in the CAP—to create more rigorous commitments on nitrates and pesticides, and their effects on water; crisis and risk management policies, particularly in animal health and natural disasters; and agricultural land policies. This region has a strong stated commitment to support MF.[128]

6.1.2 Bulgaria

Bulgaria's landscape is characterized by 47% agricultural areas and 37% forest areas, with the second highest percentage of territory (34.3%) in the EU protected under the Nature 2000 network. Most of Bulgaria's forests are owned by the state (69.5%) and managed by six different enterprises. AF is a well-known concept in Bulgaria, found in traditional land use practices for forests and agriculture. Therefore, both traditional and modern implementations of AF can be found such as protective forest belts, forest farming and silvopasture. This is due, in part, to the legal basis for such systems and the political understanding of the importance of promoting AF systems.[129]

One such important system is the agricultural use of forest areas, where agricultural crops are grown together with tree species either by planting crops in open areas that are scheduled for afforestation or with intercropping techniques. These two systems are primarily used with the intention of cultivating in young forests before the forest ecosystem has fully formed. Forest farming is also being used for more permanent ecosystems, and there have been impressive achievements in Bulgaria for the cultivation of fruit-productive forest trees and shrubs in forest areas since the 1960s. Another widespread system is Protected Forest Belts (PFBs). PFBs have been established since 1925, gaining momentum in the 1950's. These belts are linear forest plantations designed to improve microclimates, civil engineering constructions, urbanized areas; and to protect soil. Some financial support in legislation is available for this. Further, shelterbelts were used along waterways such as ravines, canals, rivers, reservoirs, roads, fields and meadows to stabilize river banks, flood abatement and for environmental benefits by planting poplars, acacias, willows, lindens, sycamores and other trees that worked well within the local climate. Large stretches of silvopasture were created where trees and shrubs are grown alongside herbaceous forage crops for freely grazing animals. This has caused an increase in organic livestock rearing leading to balanced animal nutrition, increased timber production, and increased economic efficiency, environmental sustainability and social benefits.

[128] Granderegion.net. 2021. Accueil — Grande Region. [online] Available at: <http://www.granderegion.net> [Accessed 31 July 2021].
[129] Kachova, V., Hinkov, G., Popov, E., Trichkov, L. and Mosquera-Losada, R., 2016. Agroforestry in Bulgaria: history, presence status and prospects.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Further, along the Danube River, poplar plantations are being grown with sunflowers, cabbages, corn, peppers, eggplants, watermelons, squash, cauliflowers, wheat and beans, creating biodiverse ecosystems on lands that would otherwise be monocultures of trees. Plantations of oak, walnut and alder are also being grown alongside corn. This agricultural use of forest areas, has increased production per unit area, decreased costs associated with afforestation and created additional income through the diversification of products. Tree growth has also improved through the increase of soil nutrients, water retention, reduction of wind and water erosion, as well as increased resistance to crop diseases and pests. They have also led to the earlier growth of trees, forming canopies sooner, higher total productivity and increased social measures such as employment for landless people from various regions in Bulgaria.

The main association for AF found in Bulgaria is the Bulgarian Association of Agroforestry, who had an impressive project from 2015-2018 to discover how AF systems can be used to improve the health of coastal lands.

MF is present in Bulgaria's agriculture mainly in the form of mixed plant and animal farms, mixed plant farms, mixed crop and livestock and mixed livestock farms.[130]

6.1.2.1 CAP

Although up until now, AF has not been supported in Bulgaria through Measure 222 and Measure 8.2, green payments have been part of the country's strategy to support AF. For example, the national Law for supporting agricultural producers and the Law for Forests have up until 2020 provided nearly 800 million € in 'green payments'. In regards to AF, the Law for Forests gives green payments to protect forest belts.[131]

There are well over 9,000ha devoted to PFBs, mostly in north-eastern Bulgaria. Policies that support PFBs are seen as very important to protect fields from strong winds, reduce the adverse effects of rainfall, prevent run-off waters, reduce polluting emissions and to improve microclimates, soils and environmental factors. AF is accounted for in the Law for Forests, and grazing livestock in forest areas is allowed.[132]

In the RDP for 2014-2020 several non-direct measures are found supporting AF, such as those supporting the reconstruction and establishment of shelterbelts, agroecological activities, organic farming, erosion control, financing to support activities that diversify production and the restructure of small farms and activities to introduce new technologies agro-production.[133]

---

[130] [1] Hrabrin Bachev, Bodjidar Ivanov, and Desssislava Toteva, , 2019. Sustainability of Agricultural sub-sectors in Bulgaria [online] Available at: https://mpra.ub.uni-muenchen.de/93323/.

[131] Kachova, V., Hinkov, G., Popov, E., Trichkov, L. and Mosquera-Losada, R., 2016. Agroforestry in Bulgaria: history, presence status and prospects. *Agroforestry Systems*, 92(3), pp.655-665.

[132] Ibid.

[133] Kachova, V., Hinkov, G., Popov, E., Trichkov, L. and Mosquera-Losada, R., 2016. Agroforestry in Bulgaria: history, presence status and prospects. *Agroforestry Systems*, 92(3), pp.655-665.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

During Bulgaria's discussions for the new CAP, there seems to be political support for including AF but it is yet to be confirmed.

6.1.2.2 National Policies

6.1.2.2.1 Agroforestry

There are multiple legislations in Bulgaria promoting AF including the Law on Ownership and Usage of Agricultural Land (LOUAL), the Law for Forests (LF), the Law on the Protection of Agricultural Land (LPAL), and the Law for Supporting Agricultural Producers (LSAP).[134]

Although not distinctly stated, the National Agroecological Program of Bulgaria also supports AF through indirect measures directed at organic farming, restoration and maintenance of lands with HNV, among others.[135]

In the Bulgarian National Action Program for Sustainable land management and combating desertification, AF is mentioned as an important land use practice that needs to be increased in order to reap the benefits of its multifunctionality.[136]

The National Strategy for the Forest Sector Development (NSFSD) that occurred in 2013-2020, created many targets for how woody vegetation could be used to combat the effects of climate change, enhance biodiversity and increase renewable energy resources. The Strategic Plan for the Development of the Forestry Sector (SPFSD) for 2014-2023 also includes important measures for woody landscape components such as the restoration and construction of shelterbelts, and the development of non-timber forest products.[137]

As mentioned above, PFBs are very important within Bulgarian policy and receive an extensive amount of policy support. PFBs are divided into various groups: anti-wind, anti-erosion, shelterbelts to protect waterways, anti-polluting belts on roadsides, and forest belts in urban and industrial areas. Thus far, many benefits have been observed including an increase in crop yields by 30% and soil moisture by 10%; overall improvement in soil fertility; protection of crops from insects and pests due to the increase of birds in the landscape (and settling in the trees); a reduction of wind speed by 30-40%; a decrease of soil evaporation by 40%; an increase in air humidity by up to 16%; a reduction of daily temperature amplitudes in the surface layer of the air; and an increase in the

[134] Ibid.
[135] Ibid.
[136] Ibid.
[137] Kachova, V., Hinkov, G., Popov, E., Trichkov, L. and Mosquera-Losada, R., 2016. Agroforestry in Bulgaria: history, presence status and prospects. *Agroforestry Systems*, 92(3), pp.655-665.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

ability for the landscape to retain snow. The Strategic Plan for the Development of the Forestry Sector (SPFSD) also includes measures to restore and construct new shelterbelts.[138]

The Bulgarian RDP supports HNV extensive grazing and specific local traditional breeds that are in danger of decline. This is done both to maintain biodiversity and for the genetics of these animals, since they are better adapted to local conditions. In the latter case, subsidies apply per herd size. This program also supports seasonal grazing in mountain pastures.

6.1.2.2.1.2 Forest Farming

While forest farming is present in Bulgaria, there are no policies supporting forest farming directly.[139]

6.1.2.2.2 Mixed Farming

No policies can be found that support MF in Bulgaria.

6.1.3 Czech Republic

The Czech Republic maintains an agricultural landscape that contrasts from the rest of the EU. For example, while 96% of farms in the EU are small-scale and family run, more than 70% of farms in the Czech Republic are large-scale enterprises. The national average farm size in the Czech Republic is 130 ha, while the EU average is 16.6 ha. Yet, the Czech agricultural landscape is in line with other post-communist Central and Eastern European countries, where small mosaic plots of diverse land uses and agricultural production systems were collectivised leading to large cooperatives or state farms. This resulted in the removal of most woody vegetation from agricultural landscapes, including trees along roads to facilitate the use of heavy machinery. These blocks of monocultures are continuing to decrease biodiversity, while increasing soil erosion, land degradation and many other ecological factors. [140] After the communist regime ended in 1989, land was returned to the owners or their descendants but more often than not, these families did not return to agricultural cultivation, and instead leased their land, most often to large agricultural companies.[141] The Czech Republic can be seen as a great example of a region where the AF tradition was almost lost due to decisions made in policy.[142]

---

[138] Ibid.
[139] Ibid.
[140] Èermáková. Mácová 2016, Eurostat 2016.
[141] Ecology and Society - ES-2021-12541 (Version 3 of ES-2020-11999), 2021. Agroforestry in the Czech Republic: what hampers the comeback of a once traditional land use system?.
[142] EURAF. 2021. Czech Republic. [online] Available at: <https://euraf.isa.utl.pt/countries/czechrepublic> [Accessed 31 July 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Until the political phenomenon mentioned above, AF was a common land use practice—meadows and pastures with woody vegetation were common in the mountainous regions of the country and fruit cropland, meadows and pastures that were bound together very closely and complexly were found in the more fertile lowlands.[143] Today, most of the traditional AF that remains is found within silvopastoral systems, where grazing occurs in extensive fruit orchards often found in sites that are unappealing to intensive agriculture such as the White Carpathians region and along the Bohemian Forest. Other AF systems do exist in the Czech Republic such as trees on pasture, intercropping with forest trees, forest farming and more rarely intercropping under fruit orchards. Intensive AF systems such as alley cropping for timber production are not yet practiced in the area. The total land area devoted to AF in 2018 was around 36,000—0.45% of territorial area and 0.8% of the land being used for agriculture.[144]

The main AF association in the Czech Republic is the Czech Association for Agroforestry (CSAL) which was established in 2014.[145]

MF represents approximately one third of the total agricultural holdings within the Czech Republic, covering 40% of the total utilised agricultural land and 43% of the total number of livestock units are kept in mixed production farms. Most mixed production farms are situated in Vysočina Region (729 holdings) with 29% of the total number of agricultural holdings in this region, in the Central Bohemian Region (704 holdings) and in the South Bohemian Region (700 holdings). 59% of the holdings are focused on the mixed field crops and grazing livestock production, 25% are producing various crops and livestock combined, mixed - mainly grazing – livestock takes up 12%, while mixed cropping and mixed livestock is 3% of the of the total holdings.[146]

6.1.3.1 CAP

While AF Measure 222 or 8.2 were not implemented in the Czech Republic, the “greening” payments described in Regulation (EU) No 1307/2013 which focus on crop diversification, maintenance of permanent grassland and EFAs were activated. The Czech Republic implemented 12 out of the 19 possible EFAs for the 2014-2020 period, including six Landscape Features. Nonetheless, most of the EFAs selected by farmers were for nitrogen fixing crops and cover or catch crops, with only 1% selecting landscape features which could be considered AF.[147]

Within the Czech Republic the 100 tree per hectare limitation that was attached to the 2014-2020 CAP is relevant for both arable and permanent grassland. Yet, the State Agricultural Intervention Fund which is responsible for the administration of agricultural subsidies, has the ability to “exclude

[143] Ibid.
[144] Ibid.
[145] Ibid.
[146] Czech Statistical Office: Farm Structure Survey – analytical evaluation, 2016. [online] Available at: https://www.czso.cz/csu/czso/farm-structure-survey-analytical-evaluation-2016
[147] Ecology and Society - ES-2021-12541 (Version 3 of ES-2020-11999), 2021. Agroforestry in the Czech Republic: what hampers the comeback of a once traditional land use system?.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement 862993.

the area under tree crown from the total area eligible for payment." Therefore, only extensively grazed orchards with landscape elements and ecological functions were supported by the RDP. Short rotation coppices could receive direct payments and greening subsidies but only if they were not combined with crops or livestock, thus not agroforestry in its full form.[148]

AF is planned to be included in the new CAP Strategic Plan for the Czech Republic. The Czech Ministry of Agriculture and the Ministry of Environment are currently planning a new AF measure that will support the establishment and maintenance of AF Systems. This measure will be similar to Measure 222 and 8.2, stating that financial support will be provided for the establishment of AF systems and the first five years of maintenance. Unfortunately, the subsidies look like they will only support the planting of new systems and not existing systems.[149]

Two types of AF systems are currently being proposed as the ones that will be supported—silvoarable systems with 80 to 100 forest or fruit trees grown per hectare in alley cropping systems on arable land; or silvopastoral systems with 80 to 100 trees per hectare scattered throughout pasture land (i.e. permanent grasslands). A list of permitted species of trees is being included within the measures which gives subsidies to primary tree species and does not for supplementary tree species and shrubs. Currently, 45 different tree species are being discussed as eligible, 16 of which are fruit trees. The measure will also require that no one tree species accounts for more than 40% of all species, meaning that at least three species must be planted, and that at least 50% of trees must be forest trees.

6.1.3.2 National Policies

6.1.3.2.1 Agroforestry

At the moment, Czech law makes it very hard for any parties interested in AF to pursue this land use practice. The law on the conservation of agricultural land (334/1992 Coll.) does not allow any trees to grow on farmland with only one exception made for plantations of fast-growing trees. Such plantations can only remain on a particular farm for 30 years. Further, the Czech Agricultural Act states that only one crop group can be grown per block. This means that combining crop or grassland with woody components (except for fruit trees) is not recognized as a productive piece of agricultural land.

When it comes to landscape features, very few of these elements still exist in the country—those that do are currently registered as landscape features. Woody components outside of forest land are protected by the Nature and Landscape Protection Act, which states that woody vegetation cannot be managed or harvested without specific permission. When it comes to agricultural subsidies, the amount of land covered by woody vegetation in a field can either be excluded from the calculation of total agricultural land within Pillar I of the CAP; or it can be categorised as an area

[148] Ibid.
[149] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

with landscape elements under the Land Parcel Identification System (LPIS), which means that the piece of land can no longer be used, managed or harvested by the farmer without permission.

6.1.3.2.1.2 Forest Farming

The Forest Act (289/1995 Coll.) prohibits the grazing or passing of livestock through forest land. The only form of AF that is allowed within a forest landscape is the intercropping of forest trees with specific parameters laid out in the Forest Act, although this is almost never implemented. Thus, it is forbidden for animals to use forests as pasture, although under some circumstances it is permitted if it is approved by the managing authority and has specific management tools in the forest management plan. Yet, this is also very rare since forest lobbies in the Czech Republic are strongly against this type of forest grazing. Only one case has been found where grazing is practiced as forest management, in the Podyjí National Park.

Growing specialty crops in forests such as mushrooms or berries is permitted, although since most of the forest is owned and managed by large companies (more than 50% is owned and managed by state company Lesy CR) this is not often relevant.

6.1.3.2.2 Mixed Farming

MF has no policy support in the Czech Republic.

6.1.4 Estonia

Estonia has a long tradition of wood-pasture management and grazing forests were historically widespread. This practice was stopped and pastures were divided up, which led to further decline of forest grazing and by 1999 grazing wood-pastures had almost ceased. The situation changed when grazing subsidies were introduced for managing and restoring semi-natural grasslands. Estonia was amongst the first countries of the EU that introduced financial support to maintain wood-pastures and restore abandoned ones in 2008.[150] Although there is no extensive data and information on Estonian AF and MF systems, estimates can be made based on land cover and land use data. A recent study done in 2017 has shown that Estonia has a particularly small AF cover compared to other EU countries, taking up approximately 1,5% of the total utilised agricultural area (UAA) with livestock AF.[151]

[150] Roellig M, Sutcliffe LM, Sammul M, et al. Reviving wood-pastures for biodiversity and people: A case study from western Estonia. Ambio. 2016 Mar;45(2):185-195. DOI: 10.1007/s13280-015-0719-8. PMID: 26458391; PMCID: PMC4752564.

[151] Herder, Michael & Moreno, Gerardo & Mosquera-Losada, María Rosa & Palma, Joao & Sidiropoulou, Anna & Santiago-Freijanes, José & Crous-Duran, J. & Paulo, Joana & Tomé, Margarida & Pantera, Anastasia & Papanastasis, V. & Mantzanas, Konstantinos & Pachana, Przemko & Papadopoulos, Andreas & Plieninger, Tobias & Burgess, Paul.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.4.1 CAP

Estonia did not make any provisions for AF under CAP Measures 222 and 8.2 but *sensus lato,* a specific type of AF that supports the management of wooded meadows and wood pastures, receives funding. These schemes are included in the agri-environmental measures for semi-natural habitats in Natura 2000 areas. Further, Estonia has defined requirements to maintain agricultural landscapes in good agricultural and environmental conditions (GAEC), on the basis of Annex II of Council Regulation (EC) No 1306/2013. Thus, retention of woody landscape features—hedges; trees in line, in groups or isolated (e.g. 'field islands'); groves; woody and natural vegetation along ditches; and heritage objects (including trees) are subject to defined minimum requirements.[152] Finally, there are some opportunities for AF within the forest and arable sector which include EU subsidies for private forest owners.

The new CAP Strategic Plan has yet to be released but the support for wooded meadows and wood pastures is likely to continue, with some further planned support to increase mosaic agricultural landscapes. The CAP has played a role in de-mixing the landscape through their stringent rules on what does and does not count as arable land for payments therefore, discussions are now underway to improve the situation through the new plan. While the potential improvements are welcomed by experts, there is no discussion of a specific AF or MF target.

6.1.4.2 National Policies

6.1.4.2.1 Agroforestry

The regulations for trees on farms, beyond the CAP, are very limited within Estonia. The Estonian Forest Act primarily applies to large-scale forest operations and makes no mention of trees on farmland. While nature conservation policies do place some additional regulations on how trees can be cut, and under what circumstances, this is only if they are located in conservation areas. The impact of this law has been found to be quite narrow. For example, the Heritage Conservation Act classifies and protects "historical natural sacred sites," which can include trees or woody vegetation although the act does not place specifications on this.[153]

Within Estonia, agricultural land is integrated into the typology of green infrastructure, however trees and other woody elements are not prioritised. While the Planning Act does include green networks, it once again does not specify limitations or support for trees, forests or woody vegetation. There are water protections required between arable land and bodies of surface water

(2017). Current extent and stratification of agroforestry in the European Union. Agriculture, Ecosystems & Environment. 241. 121-132. 10.1016/j.agee.2017.03.005.

[152] Riigiteataja.ee. 2021. Maa heas põllumajandus- ja keskkonnaseisundis hoidmise nõuded – Riigi Teataja. [online] Available at: <https://www.riigiteataja.ee/akt/131032020004#para3> [Accessed 31 July 2021].

[153] Riigiteataja.ee. 2021. Heritage Conservation Act – Riigi Teataja. [online] Available at: <https://www.riigiteataja.ee/en/eli/513122020003/consolide#para11> [Accessed 31 July 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

which can use trees through riparian buffers to do so, but this is also not specifically required or supported.

6.1.4.2.1.2 Forest Farming

Forest pastoralism is legal and to some extent even supported through *sensus lato* (i.e. wooded meadows and wood pastures) which receives funding through the CAP. Before this support, it had more or less died out and now, to some small extent, has been revived. No other forest farming is currently present and would be incompatible with existing legislation, although it may not strictly be illegal.

6.1.4.2.2 Mixed Farming

There are no policies found in Estonia that favour MF.

6.1.5 Finland

While Finland does not seem to have a huge landscape for AF (other than reindeer husbandry), farms which are concentrated to only one income revenue are a minority, making their agricultural landscape somewhat focused on mixed crop production. This is partially due to the fact that up until the 1800s most of the production was concentrated on wheat, which was completely wiped out by a pest outbreak, resulting in a devastating famine that caused the production to be diversified from that point forward.[154] Further, silvopasture and cattle grazing in forestland, was popular until the 50s when modern forestry policies took hold that decided that forests should be kept for timber production. Therefore, cattle were moved to open pasture. One prevalent form of silvopasture in Finland is reindeer husbandry, which takes up 40% of the country and is the biggest AF system in Europe.

Currently, there are no official AF associations in Finland but the Finnish Agroforestry Network is an informal network coordinated by the Baltic Sea Action Group to exchange knowledge on AF and the network organises excursions, field visits, trainings, network meetings and information events a couple of times per year.[155]

6.1.5.1 CAP

Measure 222 and 8.2 were not activated by Finland and no discussions are occurring for AF to be included in the next CAP. Most of the CAP funding goes to natural constraint payments, investments in setting up new ventures and environmental payments, together representing around 80% of Pillar II funding.

[154] Data provided by the Nature Research Institute Finland.
[155] EURAF. 2021. *Finland*. [online] Available at: <https://euraf.isa.utl.pt/countries/finland> [Accessed 2 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.5.2 National Policies

6.1.5.2.1 Agroforestry

While no direct AF policies can be found in Finland, there is relatively strong legislative support for reindeer husbandry. Nevertheless, the support is only national and not connected to the CAP.

When it comes to landscape elements, Finland is lacking in regulations that give trees protection because of their high tree cover. Even in the most intensive agricultural areas, where monocultures are most present, tree cover is still 50%, making trees on farms not a priority. Nevertheless, in certain landscapes which are considered important conservation areas, there are a few regulations on how trees should or should not be cut but this is not connected to agriculture in any way, and therefore not AF. Further, there are also some rules on water protection that require a certain percentage of trees to remain to protect waterways but this is once again not related to AF.

6.1.5.2.1.2 Forest Farming

Forest grazing in Finland has many different policies attached to it. While grazing is allowed, it always requires permission from private landowners or the state. However, reindeer grazing is an exception, as free grazing rights are given at all times no matter who owns the land, public or private. Further, this policy is supplemented by a subsidy of 4 to 5 million euros each year, which though marginal, does provide some support to herders. To access this support, one has to own more than 80 reindeer. The support is then calculated based on herd size.

6.1.5.2.2 Mixed Farming

No policies can be found in Finland for MF, although this type of farming seems to be the norm.

6.1.6 France

France has one of the most progressive policy landscapes when it comes to MF and AF systems, although it is yet to be determined how effective these policies have been to expand and maintain such systems. MF exists at a territorial level in its traditional form through the grazing of animals between crops and the exchange of straw, manure and alfalfa across farmers. Trees and woody elements on farms are also prominent within traditional French agriculture. Hedgerows are protected under French law although they continue to decrease due to age or poor management.

The AF landscape within France is very diverse and many different variations of fruit and nut trees with animals such as sheep, cattle and pigs exist. Intra-plot AF is something new in France and is still being established experimentally by many farmers.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

The MF landscape is one of the most diverse that we have found within Europe, with deep representation found in five different regions including Lorraine and Haute Normandie.[156] A rise in MF has been found in Basse Normandie and Pays De Loire while a decline has been seen in the Midi-Pyrenees. MF systems are common on dairy cattle and beef cattle systems, but also for ovine systems and caprine systems

The Association Française d'Agroforesterie is the main AF association found within France. They were founded in 2010 and since then have been working with farmers, researchers and decision makers to improve the policy landscape for AF.[157]

6.1.6.1 CAP

France has made provisions for AF in both the 2007-2013 and 2014-2020 periods within some regions. In the case of the 2014-2020 period 15 regions out of 18 placed Measure 8.2 in their RDPs—Auvergne, Basse Normandie, Guadeloupe, Guyane, Haute Normandie, Ile de France, Limousin, Martinique, Midi Pyrenees, Rhone Alpes, Lorraine, Nord Pas de Calais, Pays de Loire, Picardie and Poitou Charentes. Out of these 15 regions, only Auvergne, Rhone Alpes and Lorraine did not open the scheme for farmers.

Three main measures were enacted within the 2014-2020 CAP for GAECs, the green payment for EFAs and AECMs. When it comes to AF, the GAECs focused on hedges while the green payments concentrated on hedges, trees[158] and buffer strips for agroecological infrastructure to favour habitat for functional biodiversity.[159] The green payment accounted for 5% of arable land. Finally, AECMs funded the installation and maintenance of intra-parcel trees and hedges.

The French RDP is the only one that makes clear and direct provisions for MF under their AECMs, with two main policies. The first is specialized support for monogastric animals and crops, in order to diversify and extend the types of rotations; the economic management of nitrogen fertilization; and the production of a minimum amount of feed produced directly on the farm, which is set at a regional level. The second is an initiative for ruminants and crops which encourages the production

[156] Hirschler J., Stark F., Gourlaouen Y., Perrot C., Dubosc N., Ramonteu S., 2019. Evolution des systèmes de polyculture-élevage : une rétrospective statistique 2007-2014. Innovations Agronomiques 72, 193-209. dx.doi.org/10.15454/hptjh1

[157] Association Française d'Agroforesterie. 2021. *Agroforesterie - Association Française*. [online] Available at: <https://www.agroforesterie.fr/index.php> [Accessed 11 August 2021].

[158] Agriculture.gouv.fr. 2021. Paiements découplés – Le « paiement vert ». [online] Available at: <https://agriculture.gouv.fr/paiements-decouples-le-paiement-vert> [Accessed 31 July 2021].

[159] Ecophytopic.fr. 2021. Des infrastructures agro-écologiques pour plus de régulation naturelle | Ecophytopic. [online] Available at: <https://ecophytopic.fr/pic/prevenir/des-infrastructures-agro-ecologiques-pour-plus-de-regulation-naturelle> [Accessed 31 July 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

of grass and feed autonomy, and promotes the maintenance of farms in areas where MF and heritage breeds are threatened.[160]

There are also further schemes under the ACEMs that could be considered relevant to both AF and MF systems, which support farmers that are committed to a multi-year project to modify or consolidate their practices, aiming at economic, environmental and social objectives.[161]

Unusually for an EU MS, the French RDP which includes the *Objectif Terres 2020*, ran from 2007-2020 to provide continuity and assurance to farmers. The *Objectif Terres* has five goals: water use, water quality, biodiversity and landscape, soil protection and energy and climatic changes. Although AF can contribute to all of these goals, it is mentioned within the document in relation to biodiversity, and landscape and soil protection.

Hérault Méditerranée developed an AF system with Institut National de la Recherche Agronomique (INRA) which introduced lines of trees between crops or pasture. The results of this collaboration enhanced biodiversity, slowed soil erosion and runoff, as well as providing economic resilience for the farmers involved due to diversity in income. The encouraging results found in this study led to the Chamber of Agriculture of Hérault to finance 50% of the costs required to establish six new AF projects, which will be developed in the municipalities of Agde, Bessan, San Thibéry and Pezenas—27ha altogether.

In Montpellier, the SAFE (Silvoarable Agroforestry for Europe) project, which was funded by the CAP, created a French national scheme to plant half a million ha of AF during the next 25 years.

6.1.6.2 National Policies

6.1.6.2.1 Agroforestry

There are many policies throughout France that support both AF. Below are only a few examples.

At the regional level, there are policies with regional funding such as the *Plans Ambition Filière Avicole* to plant trees for free range poultry in the Auvergne-Rhône Alpes Region.[162] In the Hauts de France, Picardie and Nouvelle Aquitaine Regions there is direct support for the installation of AF

[160] Agriculture.gouv.fr. 2021. *MAEC : les nouvelles mesures agro-environnementales et climatiques de la PAC*. [online] Available at: <https://agriculture.gouv.fr/maec-les-nouvelles-mesures-agro-environnementales-et-climatiques-de-la-pac> [Accessed 2 August 2021].
[161] Agriculture.gouv.fr. 2021. Plus de 12 000 exploitations agricoles engagées dans les groupements d'intérêt économique et environnemental (GIEE). [online] Available at: <https://agriculture.gouv.fr/plus-de-12-000-exploitations-agricoles-engagees-dans-les-groupements-dinteret-economique-et> [Accessed 31 July 2021].
[162] AFIVOL - Association Filières Volailles Auvergne-Rhône-Alpes. [online] Available at: <https://www.afivol.com/soutien-a-la-filiere/> [Accessed 31 July 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

systems.[163] In the Grand East region there are the funds for the *Trame Verte et Bleue*, which is a network of terrestrial and aquatic ecological continuities identified by regional schemes of ecological coherence. Groups of farmers can apply to receive funds to preserve or restore the functioning of the local ecological network—primarily planting hedges and fruit trees. They take into account biological corridors to increase biodiversity, especially in certain sensitive areas.[164]

There are also both regional and national policies for AF and MF research such as the FAM/ADEME [165] and PEPIT (Poles for Agricultural Experimentation Partnerships for Innovation and Transfer to Auvergne-Rhône-Alpes farmers) schemes.[166]

The Programme de Développement Rural Hexagone in France, which occurred from 2007-2013, subsidized sheep transhumant systems that make use of mountainous resources.

6.1.6.2.1.2 Forest Farming

Pastoralism and ruminants grazing through forest land is legal but it is restricted by many factors such as land access, pastoral land associations in mountain zones, whether land is public or private, and whether the land is a national park. In forests where the farmer is the owner of that particular piece of land, poultry is legally allowed to roam freely.

6.1.6.2.2 Mixed Farming

Most of the support for MF within France is found through La Grande Région.

[163] Landes.chambre-agriculture.fr. 2021. Mise en place de systèmes agroforestiers. [online] Available at: <https://landes.chambre-agriculture.fr/fileadmin/user_upload/Nouvelle-Aquitaine/101_Inst-Landes/Documents/gestion_entreprise/aides_investissements/PCAE_agroforesterie.pdf> [Accessed 31 July 2021].
[164] Trameverteetbleue.fr. 2021. Trame verte et bleue, Centre de ressources pour la mise en œuvre de la Trame verte et bleue. [online] Available at: <http://www.trameverteetbleue.fr> [Accessed 31 July 2021].
[165] Investissements d'Avenir Appel à projets "Agriculture et Alimentation de demain." (n.d.). [online] . Available at: https://www.franceagrimer.fr/content/download/58539/document/20181025%20AAP%20Agro-Agri%20v5%20finale%20arr [Accessed 31 Jul. 2021].
[166] Rhône-Alpes, R.A. (n.d.). Appel à projet PEPIT (Pôles d'Expérimentations agricoles Partenariales pour l'Innovation et le Transfert aux agriculteurs d'Auvergne-Rhône-Alpes) - Agriculture. [online] www.auvergnerhonealpes.fr. Available at: https://www.auvergnerhonealpes.fr/aide/233/289-appel-a-projet-pepit-poles-d-experimentations-agricoles-partenariales-pour-l-innovation-et-le-transfert-aux-agriculteurs-d-auvergne-rhone-alpes-agriculture.htm [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Case Study: Mixed Farming in La Grande Région

As mentioned above in the case of Wallonia, France is part of the interregional cooperation La Grande Région, covering 2,700 million ha in France, Belgium, Germany and Luxembourg to preserve the system of *polyculture-élevage*.

La Grande Région has an area of more than 2.7 million ha and MF is a system well represented all over the region, with at least 22% of that land devoted to *polyculture-élevage*. While the situation varies significantly from one region to the other, 600,000ha are still devoted to it, primarily in the Lorraine region, where one in four farms are mixed. Nevertheless, some sectors continue to lose land devoted to MF, but altogether most areas have increased their hectares devoted to this between 2005 and 2013 in correlation to these policies.[167]

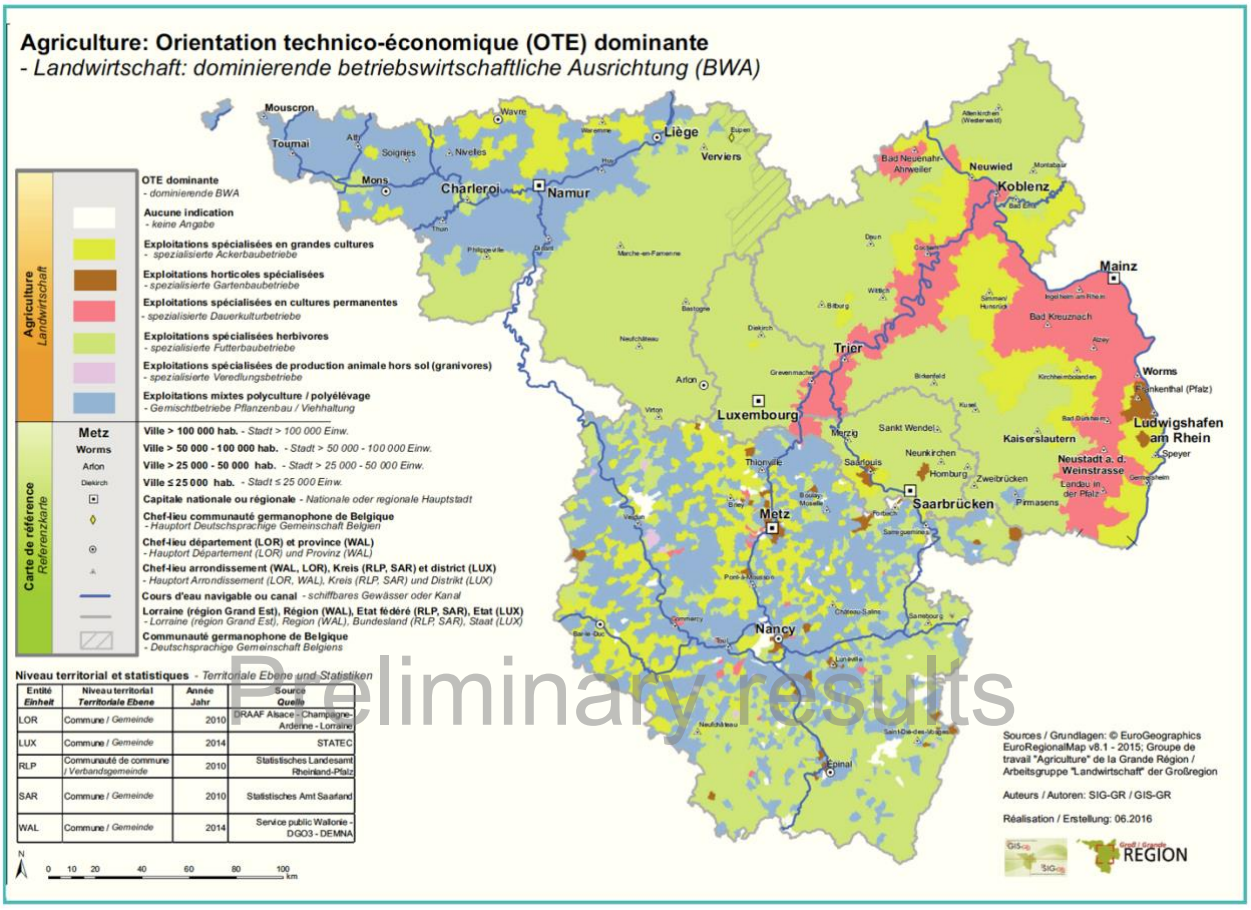
While the income coming from such activities changes from year to year and from region to region, in some regions, such as in Lorraine, the income is much higher within MF enterprises.[168]

In France, this region (Grand-Est) extends over 10% of the total area of France, with permanent meadows occupying 25% of the agricultural land. Out of the total 45,700 farms, 75,00 full time jobs are generated. In the region of Lorraine alone, 60% of the beef and dairy industry and a third of the area for arable crops is through MF.[169] Figure 4 below shows in blue all of the land devoted to MF within France.

[167] Ministère de L'agriculture de L'agroalimentaire et de la Forêt, Agreste, Grand Est, Les exploitations de «polyculture élevage» dans la Grande Région transfrontalière. www.draaf.grand-est.agriculture.gouv.fr. [Accessed 31 Jul. 2021].
[168] Ibid.
[169] Broschiero, Bruno. Agricultures & Territoires Chambre D'Agriculture Grand East. Etudes économiques.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Figure 4. Map of Agriculture within France. Blue areas signify landscapes devoted to *polyculture-élevage*.[170]



Under this interregional policy, MF is understood as:

1. The integration of crops and animals on one farm
2. The cooperation between arable farms and livestock farms
3. The exchange of resources like manure and straw between neighbouring farms.

This policy is not only a significant example of interregional cooperation and the deep impacts that can be felt through it, it is also the most extensive mixed farming policy found within Europe. Through policies such as these many benefits can be felt that increase the efficiency of our agricultural systems and give deep ecosystem services. For example, such programs increase the feed efficiency of herds, recycle co-products in animal feed (e.g. spent grain) that would

[170] Ministère de L'agriculture de L'agroalimentaire et de la Forêt, Agreste, Grand Est, Les exploitations de «polyculture élevage» dans la Grande Région transfrontalière. **www.draaf.grand-est.agriculture.gouv.fr**. [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

normally be wasted, develop local sectors for feed and waste management, creates links within the territory, promotes feeding based on local ecosystem capabilities, develops local exchange, promote autonomous regions and develops decision-making avenues for farmers.


Cultivated plants for nutrition


Cultivated plants for energy


Cultivated plants for materials


Reared animals for nutrition


Reared animals for materials or energy


Nitrogen fixation


Enhanced soil fertility


Increased animal welfare


Recovery of marginal areas


Grassland management


Biodiversity

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.7 Germany

Germany has a few traditional AF systems that are still being practiced today including windbreaks, hedgerows, silvoarable fruit orchards, rows of pollarded trees, willow strips and forest pasture (which usually includes fallow deer but less commonly pig and cattle). Windbreaks and hedgerows are known as *knicks* and are the historical field border edges that are still present in the landscape, especially in Northern Germany. *Wallhecken,* also found primarily in the north, are the hedgerows found on man-made soil ridges which are covered with shrubs, trees and herbs. Silvopastoral systems, known as *Streuobstwiesen,* are extensively managed fruit orchards with grassland or meadows that are used for grazing sheep, cattle, horses or chickens. These systems are most often found in Southern Germany.[171]

100 years ago, Germany would have had many more landscape features present on farms but interestingly, there was less forest area than we find now. Trees on plots and other landscape features were maintained for human use—fuel, firewood, building, basket-making. Like most of Europe, the intensification efforts and the machinery required in the latter part of the 20th century, removed many trees from the farm landscape and reduced forest farming since forest pastures could no longer meet the needs of highly industrialized breeds.[172] This was even more significant in the German Democratic Republic (East) where collectivization occurred, than in the West where land ownership remained fragmented with smaller plots which preserved some woody elements.[173]

Modern forms of AF, which primarily consist of alley cropping systems and the combination of broadleaved tree species for valuable wood production with various crops and pasture, are primarily found in experimental fields where they are used for research and as showcase mechanism for transitioning farmers.

The two main AF associations in Germany are AG Agroforst Deutschland and DeFAF (Deutscher Fachverband für Agroforstwirtschaft).[174]

6.1.7.1 CAP

AF is not directly eligible for funding in either pillar of the CAP, although there are possibilities for support for extensively managed orchards within Pillar II, as well as EFAs within Pillar I. Within Pillar I, EFAs are possible through short rotation coppices which have to be a minimum of 0.3ha for most federal states, but not in others (e.g. in Baden-Württemberg, the minimum plot size is 0.1ha). These areas are also eligible for direct payments because they can be classified as permanent cropland.

---

[171] EURAF. (2012). Germany. [online] Available at: https://euraf.isa.utl.pt/countries/germany [Accessed 31 Jul. 2021].
[172] Santiago-Freijanes, J.J., et al. "Agroforestry Development in Europe: Policy Issues." Land Use Policy, vol. 76, July 2018, pp. 144–156, 10.1016/j.landusepol.2018.03.014. Accessed 4 Dec. 2020.
[173] Dabbert, S. "Agroforestry and Land-Use Change in Industrialized Nations: A Case Study from Northeastern Germany." Agroforestry Systems, vol. 31, no. 2, Aug. 1995, pp. 157–168, 10.1007/bf00711723. Accessed 22 Dec. 2020.
[174] EURAF. (2012a). *Germany*. [online] Available at: https://euraf.isa.utl.pt/countries/germany.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

For trees that are classified as permanent crops, mostly applicable to fruit and nut trees, there is funding available under Pillar II—the ELER funds. Although the planting of permanent crops on arable land changes the plot code from arable to permanent cropland, they still remain eligible for direct payments. It is also possible to fragment a previously uniform plot into different 'strips', which can then be cultivated with permanent and arable crops. However, it is important to maintain each strip to a minimum of 0.3 ha. If each strip meets the minimum requirement size and consists of a defined selection of tree species, direct payments can be activated. Conversion of this land back to arable land is possible, while planting trees on permanent grassland is considered a type of conversion which has to be approved in advance and compensated.[175] Furthermore, the area that was converted into permanent cropland remains so for five years. Afterwards, it may be converted back to arable land under certain conditions, but in most cases the plot code remains permanently changed.

In Germany, Pillar II is implemented at the federal state level, involving a total of 13 different RDPs. Although the establishment and maintenance of AF systems was not taken into account in any of the programs, all programs support the maintenance of traditional AF systems at some level (e.g. hedgerow systems are considered a protected landscape element). Five federal states include measures to restore and preserve existing hedgerows and/or measures to plant new hedgerow systems. Most federal states implement programs to maintain orchard meadows. Six RDPs support measures to restore and preserve existing orchard meadows and/or measures to plant new ones, while two federal states support marketing measures for orchard products.

There are four types of woody vegetation that can be registered as landscape features and can count towards cross compliance and registered as EFAs: hedges or *knicks* (minimum length of 10 meters, average width of 15 meters); tree rows (five trees minimum, minimum length of 50 meters, needs to be planted in linear orientation); woodland patches or field shrubs (minimum area of 50 m2, maximum area 2000m2); and single trees (free standing and protected trees that have been recognized as such under the German Federal Nature Conservation Act).[176]

It is illegal to cut down landscape features and they can only be managed (e.g. pruned) between October 1st and April 30th. If a landscape feature is cut down, direct payments will be reduced and there is the possibility of more significant sanctions.

Some trees can be classified as permanent crops making them fully eligible for direct payments, and have the possibility to be classified as EFAs. There are two possible AF systems included: short

[175] Hausding, G. (n.d.). *Deutscher Bundestag - Bundestag tritt für eine Förderung der Agroforstwirtschaft ein*. [online] Deutscher Bundestag. Available at: https://www.bundestag.de/dokumente/textarchiv/2021/kw02-de-agroforstwirtschaft-814222 [Accessed 31 Jul. 2021].

[176] www.landwirtschaftskammer.de. (n.d.). *Landschaftselemente - beihilfefähige Fläche - Landwirtschaftskammer Nordrhein-Westfalen*. [online] Available at: https://www.landwirtschaftskammer.de/foerderung/direktzahlungen/landschaftselemente.htm [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

rotation coppices and fruit and nut trees. Short rotation coppices have specific requirements such as the cultivation of approved tree species, with a minimum cultivation area of 0.3 ha and at least one harvest in the total cultivation period of 20 years. The approved tree species are all poplar and willow species; locusts (Robinia); birch; alder; European ash; common oak; durmast oak and red oak. When classified as EFAs, the specific conditions include no use of mineral fertilizers, pesticides and herbicides, as well as a further limitation of tree species.[177] When it comes to fruit and nut trees, the establishment of extensively managed fruit orchards are eligible for a funding period of two years.[178]

AF has been named as a potential eco-scheme in Pillar I for the new CAP, yet it is important to note that the current draft only includes AF support for the continuation of AF on arable land.

6.1.7.2 National Policies

6.1.7.2.1 Agroforestry

Most of the policy support that can be found within national policies is for *Streuobstwiesen*, extensively managed fruit orchards. These orchards can be funded under two programs—the *Agrarinvestitionsförderprogramm* and *Landschaftpflegerichtlinien*. If fruit trees are cut down for any reason and then replanted, further funding is available in some areas, such as under the *Produktionsintegrierte Kompensation* program in Baden-Württemberg.

The Water Act for Baden-Württemberg does some work to protect woody vegetation close to bodies of water. Existing trees are protected from removal unless their removal is necessary for the restoration or maintenance of the bodies of water in question. The use of these strips within a range of five meters from the body of water is prohibited since January 2019. Planting and harvesting woody plants within harvest intervals of more than two years is permitted, as well as the establishment and maintenance of flowering strips in the form of perennial nectar and pollen resource areas for insects.[179]

All national regulations for trees on farms are in relation to the CAP, the only 'separate' regulations are the ones that deal with trees which are not on arable land such as woody components or trees

[177] Peschel, T 2015, Kurzumtriebsplantagen. Fördermöglichkeiten des Energieholzanbaus, Lignovis GmbH. Available from: https://www.lignovis.com/fileadmin/user_upload/PDF/LV/2015_09_21_LIGNOVIS_Praesentation_Saechsischer_Bioenergietag_KUP_Foerderung.pdf [22 March 2021].

[178] Richtlinie des Ministeriums für Landwirtschaft, Umwelt und Klimaschutz des Landes Brandenburg zur Förderung umweltgerechter landwirtschaftlicher Produktionsverfahren und zur Erhaltung der Kulturlandschaft der Länder Brandenburg und Berlin (KULAP 2014). (2020). [online] . Available at: https://mluk.brandenburg.de/sixcms/media.php/9/RichtlinieKULAP2014-Reinfassung2020.pdf [Accessed 31 Jul. 2021].

[179] Baden-Württemberg (2014). Wassergesetz für Baden-Württemberg (WG). available from: http://www.landesrecht-bw.de/jportal/?quelle=jlink&query=WasG+BW&psml=bsbawueprod.psml&max=true&aiz=true.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

in open country. Such trees cannot be cut down as they are often protected under regional tree protection regulations and every federal state has their own tree conservation laws.

6.1.7.2.1.2 Forest Farming

Forest farming is not legal in Germany within state or private forests because there is a popular assumption that livestock always damages forests. In some federal states there are possibilities to receive exemptions for extensive forest grazing but there are significant legal hurdles to achieve special considerations and approval by local authorities. If special permission is not granted, and forest owners allow livestock to graze, fines could be given. If one wants to practice forest grazing without permissions, it is often necessary to convert forest land into another land use category which is more agriculturally dominated. However, since the preservation of forest is a high priority, this is rarely granted.[180]

6.1.7.2.2 Mixed Farming

There are no national policies that directly support or are in favour of MF.

6.1.8 Hungary

MF has been the most traditional agricultural landscape in Hungary, and today it can still be found on small-scale family farms. AF, though not presently very common, has centuries of knowledge manifested in silvopastoral systems, grazed fruit orchards, shelterbelts, hedges and other woody components incorporated on arable lands.

Currently, most AF found within Hungary is through alley cropping (often large-scale industries that transform landscapes completely), mixed vegetable and fruit tree plantations (both at the small-scale family farm and garden level), hedges and the remnants of old traditional silvopasture systems. In the case of mixed fruticulture, there are interesting examples of floodplain fruit plantations that include grazing and apiculture, as well as fruit plantations that include vegetables and/or grazing. Traditional wood pastures and wood meadow systems can be found primarily in hilly and mountainous areas. According to the assessment made by the Horizon 2020 project, AGFORWARD, there are about 38,000ha of AF in Hungary, 95% of which are livestock systems.[181]

[180] Luick, R.; Schuler, H.-K. (2008): Waldweide und forstrechtliche Aspekte. Berichte des Institutes für Landschafts- und Pflanzenökologie der Univ. Hohenheim (17), 149-164, Stuttgart-Hohenheim.

[181] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Hungary's AF is currently being supported by the Hungarian Agroforestry Civil Association (ACT) which was established in 2016. Its members are mostly farmers, advisers and researchers.[182]

6.1.8.1 CAP

In terms of AF within the CAP, Hungary has been exemplary, implementing both Measure 222 and 8.2 country wide.

Within the 2007-2013 and 2014-2020 CAP, Hungary was the only Central and Eastern European country to implement AF. During the 2014-2020 period the national RDP supported the implementation and maintenance of grassland management combined with AF systems, field-protective afforestation (e.g. shelterbelts or woody vegetation), and Innovative Agroforestry Systems (cooperative projects within the Forestry Innovation Operative Groups).

The basic subsidies were as follows:

- Crop-forest mix: plantation (once) 872 EUR/ha + yearly manage 26-52 EUR/ha
- New silvopasture: plantation (once) 1652 EUR/ha + yearly manage 26-52 EUR/ha
- Silvopasture + already existing meadows: 872 EUR/ha + yearly manage 26-52 EUR/ha
- Hedges with alleys: plantation (once) 1249-1682 EUR/ha + yearly manage 670 EUR/ha/5 years
- Hedges with tree groups: 1249-1682 EUR/ha + yearly manage 670 EUR/ha/5 years
- New plantations of silvopasture mixed with fields of hay: 116-255 EUR/ha

These subsidies, along with other agri-environmental CAP related subsidies, natural conservation management practices and the rising demand for organic food has seen a steep increase in newly established AF systems, as well as formerly abandoned systems being farmed again as wood pastures.

While the new CAP Strategic Plan has not been released, it is foreseen that it will continue to support the same measures it did within the 2014-2020 period.

6.1.8.2 National Policies

6.1.8.2.1 Agroforestry

AF is supported in Act 2009/XXXVII on forests, forest protection and forest management primarily through field protecting forests which aim to protect soil from erosion and provide ecological corridors.

[182] EURAF. (2012b). *Hungary*. [online] Available at: https://euraf.isa.utl.pt/countries/hungary [Accessed 11 Aug. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

The Hungarian Forest Law states that any piece of land above 0.5 hectares, where the tree canopy cover is at least 30%, is considered forest land, which includes native and non-native forests and plantations.

Landscape features other than hedges do not have any specific policies or protections unless they are part of Natura 2000 areas. Further regulations and support may be found in Act 2013/CXXII on forest and agri-parcels capitalization (*földforgalmi törvény*); the National Structural Plan for forest layers; the National Green Infrastructure system-plan; the Landscape Character Plan; and the Ecosystem Services Cadastre.

6.1.8.2.1.2 Forest Farming

Wood pastures have always been an integral part of land use in Hungary although in the 18th century the country took on a German style of forest management that restricted their usage. Forest grazing was officially banned in 1961 and punishment was common for any breaches.
In 2017, the New Forestry Act permitted forest grazing with sheep or cattle in forests that are primarily made up by non-native trees. In most native forests, grazing is still prohibited. In Natura 2000 areas, grazing through forest land requires permission by relevant authorities whether in native or non-native forests. Interestingly, if the land-use type is categorized as a meadow, grazing is allowed and, in some areas, even required within the nature protection plan of protected areas.

Case Study: Forest Grazing within Hungary

Forests make up 20% of Hungary, with nearly 60% of these forests being native. Additionally, 60 % of forests are state owned and 85% forests are less than 80 years old. The cause of this majority of young forests is historical, primarily caused by gold mining in the medieval ages, which was a huge part of the economy and demanded significant amounts of timber.

Today, forest management under all types of ownership is strictly regulated by the Forest Law and supervised by authorities, which creates a strict separation between forest ownership and management. A specific administrative body prepares plans for both state and private forests, unlike in most other European countries where the appointed body simply supervises and approves.[183]

Up until 2017 forest farming was prohibited severely for 50 years and incrementally restricted for more than 200 years before that. Nevertheless, this seems to not have stopped grazing through forests as a study carried out between 2017 and 2019 shows us. The researchers interviewed 58 herders in 43 different locations to understand their use of forest land for

[183] Jager, L., Schiberna, E., Gábor Ali, T. and Horvath, K., 2021. Forest Land Ownership Change in Hungary. COST Action FP1201 FACESMAP Country Rep, [online] European Forest Institute Central-East and South-East European Regional Office (EFICEEC-EFISEE). Available at: <http://facesmap.boku.ac.at/library/countryreports> [Accessed 31 July 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

grazing. Since the interviews were conducted about illegal activities, the small sample size is only a fragment of the overall use of these landscapes.[184]

Forest land was found to be used for grazing all year, but particularly in late winter and early spring since forests have the earliest edible grasses, especially non-native Black locusts, *Robinia pseudoacacia* forests. Forest land is also used in summer for its herb layer which stays green for longer than in pastures; for cool and shade which keeps the animal's heart rate down; and shelter from storms. In winter and autumn, when the ground isn't covered in snow, these ecosystems are used for acorns and wild fruit foraging. Year round, forests are used for protection from wind and rain; as a haven from disruptive insects especially gadflies; and so, livestock can scratch off insects on bark. These forests are used as complementary feed and supplementary pastures normally account for only 10-20% of the livestock's calorie intake.

The farmers interviewed showed impressive knowledge of when to enter and stay out of forests, never visiting a spot more than once every few weeks or even months, depending on if there has been heavy rain that allowed the grasses to grow back. Many of their grazing skills are based on regeneration because their profession depends on the forest being managed sustainably. Grazers even reported differences in how each particular type of forest needs to be grazed and how various animals behave in each. Further, they often remain at the edge of the forest so the deeper shrub layer is not disturbed.

The farmers reported that grazing made the herb layer more biodiverse; that animals pulling down dead branches and trampling broke down vegetation, accelerating decomposition; fertilized; had no impact on roots and moss; and if done correctly, had no impact on young tree shoots since they kept out of forests until the shrubs had "grown past the mouths of the livestock." Farmers avoided using the same resting ground twice or for extended periods of time since these practices can cause changes in landscape composition—decreasing biodiversity with a regrowth of species that are disliked by the livestock, such as nettle. On the other hand, in forests where invasives were an issue, grazing was used as a way to help native trees regenerate and to eradicate a certain species. This is often done with thorny vegetation, such as blackberry plants in the spring, when the shoots are still small and animals can feed on them easily.

This deep well of knowledge is undoubtedly caused by the practice being uninterrupted, making this living knowledge of the local ecology. When forest farming was made illegal five decades ago, some villages were completely depopulated because the ban on grazing took the economic life force of many regions. In 2017, the law was overturned by many of the same scientists that did the aforementioned study. Grazing is now allowed in non-native

[184] Varga, A., Demeter, L., Ulicsni, V., Öllerer, K., Biró, M., Babai, D. and Molnár, Z., 2020. Prohibited, but still present: local and traditional knowledge about the practice and impact of forest grazing by domestic livestock in Hungary. Journal of Ethnobiology and Ethnomedicine, 16(1).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

forests and plantations, but is still illegal in native forests, Natura 2000 areas and conservation forests. A permit is required but it is just a formality, and all requests are approved.

Hungary is an interesting case because it is one of the countries in Europe where forest grazing has been the most severely restricted. Yet, the need for the dietary supplement caused by deep cultural connection to forests, economic constraints and the demands of extensively grazed animals, allowed it to survive. Interestingly, the illegality of forest farming may actually be the cause of such deep ecological knowledge by the herders, as they needed to learn to graze without being noticed, causing no impact on woody species. Before the law was overturned, grazing occurred primarily in oak and beech forests, while now it is in non-native forests of black locust, since it is now legally permitted in such forests. While there is a risk that the recent legality may cause a change in the ecological management, the herders are now very aware of nature protections, so their care for the land will likely remain, since they understand the usefulness of their work for conservation.[185]

Reared animals for nutrition

Surface or groundwater used for nutrition, materials or energy

Carbon sequestration

Nitrogen fixation

Carbon cycling

[185] Varga, A., Demeter, L., Ulicsni, V., Öllerer, K., Biró, M., Babai, D. and Molnár, Z., 2020. Prohibited, but still present: local and traditional knowledge about the practice and impact of forest grazing by domestic livestock in Hungary. Journal of Ethnobiology and Ethnomedicine, 16(1).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.


Pest and disease control


Enhanced soil fertility


Hydrological cycle and water flow regulation


Wind protection


Fire protection


Pollination and or seed dispersal


Regulation of temperature, light, humidity, and transpiration


Increased animal welfare


Recovery of marginal areas


Grassland management


Biodiversity

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.8.2.2 Mixed Farming

While there are no policies supporting MF in Hungary, there are a few measures supporting small and medium size farms which in practice, are often mixed. These measures include Act 2013/CXXII on forest and agri-parcels capitalization, and Act 2020/CXXIII on family farms. The act on family farms also makes a reference of support to traditional small-scale producers.

6.1.9 Ireland

AF and MF systems are very scarce in Ireland. The National Farm Survey in 2018 surveyed 898 farms and found that only two typologies of MF were present: field crops combined with non-dairying grazing livestock and non-dairying grazing livestock combined with field crops (Table 27). Nevertheless, livestock AF is the most popular AF system in Ireland maintaining around 224,000ha. Ireland's hedgerow surface on the other hand, is 1.6% of the land, the highest percentage in the EU[186], which is due primarily to the prevalence of small fields and hedgerows.

Centuries of logging and conversion of forested land prior to the 20th century, left Ireland with an estimated 1% forestland by 1900. In 1903 state forestry began and since then it has followed an expansionist policy which has significantly increased forest cover through plantation forestry.[187] In 2017, there was 770,000 ha[188] of forest area with an additional 348,000 ha of hedgerow and non-forest wooded land. The greatest increase in forest cover has occurred within the last 30 years. The majority of afforestation during the last century was carried out by the State, mostly by planting coniferous trees. A number of schemes have funded private afforestation since 1932, but it wasn't until 1987 that an annual compensatory income was provided. The Compensatory Allowance Scheme was the first EU scheme to encourage alternative uses of agricultural land in order to reduce agricultural surpluses for farmers who afforested all or part of their land. Compensatory Payments were based on the need to reduce livestock numbers on farms. The Forest Service was disappointed with the response of farmers to the scheme. Agricultural sources signified that the Compensatory Payments were unattractive to farmers who are traditionally attached to livestock ownership.[189]

The introduction of real annual payments to farmers in the form of payments paid over a period of years without requirement to reduce livestock levels occurred in 1989, through the Forestry

[186] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

[187] Neeson, E. (1991). *A History Of Irish Forestry*. The Lilliput Press Ltd., Dublin

[188] DAFM (2018) *Ireland's National Forest Inventory 2017 – Main Findings.* Department of Agriculture, Food and the Marine. https://assets.gov.ie/109397/d0d9f99b-b556-4f0f-86a0-5211354bd1c2.pdf

[189] Bulfin, M. (1999). Farm forestry development in the Republic of Ireland. In: Burgess, P.J., Brierley, E.D.R., Morris, J. and Evans, J. (eds.) *Farm Woodlands for the Future. Papers presented at the conference "Farm Woodlands for the Future".* Cranfield University, Silsoe, Bedfordshire, UK, 8 – 10 September 1999. Bios Scientific Publishers. pp. 11 – 22.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Operational Programme and the Operational Programme for Rural Development, and ran to 1993. During that five-year period, 80,000 ha (1.2% of the land area of the State) were afforested.[190] Farmers have been able to receive annual payments in all subsequent schemes and have continued to establish farm-forestry plantations. Nearly 300,000 ha of private forests were established between 1980 and 2019.[191] Ireland still maintains a forest expansionist policy, with the aim to increase forest cover by 15,000 ha per annum by 2046, which would result in 18% forest cover (DAFM, 2014).

In 2021 the Irish Agroforestry Forum was established to promote, demonstrate and encourage AF, act as a coordinated voice and to develop proposals to introduce trees onto farms. While the Forum is still in the early stages, they have received DAFM funding from Oct 2021 - Dec 2022 to expand their reach.[192]

Table 27. Number of farms by Farm Type and Region 2016. Data taken from the National Farm Structure Survey of 2016.[193]

Region	Farm type[1]								Total
	Specialist tillage	Specialist dairying	Specialist beef production	Specialist sheep	Mixed grazing livestock	Mixed crops and livestock	Mixed field crops	Other	
State	**4.7**	**16.1**	**78.3**	**15.1**	**11.6**	**2.1**	**8.2**	**1.3**	**137.5**
Border, Midland and Western	**1.0**	**3.6**	**46.0**	**10.3**	**6.5**	**0.6**	**3.9**	**0.6**	**72.5**
Border	0.4	1.7	16.3	5.5	2.4	0.2	1.5	0.4	**28.4**
Midland	0.5	1.1	8.8	0.4	0.8	0.3	0.7	0.1	**12.8**
West	0.1	0.8	20.9	4.4	3.4	0.1	1.6	0.1	**31.4**
Southern and Eastern	**3.7**	**12.6**	**32.3**	**4.8**	**5.1**	**1.5**	**4.3**	**0.7**	**65.0**
Mid-East and Dublin	1.2	0.9	4.5	1.3	1.3	0.3	0.8	0.2	**10.3**
Mid-West	0.1	2.7	11.0	0.2	0.8	0.1	0.9	0.1	**15.9**
South-East	1.6	3.4	6.9	1.0	1.5	0.8	1.1	0.2	**16.5**
South-West	0.8	5.6	10.0	2.3	1.5	0.3	1.5	0.2	**22.3**

[1] See background notes for further information on farm types.

[190] Ibid.
[191] DAFM (2020) *Forest Statistics Ireland 2020.* Department of Agriculture, Food and the Marine. https://assets.gov.ie/109208/c4970674-7b5f-46a6-8ceb-e3c4a958e3d3.pdf
[192] 2021 Irish Agroforestry Forum Coming Soon. 2021. 2021 Irish Agroforestry Forum Coming Soon. [online] Available at: <https://irishagroforestry.ie/> [Accessed 20 October 2021].
[193] Cso.ie. 2021. *Farm Structure - CSO - Central Statistics Office*. [online] Available at: <https://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2016/da/fs/> [Accessed 11 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.9.1 CAP

In Ireland, afforestation, including the establishment of AF, is funded by the Irish Exchequer. Measure 222 and 8.2 of EU Pillar II funding were not activated by Ireland. The available grants are further explained in Table 28.

Table 28. Available grant for establishment of agroforestry in Ireland - Afforestation Grant Premium Category 11.[194]

ITEM	VALUE (€/ha0	
Establishment grant (1 year)	4,215	
Maintenance grant (4 years)	1,405	
Fencing (1 year)	600	
Total Establishment	6,200	
	<10ha	>10ha
Annual Premium Payment (5 years)	645	660

The Irish CAP Strategic Plan is still in draft form but the European Commission has made AF a key provision that Ireland should establish under the CAP. Within the Commission Staff Working Document SWD2020(846) – the following reference is made to AF:

*Step up efforts to encourage tree-planting in various configurations – including **agro-forestry** systems – sink capacity and resistance to pests and diseases. Support may be necessary not only for afforestation but also for advice on species selection and on effectively integrating woodland into farm management.*

There is no mention of MF thus far although the Commission has recommended that it will be important to "Improve the resilience of the farming sector to climate risks such as water stress on grassland and fodder crops - for example, by supporting partnerships between livestock and arable farms and the creation of fodder reserves."[195]

6.1.9.2 National Policies

6.1.9.2.1 Agroforestry

The Irish Afforestation Scheme has 12 Grant and Premium Categories (GPC). The GPC11 is the body that funds the establishment of AF. It is a part of the Afforestation Grant and Premium Scheme. AF in the Irish afforestation plan can include pasture, grazing, silage and hay. Other systems may be considered on a site-to-site basis as long as the tree stocking rate is between 400-1000 trees per

[194] Assets.gov.ie. 2021. [online] Available at: <https://assets.gov.ie/69781/6f6dc37d067d4e7a813605acadd6b77e.pdf> [Accessed 25 October 2021].

[195] European Commission, 2020. COMMISSION STAFF WORKING DOCUMENT. Commission recommendations for Ireland's CAP strategic plan SDW (2020) 377 final. [online] Available at: <https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/key_policies/documents/ie-swd2020_377-other-swp_en.pdf> [Accessed 20 October 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

hectare, it is at least 0.5 of a hectare, and at least 20 meters wide. Trees are thinned out after a certain period of time reducing numbers to between 160-250 trees per hectare to ensure that enough light will filter through the canopy, enabling continued grass growth. There are specifications where trees must be protected against browsing animals by tree shelters, fencing or both. When silage and hay are being produced, farmers must ensure that appropriate machinery is used to avoid damage to the trees.

AF measures are targeted at silvopastoral AF systems which combine forest and pasture. A stocking rate of 400-1000 trees per hectare is permitted, with a minimum eligible plot size of 0.50ha and tree-to-tree width of 20 metres. Acceptable tree varieties include broadleaf species such as oak, sycamore and cherry, but other species, including conifers are considered on a site-by-site basis. All activities including pasture and fodder are permitted, as long as the activity protects all present trees. For pasture systems the grazing of sheep or young domestic stock is permitted during the spring and summer months for the first 6-8 years, depending on tree growth, but trees must be protected and tree shelters checked regularly. Thereafter, when tree shelters are replaced with plastic mesh, larger animals may be introduced. AF must remain under forestry and therefore is subject to a replanting obligation. Under state aid rules only 80% of eligible costs can be funded. Premiums are paid for five years to cover only the cost of maintenance. Support for the establishment of demonstration plots for research purposes may also be considered under this scheme.[196] Exchequer funding is also available for thinning and high-pruning via the Woodland Improvement Scheme.

Currently (September 2021) there are 71 Afforestation GPC11 applications at various stages, consisting of 226 ha. There are currently 19 people who received GPC11 payments and have therefore planted AF under the Afforestation Scheme.

One key barrier to increased uptake of AF is that agricultural land planted as AF under the DAFM Forest Service Afforestation Scheme is subsequently categorized as “Forest Land”. Under the Forestry Act 2014, forest land must remain as forest land into perpetuity. Landowners view this as limiting what they, and their descendants, can do with the land. Another barrier is that the annual premium payments payable for AF are only for 5 years, as compared to 15 years for other afforestation projects. There is currently an ongoing project that is investigating the perceptions and attitudes towards trees of Irish dairy and Drystock farmers. This project will also identify perceived barriers to uptake of agroforestry.

Within Ireland’s Ag Climatise – A Roadmap Towards Climate Neutrality document AF is mentioned twice in Action 13 and 14:

[196] Department of Agriculture, Food and the Marine (2015). *Afforestation Grant and Premium Scheme 2014-2020*. [online] Available at: https://assets.gov.ie/69781/6f6dc37d067d4e7a813605acadd6b77e.pdf.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement 862993.

Action 13: Engage with Teagasc, NESC and other stakeholders to review and analyse the full suite of land diversification options to consider alternative economic opportunities that could assist with a just transition to lower emissions land use options, including agroforestry.

Action 14: Expand areas of broadleaved and native woodland planted through initiatives such as Agroforestry; Encourage diversification of different types of forestry systems such as agroforestry.[197]

AF is also mentioned multiple times in the Programme for Government under the roadmap to reduce emissions and support the forestry sector within the Green New Deal. Some of the references are listed below:

Trees and forests store carbon, clean the air, mitigate water movements, prevent soil erosion, provide habitats for flora and fauna, and provide an attractive amenity for the public. The forestry industry is a significant employer in rural communities, providing in the region of 12,000 jobs. We fully support this sector and will:

Publish a successor forestry programme to deliver an ambitious afforestation plan reviewing grant and premium rates across all categories in this area, with a particular focus on an increased farmer rate of support.

Support the development of on-farm forestry initiatives through the new CAP, aligning agri-environment schemes with climate-change objectives and investing further in knowledge transfer.

Incorporate afforestation into the new CAP to provide incentives for farmers to plant woodland on their farms, acting as a carbon store, helping to promote wildlife corridors, and providing a future fuel source for the household.

Actively promote and support farm forestry/rewilding options that do not impact on agricultural production and support biodiversity and habitat creation. We will incentivise the option of small-scale (e.g. one hectare) forestry/rewilding.

Promote planting of 'protection forests' along rivers and lakes to protect water quality and assist in managing flood risks.

Provide increased support for the development of agroforestry/silvopasture on Irish farmlands.[198]

Many of the rules for landscape features are covered in the Forestry Act of 2014.

---

[197] Department of Agriculture, Food and the Marine, A.C. (2020). *A Roadmap towards Climate Neutrality*. [online] Available at: https://assets.gov.ie/100931/7c8b812c-d857-4f39-96b9-1e7f134ba896.pdf.

[198] *Programme for Government Our Shared Future*. [online] Available at: https://www.rte.ie/documents/news/2020/06/programmeforgovernment-june2020-final.pdf **[**Accessed 11 Aug. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.9.2.1.2 Forest Farming

Forest grazing is permitted under certain conditions. If the forest establishment has been aided by government grants and in receipt of annual premium grant payments, pastoralism is not permitted until the final annual premium payment has been paid. Any grazing must be managed to ensure that the trees are not damaged.

6.1.9.2.2 Mixed Farming

There are no national policies that support MF however, the organic scheme does promote it as a best practice.

6.1.10Italy

Historically, AF was a very common landscape practice in Italy, representing the most typical cropping system in plains, hills and mountain systems. Currently around 1,304,600ha still integrate trees with animals on agricultural landscapes—this is about 10.1 % of the total agricultural area. [199][200]

The largest area devoted to silvopastoral systems, which include wooded pastures and grazed woodlands, are found in Sardinia, but a large amount is also found in the Alpine Regions where the traditional AF system of larch wood pasture can still be found.[201]

Olive trees cover an area of 1.16 million ha, making them the most widely planted tree in the country. Historically, olive trees were intercropped with other crops and grazed but this has declined in recent decades.[202]

The main associations related to AF in Italy are AIAF, the Italian Association of Agroforestry which was established in 2012; SISEF which is the Agroforestry Working Group of the Italian Scientific Society on Silviculture and Forest Ecology; Compagnia delle Foreste; and PEFC, a national governing body for the Programme for the Endorsement of Forests Certification Schemes.[203]

---

[199] Paris, P., Camilli, F., Rosati, A., Mantino, A., Mezzalira, G., Dalla Valle, C., Franca, A., Seddaiu, G., Pisanelli, A., Lauteri, M., Brunori, A., Re, G.A., Sanna, F., Ragaglini, G., Mele, M., Ferrario, V. and Burgess, P.J. (2019). What is the future for agroforestry in Italy? *Agroforestry Systems*, 93(6), pp.2243–2256.

[201] EURAF. (2012a). *Italy*. [online] Available at: https://euraf.isa.utl.pt/countries/italy [Accessed 31 Jul. 2021].
[202] Paris, P., Camilli, F., Rosati, A., Mantino, A., Mezzalira, G., Dalla Valle, C., Franca, A., Seddaiu, G., Pisanelli, A., Lauteri, M., Brunori, A., Re, G.A., Sanna, F., Ragaglini, G., Mele, M., Ferrario, V. and Burgess, P.J. (2019). What is the future for agroforestry in Italy? *Agroforestry Systems*, 93(6), pp.2243–2256.
[203] EURAF. 2021. *Italy*. [online] Available at: <https://euraf.isa.utl.pt/countries/italy> [Accessed 11 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.10.1 CAP

Measure 222 and 8.2 were both activated in Italy, within some regions. Five out of twenty regions activated Measure 8.2 in the 2014-2020 CAP including Basilicata, Marche, Puglia, Umbria and Veneto. While Basilicata and Marche did not open their call, Umbria, Veneto and Puglia did—Puglia being the only region that had farmer uptake. Each region had a specific focus, which will be outlined in Table 29 below.

Table 29. Agroforestry support in the 2014-2020 RDPs of five Italian regions.[204]

REGION	SUPPORTED OPERATIONS	MAXIMUM AMOUNTS €/ha + €/ha/year	STATUS
Basilicata	1. The establishment of *silvopastoral systems* which included the cultivation of one or more forestry and agricultural woody species, with a medium to long cultivation cycle on the field border of arable lands to realize hedges, windbreaks or buffer strips. The tree density requirements were 60-200/ha with a tree distance of < 6 m. 2. The establishment of *linear systems* including the cultivation of one or more forestry and agricultural woody species, with a medium to long cultivation cycle on the field border of arable lands to realize hedges, windbreaks or buffer strips. The tree density requirements were 60-200/ha with a tree distance of < 6 m.	2,000 + 200	Not open
Marche	The establishment of the following AF systems: 1. creation of small wooded areas; 2. realization of linear systems (hedges and rows); 3. planting isolated trees scattered in the field. The maximum density for trees is 50-100 trees/ha; and < 200 shrubs/ha.	Agricultural areas: 3,100 + 300 Abandoned agricultural areas: 4,600 + 300	Not open
Puglia	The establishment of the following AF systems: 1. linear systems (hedges, rows, windbreak, etc.); 2. planting one or more forestry or agricultural woody species and/or shrubs, with medium-long cultivation cycle. The maximum tree density is 50-250/ha	2,750 + 1,200	Allocated resources of 5 million €

[204] EURAF. (2012a). *Italy*. [online] Available at: https://euraf.isa.utl.pt/countries/italy [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Umbria	1. The establishment of silvopastoral systems which include planting forestry trees species on agricultural land, with a medium to long cultivation cycle, combined with livestock activity and aimed to produce timber, biomass or other non-forest products. The maximum tree density is 20-50 trees/ha, with a tree distance of more than 10m. 2. The establishment of silvoarable systems which include planting one or more forest trees or shrubs species in linear system or scattered in the field, with a medium to long cultivation cycle, aimed to produce timber, biomass and other non-forest products. a. In the case of linear system: the tree density requirements are 40-100 trees/ha, with a distance of 20-30m between tree rows and 5-10m between trees. Trees can be planted in field borders as hedges, windbreak or buffer strips. b. In the case of scattered trees: the tree density requirements are 20-50 trees/ha with a tree distance of >10 m.	2,300 + 500 2,000 + 500	Call open Allocated resources of 1 million € Target: 200 ha
Veneto	1. The establishment of silvopastoral systems which include selective thinning of trees species already present on agricultural lands to implement agricultural or livestock activity—it includes the recovery of abandoned agricultural lands occupied by natural vegetation. 2. The establishment of silvoarable systems: planting of one or more forestry trees or shrubs species, scattered or in regular design, with medium-long cultivation cycle, aimed to produce timber and/or biomass and/or non-forest products. 50-100 trees/ha	The maximum amount based on regional prices; maintenance contribute is 250 The maximum amount based on regional prices; maintenance contribute is 110	Call open 80% establishment cost (up to 3100 €/ha) + 250 €/ha (5 years)

While Puglia does have a strong tradition of AF, especially olive trees, this does not on its own explain why interest in Measure 8.2 has only occurred in this region. This is especially true when one takes into consideration that this strong tradition is alive in most of southern Italy and in some pockets of the north. The *Xylella fastidiosa* pathogen that has been impacting the region very severely since 2013 has had a great impact on olive oil cultivation so, Measure 8.2 could be linked to this—the replacement of olive trees with other agricultural trees.

Piemonte did not activate Measure 8.2 but nevertheless the region has measures that support MF and AF which will be mentioned in the case study below.

The current intention for the future Italian RDPs is to create specific guidelines and best practices for AF systems based on science, research and local experience. The intention of this is to have a

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

document that builds better AF measures for the next CAP since thus far the measures related to AF have not been effective in either the 2007-2013 or 2014-2020 periods.[205] This will be done in collaboration with the National Rural Network. Further, special working groups will be developed for specific issues in order to develop comprehensive national measures that will be more effective in future schemes, one of these will be devoted to AF. The aim is to strengthen the role and function of silvopastoral systems. In parallel, attention to AF is being fostered at a regional level through two operational programs projects: CARTER in Veneto and NEWTON in Tuscany.

6.1.10.2 National Policies

6.1.10.2.1Agroforestry

There are no national policies that support AF directly in Italy. Further, while there are no subsidies or payments for maintaining trees on farms either at the CAP or state level, Italian law does protect some landscape features.

For example, monumental trees which are defined as isolated trees that represent either naturalistic value, reference to specific events or memories (either historical, cultural or local traditions), are protected. Further, rows of trees of particular landscape, historical and cultural value (including those in urban centres), and trees in architectural complexes of historical and cultural importance (i.e. in villas, monasteries, churches, botanical gardens and private historical residences), are also protected, although these are not necessarily on agricultural land.

6.1.10.2.1.2 Forest Farming

Grazing in forest land is not forbidden but is regulated by each regional authority which has specific aims for forest regeneration and conservation. This also includes specific rules on which animals are and are not allowed.

6.1.10.2.2Mixed Farming

There are no national policies that support MF.

[205] Nazionale, R.R. (n.d.). *PAC post 2020 - Il percorso nazionale*. [online] Rete Rurale Nazionale. Available at: https://www.reterurale.it/PACpost2020/percorsonazionale [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Case Study: Pastoralism in the Italian Alps

Pastoralism is an ancient practice that has recently found increasing policy support for its ecosystem services—enhancing plant and animal biodiversity; facilitating water flow and retention by reducing soil erosion, flooding and fire hazards from maintaining vegetation cover; and carbon sink capacities. Additionally, a social and economic role is also being played as the increase of this practice is bringing life back to rural communities, especially mountainous ones.

Although not normally recognized as an MF system, the authors of this inventory believe that pastoralism can fit under the definitions of both AF and MF, since it is an extensive livestock system. During winter, late autumn and early spring most pastoralists work in collaboration with other farmers and graze on their arable lands, providing many of the spatial interactions described at the beginning of this inventory as fitting within the definition of MF. During summer, late spring and early autumn, pastoralists bring their animals to mountainous regions maintaining woody vegetation in grassland landscapes and in forests, engaging in AF.

Piemonte is both a perfect example of this and a fascinating one. Pastoralism has been occurring in the region uninterrupted for thousands of years, even though the region is highly populated and industrialized.

A study done by Giulia Mattalia gives an intimate portrayal of pastoralism in the region that shows us the deep connection that is maintained between humans and animals, and the impressive knowledge of the landscape that is being held by these semi-nomadic peoples. The study found that pastoralists had a wide range of understanding of the land including: how to make sure trampling doesn't damage soil; determining the amount of moisture in the soil before deciding if they can graze or not; training their animals to eat invasive species; and allowing other plants to thrive, thus increasing biodiversity and fertilizing.[206]

There are 65 nomadic sheep flocks found in this region with herd sizes ranging from 400-3000 of traditional breeds—Biellese and Bergamasca—as well as a few goats, and at times, cows will join the flock in the summertime. Flocks are grazed during the day and placed inside mobile fences at night.[207]

Every shepherd maintains his or her main area which has been grazed by their family or lineage for centuries. Further, since pastoralism is a highly skilled profession that requires an array of skills, including veterinary ones, new shepherds will follow each other transmitting a direct line of knowledge. Endangered breeds are supported by the CAP and some municipalities also provide pastoralists with a certain number of subsidies per year for each sheep head.[208]

[206] Data sourced from interview with Giulia Mattalia.
[207] Ibid.
[208] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Historically, Piemonte was a very important exporter of wool - the primary form of income for pastoralists. Yet, since the demand for wool has decreased, pastoralists have had to find other forms of income. This is especially challenging within a region that traditionally does not have a culture of eating sheep for meat. Further, selling meat is complicated by many other issues. Chief among them is that since they cannot predict the time or day they will arrive (since it depends on grass conditions and permits), they cannot book a time at the slaughterhouse. Therefore, a middleman who is as historical as the shepherds, comes into the equation. This middleman buys the sheep from the pastoralists and then sells them later to the slaughterhouses. Secondly, there is competition with Sardinia, who is more recognized for sheep meat and who's pastoralists are often not nomadic and therefore do not have to deal with the same issues and costs. Lastly, while cheese was historically a way pastoralists supplemented their income, the food safety (specialized equipment) and ecological conservation laws have resulted in them having to halt this practice. In the case of conservation laws, huts cannot be restored and mobile cheese making facilities cannot be created. Many of their summer huts do not even have running water.[209]

Legally, each time the flock has to pass through an area, they require the permission of each municipality in question, especially the local animal health authorities. Once the pastoralist applies, the municipality has one week to reject their request otherwise they can pass. Some regions don't allow pastoralists to pass at all, so these areas need to be avoided. After the municipality agrees, the pastoralist then interacts with farmers to make informal agreements for winter pasture, and more formal agreements with the municipality and region in summer. Some of these relationships have been institutionalized over centuries. Traditionally, flocks were allowed to graze on arable land between Saint Martin's Day (November 11) and Saint Joseph's Day (March 18). This process is both expensive and time consuming since so many permissions are needed for each month of the year.[210]

Within the CAP, pastoralism is supported primarily for the ecosystem services of this type of grazing management. 95% of these shepherds receive EU subsidies aimed at preserving mobility-based and marginally located pastoral systems. Yet, although the CAP does provide support, many of the environmental benefits occurring aren't being subsidized since pastoralists are grazing with informal agreements for more than half of the year. The subsidies received are mostly in summer, when the agreements are more formal in nature, and they are caring for mountainous areas, which seem to be the primary focus of the CAP. Forest patches also cannot be included in the CAP subsidies the pastoralists receive.[211]

[209] Mattalia, G., Volpato, G., Corvo, P. and Pieroni, A. (2018). Interstitial but Resilient: Nomadic Shepherds in Piedmont (Northwest Italy) Amidst Spatial and Social Marginalization. *Human Ecology*, 46(5), pp.747–757.
[210] Ibid.
[211] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

More specifically, Pillar I of the CAP gives pastoralists financial support based on the amount of land they manage, rather than per animal head. The primary concern is that what is categorized as land area, often leaves out a significant amount of the land they manage, and therefore does not provide the appropriate amount of CAP support. Pillar II, which is founded primarily on improvement of environmental practices and improving the quality of life in rural areas (two primary benefits of pastoralism), compensates pastoralists for farming in a way that is more demanding and labour intensive. Since summer pastures are often in HNV areas, they could receive benefits both for natural "handicaps" and for more specific agro-environmental measures. These Less-Favoured areas payments subsidize a maximum of 250€ per hectare. More can be given to shepherds that undertake transhumant activities such as is the case in Piemonte, where movement requires greater distances travelled and a higher economic cost.

For the 2014-2020 period, the support through the RDP was for:

1. Protect endangered autochthonous breeds;
2. Grazing management (e.g., keeping areas clear of weeds and bushes, and free from pesticides, herbicides, or mineral fertilizers);
3. Application of safety systems to prevent canine (e.g., wolves and stray dogs) attacks in the highlands (e.g., electric fences, guard dogs);
4. Application of the pastoral farm plan in Alpine pasture areas.

Most pastoralists in Piemonte apply to the first two subsidies. In the case of the first, by introducing tacola sheep, an endangered breed. The second measure is mostly applied for highland grazing because of the issues of informality of lowland agreements as stated above. Pastoralists almost never apply for the third and fourth subsidies. Agricultural unions help shepherds through the administration of the EU subsidies.[212]

Using the landscape in this way creates both economic and environmental benefits, as well as bringing economies to rural areas. Animals are also less likely to be exposed to herbicides and pesticides for at least half of the year, creating better health for the animals and nutrition for humans. Further, stubbles that would normally go to waste in industrial agriculture such as corn, soy, wheat and oats are eaten by livestock creating less demand for alternate feeds and more regional autonomy.

Outside of Piemonte, there are three programs that are worth mentioning related to pastoralism:

[212] Mattalia, G., Volpato, G., Corvo, P. and Pieroni, A. (2018). Interstitial but Resilient: Nomadic Shepherds in Piedmont (Northwest Italy) Amidst Spatial and Social Marginalization. *Human Ecology*, 46(5), pp.747–757.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

1. The Programme de Développement Rural Hexagone in France which occurred from 2007-2013 which subsidized sheep transhumant systems that make use of mountainous resources.
2. The Bulgarian RDP supports HNV extensive grazing and specific local traditional breeds that are in danger of decline. This is done both to maintain biodiversity and for the genetics of these animals, since they are better adapted to local conditions. In the latter case, subsidies apply per herd size. This program also supports seasonal grazing in mountain pastures.
3. The Ox Trail transnational cooperation project which aims to revive ancient trail routes used by pastoralists in central Europe to move oxen from Hungary, Romania, Slovakia, Austria all the way to southern Germany. The program is funded through the EU Leader programme and pastoralism plays a huge role in it.[213][214]


Reared animals for nutrition


Reared animals for materials or energy

Surface or groundwater used for nutrition, materials or energy


Nitrogen fixation


Enhanced soil fertility


Hydrological cycle and water flow regulation


Fire protection

[213] Nori, S. and Gemini, M. (2011). The Common Agricultural Policy vis-à-vis European pastoralists: principles and practices. *Pastoralism: Research, Policy and Practice*, [online] 1(1), p.27. Available at: http://www.pastoralismjournal.com/content/1/1/27 [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.


Pollination and or seed dispersal


Increased animal welfare


Educational value


Recovery of marginal areas


Grassland management


Biodiversity

6.1.11 Netherlands

AF systems in the Netherlands are only occasional, with the most common types being hedgerows, silvopasture and food forests. While there is no data available on the total area devoted to AF in the country, it is estimated that hedgerows cover at least 50,000 ha. Traditional AF systems include high stem fruit tree orchards with livestock grazing and landscapes with small fields combined with hedgerows. These systems largely disappeared due to intensification, although some were preserved. Hedgerows were common before this, as they were used as fences for livestock, for biomass and firewood, and for erosion prevention. Coppice and pollarding systems were also common for animal feed, building material and energy. Trees were common in pastures for grazing as they provided shade and additional animal feed. Finally, most farms had their own small fruit orchard that was grazed by a few animals. Modern AF systems found within the Netherlands include silvopasture with nut trees or trees for feed, highly diverse food forests (i.e. forest gardens), chickens combined with fruit or willows, small-scale silvoarable systems and forest grazing with pigs.

The Netherlands has three main AF associations: Agroforestry Nederland, Agroforestry Zuid-Nederland/Network Brabant and Stichting Voedselbosbouw Nederland.[215] In 2020 a further organisation called the Agroforestry Network Gelderland was established.

[215] EURAF. (2012b). *Netherlands*. [online] Available at: https://euraf.isa.utl.pt/countries/netherlands.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.11.1 CAP

Measure 222 and 8.2 were not activated by the Netherlands and no provisions are made directly for AF within the CAP, although fruit and nut trees can receive payments even if there is grazing on that particular parcel. However, this is not a special provision made with AF in mind. It is possible to make use of the subsidy *Agrarisch Natuur-en Landschapsbeheer (ANLb)* (an agri-environment scheme) for realizing and maintaining woody elements such as hedgerows in areas under Natura 2000[216]. There is also a crop code to register crops in order to receive the direct payments (*gewascode)* for food forests (*voedselbossen*) which makes this type of system eligible for the standard CAP payment per hectare. However, there are many requirements on how the system should look—at least 0.5 hectares; four vegetation layers have to be present; a maximum vegetation of large trees producing fruits or nuts; and no animals or fertilisation are permitted[217]—which makes this crop code unsuitable for many types of AF or MF.

The plan for the new CAP remains uncertain although it seems that it will include new workable crop codes for the registration of AF systems in order to receive direct payments. Additionally, the limit of 50 trees per hectare in order to be registered as farmland will probably be removed or replaced by a higher limit[218].

6.1.11.2 National Policies

6.1.11.2.1 Agroforestry

There are currently no national policies that support AF directly although there are some regional ones. In the province of Brabant, there is a concept for a new *Omgevingsverordening*[219] (environmental regulation), where AF systems and food forests are exempt from having to acquire permits to cut down trees and to forego the requirement to re-plant trees. Also in this province, the Groen *ontwikkelfonds* (GOB) offers land to individuals in order to realise new projects for nature and nature inclusive farming in Natura 2000 areas. Entrepreneurs are required to submit a plan with their intentions for the parcel and the GOB then makes their selection[220]. The loss of value of the land and 50% of the costs for the realisation of the project are compensated. This bottom-up-approach has led to the realisation of many AF systems. Within the Province of Gelderland, AF is mentioned as a solution to realise sustainable farming within a program that is still in the process

[216] Norén, I. S., Cuperus, F.,, , Bruil, W., Wieringa, H., Schoutsen, M. A., ... & Sukkel, W. (2018). Bomen planten op landbouwgrond, wat mag ik?: Handleiding voor agrarisch ondernemers die bomen willen planten op hun bedrijf.
[217] RVO. (2020). *Voedselbos 2020.* [online] Available at: https://www.rvo.nl/subsidie-en-financieringswijzer/uitbetaling-betalingsrechten/voedselbos
[218] Luske B., Prins E., Reichgelt, A., Kremers,. J (2020) *Gewascode voor agroforestry, advies voor erkenning en duidelijke regelgeving,* Louis Bolk, Probos.
[219] Omgevingswetinbrabant (2020). Concept-Omgevingsverordening Noord-Brabant. [online] Available at: https://www.omgevingswetinbrabant.nl/media/1634/concept-omgevingsverordening-noord-brabant-versie-21092020.pdf
[220] Groenontwikkelfondsbrabant (n.d.) *Wat kunnen wij voor u betekenen?* [online] Available at: https://www.groenontwikkelfondsbrabant.nl/homepage/wat-kunnen-wij-voor-u-betekenen

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

of being approved. Their aim is to except AF systems from certain regulations to compensate the risk farmers bear during transition[221]. At the national level there is a policy document titled, Vision Agriculture, Nature and Food: valuable connected, where agroforestry is mentioned as a good tool for circular agriculture. The government is currently working on supportive policies to develop this policy[222].

Landscape features are supported through a few policies such as the nature regulations (*Wet Natuurbescherming*) that are executed by each province with the goal to maintain the total area of trees and woody elements. While this is positive for woody vegetation, it does cause issues for the experimentation with establishing new AF systems since permissions are required to remove trees and any vegetation that is removed requires replanting. Some local governments have area plans (*Bestemmingsplannen)* that designate and regulate the height of vegetation and the planting of woody elements in relation to landscape aesthetics. Each area has a designated use, such as farmland, farmland with nature value or nature. Agroforestry does not always fit under these regulations and can therefore be rejected at times when it doesn't[223].

6.1.11.2.1.2 Forest Farming

Forest grazing is allowed in the Netherlands however, the same regulations apply as for intensive livestock farming. These include an environmental permit (*omgevingsvergunning*) and regulations regarding ammoniac, smell, particulate matter and noise. It is sometimes unclear which rules apply to forest grazing, which makes it a legal grey area. Organic production removes some of the requirements and regulations. In addition to these regulations, further permits are needed to allow grazing in nature according to the nature protection law (*Wet Natuurbescherming*). In practice, only a low number of animals per hectare are allowed in these systems when following the manure laws (*Mestwetgeving*). These types of systems are only applied successfully in a handful of cases serving only niche markets.

6.1.11.2.2Mixed Farming

There are currently no national policies that directly support MF systems.

[221] Landbouwnetwerkregiofoodvalley (n.d.) Agroforestry Netwerk Gelderland van start. [online] Available at: https://landbouwnetwerkregiofoodvalley.nl/netwerk-agroforestry-gelderland-van-start/

[222] Ministry of agriculture, nature and food quality in the Netherlands (2018) Agriculture, nature and food: valuable and connected [online] Available at: https://www.government.nl/ministries/ministry-of-agriculture-nature-and-food-quality/documents/policy-notes/2018/11/19/vision-ministry-of-agriculture-nature-and-food-quality---english

[223] Norén, I. S., Cuperus, F.,, , Bruil, W., Wieringa, H., Schoutsen, M. A., ... & Sukkel, W. (2018). Bomen planten op landbouwgrond, wat mag ik?: Handleiding voor agrarisch ondernemers die bomen willen planten op hun bedrijf.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.12 Poland

AF and MF systems are not very popular in Poland, nor are they common knowledge to agricultural producers and decision makers. Nevertheless, Poland does have many traditional forms of both systems, especially when it comes to MF, which was significantly present in Poland up until 1990. Cereal production alongside poultry; integrated production of fodder crops and grassland with dairy cows and pigs; extensive grazing of sheep and cattle combined with semi-subsistence crop farming; as well as AF systems such as pollarded willows, grazed orchards and semi-natural grasslands with woodland and trees are all still present. The microclimate function of windbreaks has been recognised for centuries and this long-standing tradition is maintained.

Most of the trees that would have been maintained in farmed landscapes for practical reasons, as well as ecological ones, were removed by specific policies and during the rapid economic transformation of Poland in the 1990's. In order to achieve a high level of production to enter international markets, farms quickly became specialised for one type of production, especially once Poland became part of the EU in 2004. At the moment, MF systems represent approximately 20% of the Polish agricultural landscape. Despite this, the strong opposition of farmers against land collectivization policies has saved many of the trees on agricultural land, especially in the central and eastern parts of Poland.[224] A large part of the agricultural landscape in Poland is based on mosaic low-intensity small scale farms, with about 59 % of farms under 30 ha.

The Polish Agroforestry Association was established in 2015 mostly by researchers, but some farmers are also present.[225]

6.1.12.1 CAP

Poland does not make provisions for AF under the CAP, although AF initiatives and regulations are currently being developed by the Ministry of Agriculture for the next CAP Strategic Plan. AF has been included as both an eco-scheme and as an intervention instrument. No direct support is planned for MF.

In the previous CAP, AF was not even included as an EFA measure, although trees on farms are subject to the rules of the Nature Conservation Act.

6.1.12.2 National Policies

6.1.12.2.1Agroforestry

There are no national policies that support AF directly, although the State Forestry Policy and the State Ecological Policy have introduced rules for the introduction and management of trees and

[224] Borek, R. (2015). Agroforestry Systems In Poland A Preliminary Identification. *Papers on Global Change IGBP*, 22(1), pp.37–51.
[225] EURAF. 2021. *Poland*. [online] Available at: <https://euraf.isa.utl.pt/countries/Poland> [Accessed 11 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

shrubs in agricultural landscapes.[226] The State Ecological Policy has designated midfield trees, shrubs and buffer strips along waterways as the woody vegetations most in need of protection.

The Program of the Conservation and Sustainable Use of Biodiversity and the roadmap for 2015-2020 recommends the regeneration of ecological corridors and of woody vegetation in agricultural landscapes. Cutting mature trees anywhere but on forest land is almost always prohibited by the Nature Protection Act.[227]

6.1.12.2.1.2 Forest Farming

Forest farming is illegal in Poland and forest management for state forests falls entirely under the Forest Act regulations. This act is a significant barrier for silvopastoral systems since even in cases where small permanent pastures are covered by a very small number of trees, they can be considered forest land.[228]

6.1.12.2.2Mixed Farming

There are no national policies that support MF.

6.1.13 Portugal

Portugal has a highly diversified tradition of AF systems due to the great variability of bioclimatic conditions; a long history of diverse land uses; and a considerable variation in land tenure between the north (small, scattered properties) and south (large properties) of the country. Accordingly, a closed system called *montado* was developed in the south (described in more detail below), but open fields involving several landscape components were developed in the north.

Due to the social and landscape characteristics of the mountainous areas of north and central Portugal, land use is characterised by an 'agroforestry mosaic' with a high diversity of tree and shrub species. Rural populations in these regions use traditional AF systems to diversify production and income, with products including meat, milk, fruits, forage, fodder, vegetables, olives, grapes, and wood products including firewood. Some examples are *lameiros*, and *soutos* and *castinçais*. *Lameiros* are natural pastures with isolated trees, hedges, tree borders and riparian buffers. Originally, they marked field boundaries but they were, and are, also important for local firewood production, animal fodder, soil protection and pasture improvement. *Soutos* and *castinçais* are

[226] Borek, R. (2015). Agroforestry Systems In Poland A Preliminary Identification. *Papers on Global Change IGBP*, 22(1), pp.37–51.
[227] Ibid.
[228] Borek, R. (2015). Agroforestry Systems In Poland A Preliminary Identification. *Papers on Global Change IGBP*, 22(1), pp.37–51.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

areas that include low densities of *Castanea sativa* (sweet chestnuts) trees that are managed for chestnut production or high-quality wood, with natural or improved permanent pastures grazed by livestock. Together, these systems cover 41,410ha.

In the north of Portugal, particularly in the Vale do Sousa and surrounding areas, we also find an ancient vineyard system originating in the Middle Ages, the hanging vineyard. Vines for wine production are cultivated within the limits of agricultural plots and deliberately managed to promote growth in height (up to 4 meters or more), supported by live poles of species such as plane trees, bastard lotus, ash, and many others. The interior of the plots is dedicated to the cultivation of agricultural crops or pastoral activities. In this system, trees are pruned annually with two objectives—to obtain forage for the animals and to reduce the amount of shade that would result in limiting the development and maturation of the grapes. For this reason, the tree species used in this system need to be able to withstand pollarding or frequent pruning.

Finally, we also find traditional olive tree systems which cover about 340,000 ha. Generally olive trees are associated with cereals or grape vines but also with rye and oats for direct consumption by animals. After the commercial collection of olives, sheep and goats flocks feed on the remaining fruit left on the ground. The understory species are grazed mainly in spring.

There are many AF associations in Portugal, some of which are União da Floresta Mediterrânica, the Associação Florestal de Portugal, the Associação Portuguesa da Cortiça, the Federação Nacional de Produtores Florestais (FENAFLORESTA) and Associação Portuguesa da Castanha.[229]

6.1.13.1 CAP

Portugal has made provisions in AF for both the 2007-2013 and 2014-2020 CAP for Measure 222 and 8.2 respectively. AF Measure 8.2 has had some farmer uptake with about 26% of the intended budget spent.

Within Pillar I of the CAP, AF systems such as the *montado*, are eligible for direct payments, as are permanent tree crops such as holm and cork oak, olives, stone pines, vines, cherries, etc.

Within Pillar 2, Portugal has several measures in the 2014-2020 CAP related to trees on farms (including forest stands, orchards, riparian buffers, forest farming of non-woody forest products as well as specific AF measures).[230]

Measures 7.6.1., 7.6.2., 7.7.1., 7.7.2., 7.9.1, 7.10.2., 7.11.1., 8.1.1., 8.1.2. and 8.1.6. of the 2014-2020 Portuguese RDP are all relevant to AF and will be described in more detail below.

[229] EURAF. (2012c). *Portugal*. [online] Available at: https://euraf.isa.utl.pt/countries/portugal [Accessed 31 Jul. 2021].
[230] www.pdr-2020.pt. (n.d.). *Programa de Desenvolvimento Rural 2014-2020*. [online] Available at: http://www.pdr-2020.pt/O-PDR2020/Arquitetura [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Operation 7.6.1. Traditional Permanent Crops

This operation supports farmers who ensure the maintenance of traditional systems of permanent crops (olive orchards, figs, carob, almonds) in certain geographical areas. The intention is for the area in question to be managed in an environmentally sustainable way which preserves the environmental benefits, such as the increased biodiversity that is associated with these production systems.[231]

Operation 7.6.2. Traditional Permanent Crops - Douro Vinhateiro

This operation was similarly aimed at farmers who upkeep traditional systems of permanent crops (traditional vineyards, citrus fruits, cherry orchards, shrubs, almond or dryland olive trees) in defined geographical areas. Special support was provided for the maintenance of stone walls in the Douro Wine Region to preserve their positive effect on biodiversity—particularly as a place of refuge and feeding grounds for local wildlife, and for landscape preservation of the Douro region.[232]

Operation 7.7.1 Extensive Grazing – Support for the Maintenance of High Nature Value Marshland

This measure supported farmers that intended to adopt or preserve extensive grazing practices that ensure the maintenance of the high natural value, *Lameiros* (natural pastures with isolated trees, hedges, tree borders and riparian buffers). This measure requires pasture maintenance and limits the number of animals per hectare.[233]

Operation 7.7.2. Extensive Grazing – Support for the Maintenance of Agro-Silvopastoral Systems Under Cork Oak Forests

This measure supported farmers that intended to adopt or preserve extensive grazing practices that ensure the maintenance of silvopastoral systems in cork oak, holm oak or Pyrenean oak forests. There must be a minimum of 40 trees per hectare in the case of cork oak forests, as well as those of a mixed composition with holm oak; or a minimum coverage of 10% in the case of holm and Pyrenean oak. Beneficiaries must have holdings with a greater proportion of agricultural area under cork oak, holm oak or black oak in relation to the total agricultural area of the holding; to keep,

231 Programa de Desenvolvimento Rural, 2014-2020. OPERAÇÃO 7.6.1. CULTURAS PERMANENTES TRADICIONAIS. [online] Available at: <http://www.pdr-2020.pt/O-PDR2020/Arquitetura/Area-3-Ambiente-Eficiencia-no-Uso-dos-Recursos-e-Clima/Medida-7-Agricultura-e-Recursos-Naturais/Acao-7.6-Culturas-Permanentes-Tradicionais/Operacao-7.6.1-Culturas-Permanentes-Tradicionais> [Accessed 20 October 2021].

232 Programa de Desenvolvimento Rural, 2014-2020. OPERAÇÃO 7.6.2. CULTURAS PERMANENTES TRADICIONAIS - DOURO VINHATEIRO [online] Available at: < http://www.pdr-2020.pt/O-PDR2020/Arquitetura/Area-3-Ambiente-Eficiencia-no-Uso-dos-Recursos-e-Clima/Medida-7-Agricultura-e-Recursos-Naturais/Acao-7.6-Culturas-Permanentes-Tradicionais/Operacao-7.6.2-Culturas-Permanentes-Tradicionais-Douro-Vinhateiro > [Accessed 20 October 2021].

233 Programa de Desenvolvimento Rural, 2014-2020. OPERAÇÃO 7.7.1. PASTOREIO EXTENSIVO - APOIO À MANUTENÇÃO DE LAMEIROS DE ALTO VALOR NATURAL. [online] Available at: < http://www.pdr-2020.pt/content/view/full/260 > [Accessed 20 October 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

during the retention period for each species, a grazing bovine, ovine and caprine livestock population of their own, with a minimum stocking density of 0.2 LU per hectare of forage area; to maintain maximum stocking density levels per hectare of forage area grazing 0.6 LU of their own or another farmer's cattle, sheep or goats or 0.75 LU per forage area if the herd includes pigs under a *montanheira* system; and not practice temporary crops.[234]

Operation 7.9.1 Agroforestry Mosaic

This operation aims to minimise the risks of fire and counteract human desertification in order to prevent severe economic, environmental and biodiversity impacts. This action focuses on agro-environmental support for farmers who, located in predominantly forested areas, own plots of land cultivated with temporary crops, as well as plots of non-forested AF with forage use through extensive grazing by herds of sheep and goats.[235]

Operation 7.10.2. Maintenance and recuperation of Riparian Galleries

This measure supports the preservation of 'riparian galleries' which are defined as long and narrow strips of indigenous woody tree or shrub species along the banks of waterways. This operation focuses on forestry and AF areas, with the aim to maintain and promote biodiversity. The geographical area for support corresponds to Natura 2000 areas, the National Network of Protected Areas and the network of ecological corridors established in the regional forest management plans. The minimum area eligible is 0.1 hectares of riparian galleries in a good state of conservation, with a minimum length of 25 metres and a width that varies between 5 and 12 metres from the edge of the waterline.[236]

[234] Programa de Desenvolvimento Rural, 2014-2020. OPERAÇÃO 7.7.2. PASTOREIO EXTENSIVO - APOIO À MANUTENÇÃO DE SISTEMAS AGRO-SILVO-PASTORIS SOB MONTADO. [online] Available at: < http://www.pdr-2020.pt/O-PDR2020/Arquitetura/Area-3-Ambiente-Eficiencia-no-Uso-dos-Recursos-e-Clima/Medida-7-Agricultura-e-Recursos-Naturais/Acao-7.7-Pastoreio-Extensivo/Operacao-7.7.2-Pastoreio-Extensivo-Apoio-a-Manutencao-de-Sistemas-Agro-Silvo-Pastoris-sob-Montado > [Accessed 20 October 2021].

[235] Programa de Desenvolvimento Rural, 2014-2020. OPERAÇÃO 7.9.1. MOSAICO AGROFLORESTAL. [online] Available at: < http://www.pdr-2020.pt/O-PDR2020/Arquitetura/Area-3-Ambiente-Eficiencia-no-Uso-dos-Recursos-e-Clima/Medida-7-Agricultura-e-Recursos-Naturais/Acao-7.9-Mosaico-Florestal/Operacao-7.9.1-Mosaico-Agroflorestal> [Accessed 20 October 2021].

[236] Programa de Desenvolvimento Rural, 2014-2020. OPERAÇÃO 7.10.2. MANUTENÇÃO E RECUPERAÇÃO DE GALERIAS RIPÍCOLAS. [online] Available at: <http://www.pdr-2020.pt/O-PDR2020/Arquitetura/Area-3-Ambiente-Eficiencia-no-Uso-dos-Recursos-e-Clima/Medida-7-Agricultura-e-Recursos-Naturais/Acao-7.10-Silvoambientais/Operacao-7.10.2-Manutencao-e-Recuperacao-de-Galerias-Ripicolas > [Accessed 20 October 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Operation 7.11.1. Non-productive Investments

This Operation supports the installation and recovery of riparian galleries; eradication of woody invasive species; and recovery of stone walls.[237]

Operation 8.1.1 Afforestation of Agricultural and Non-agricultural Land

This measure supports the afforestation of agricultural and non-agricultural land, improving ecosystems by establishing wooded areas with species well adapted to local conditions that contribute to an increase in the carbon sequestration capacity and protection of natural resources (soil, water, air and biodiversity). There is a maintenance premium for a period of 10 years, and a premium for loss of income for 10 years intended to compensate for income lost from afforestation in the case of establishment of forest stands on agricultural land. The minimum area is 0.5ha, and the tree species used in afforestation shall be those included in the Regional Forestry Management Plan (PROF), although other species may be used when justified by the local soil and climate conditions.[238]

Operation 8.1.2: Setting Up Agroforestry Systems

The aim of this operation is to promote the establishment of AF systems, namely *montados*, that combine forestry with extensive farming practices, and are recognised for their importance in maintaining biodiversity and their adaptation to areas highly susceptible to desertification. Support may be granted for the installation and maintenance (for 5 years) for the following types of systems: silvopastoral systems (with eligible species which include *Arbutus unedo, Castanea sativa, Juglans regia, Juniperus spp., Pinus pinea, Pistacia spp., Phillyrea spp., Quercus robur, Q. pyrenaica, Q. faginea, Q. suber, Q. rotundifolia*); walnut and chestnut-tree groves for the mixed production of fruit and wood, in association with an agricultural crop; and shelterbelts on agricultural areas, with eligible species producing high quality wood (*Acer pseudoplatanus, Castanea sativa, Fraxinus spp., Juglans nigra, Juglans regia, Prunus avium, Quercus coccinea, Quercus robur, Quercus rubra*). The minimum area for support is 0.5 hectares and there are minimum and maximum tree densities that must be respected (between 80 and 250 trees per ha for broadleaf species and *Pinus pinea*, and 150-250 for other species). This operation provides support for only the tree component of the AF system installed (tree irrigation, soil preparation, tree protection, etc). It is therefore less interesting,

[237] Programa de Desenvolvimento Rural, 2014-2020. OPERAÇÃO 7.11.1. INVESTIMENTOS NÃO PRODUTIVOS. [online] Available at: < http://www.pdr-2020.pt/O-PDR2020/Arquitetura/Area-3-Ambiente-Eficiencia-no-Uso-dos-Recursos-e-Clima/Medida-7-Agricultura-e-Recursos-Naturais/Acao-7.11-Investimentos-nao-produtivos/Operacao-7.11.1-Investimentos-nao-produtivos> [Accessed 20 October 2021].

[238] Programa de Desenvolvimento Rural, 2014-2020. OPERAÇÃO 8.1.1. FLORESTAÇÃO DE TERRAS AGRÍCOLAS E NÃO AGRÍCOLAS. [online] Available at: < http://www.pdr-2020.pt/O-PDR2020/Arquitetura/Area-3-Ambiente-Eficiencia-no-Uso-dos-Recursos-e-Clima/Medida-8-Protecao-e-Reabilitacao-de-Povoamentos-Florestais/Acao-8.1-Silvicultura-Sustentavel/Operacao-8.1.1-Florestacao-de-Terras-Agricolas-e-nao-Agricolas> [Accessed 20 October 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

from a financial point of view, to farmers as they would still need to submit a project within another farming measure to implement the crop and livestock part.[239]

Operation 8.1.6. Improving the economic value of forests

The aim of this operation is to promote actions aimed at increasing the economic value and competitiveness of woody and non-woody forest products by supporting systems that ensure the harmonisation of production with the maintenance of biodiversity and the safeguarding of environmental values, taking into account the principles of sustainable forest management. Support may be given to: improve the economic value of the forest through recourse to productive technologies, machinery and equipment; certify sustainable forest management at the individual level or adherence to existing regional systems; recover underproducing stands; diversify activities in forest areas; and to draw up forest management plans.[240]

Two further Measures could also be included as supporting AF —3.1 for Young Farmers and 3.2 for the investment in farming. These measures can be used to establish an entire AF system in a single project but only with agricultural trees (apples, pears, etc.) or multifunctional ones (cork oak, chestnut and walnut).

The Azores are using Measure 5.1 to subsidize projects that are aimed at preventing the consequences of natural disasters and climatic events by installing hedgerows. Their aim is also to use such hedgerows to protect crops from wind and rain and prevent soil erosion. The region also uses Measure 8.2 to create shelterbelts to protect trees and animals on pastures.[241]

Within the new CAP Strategic Plan there are a few measures that could provide support for MF and AF systems but the extent of these measures has yet to be determined.

[239] Programa de Desenvolvimento Rural, 2014-2020. OPERAÇÃO 8.1.2. INSTALAÇÃO DE SISTEMAS AGROFLORESTAIS. [online] Available at: < http://www.pdr-2020.pt/O-PDR2020/Arquitetura/Area-3-Ambiente-Eficiencia-no-Uso-dos-Recursos-e-Clima/Medida-8-Protecao-e-Reabilitacao-de-Povoamentos-Florestais/Acao-8.1-Silvicultura-Sustentavel/Operacao-8.1.2-Instalacao-de-Sistemas-Agroflorestais> [Accessed 20 October 2021].

[240] Programa de Desenvolvimento Rural, 2014-2020. OPERAÇÃO 8.1.6. MELHORIA DO VALOR ECONÓMICO DAS FLORESTAS. [online] Available at: <http://www.pdr-2020.pt/O-PDR2020/Arquitetura/Area-3-Ambiente-Eficiencia-no-Uso-dos-Recursos-e-Clima/Medida-8-Protecao-e-Reabilitacao-de-Povoamentos-Florestais/Acao-8.1-Silvicultura-Sustentavel/Operacao-8.1.6-Melhoria-do-Valor-Economico-das-Florestas> [Accessed 20 October 2021].

[241] Mosquera Losada, R. et al 2016. Extent and Success of Current Policy Measures to Promote Agroforestry across Europe. *AGFORWARD - Agroforestry for Europe*, [online] Available at: <https://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html> [Accessed 9 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.13.2 National Policies

6.1.13.2.1 Agroforestry

There are a few national policies that support AF in Portugal.

The *Programa Operacional Sustentabilidade e Eficiência no Uso de Recursos* (Sustainability and Resource Efficiency Operational Programme) and *Fundo Ambiental* (Environmental Fund) both contribute to projects that support adaptation to climate change, sustainable development, defence against forest fires, protection of water, biodiversity, etc.[242] While the Sustainability and Resource Efficiency Operational Programme does not explicitly mention AF, the Fundo Ambiental does. For instance, for a call that sought solutions to the defence capabilities of isolated villages towards forest fires, AF is explicitly financed.

Fundação para a Ciência e a Tecnologia (Foundation for Science and Technology) is a public agency that supports research. They launched calls for three consecutive years (2017, 2018 and 2019) dedicated to fire prevention and combat. These calls clearly state the importance of AF mosaic landscapes by the usage of extensive silvopastoralism.[243]

There are also two programs - *Jovem Empresário Rural* (Young Rural Entrepreneur), which is intended to promote entrepreneurship in the rural world, the creation of new businesses and the establishment of young entrepreneurs in rural areas; and *Agricultura Familiar* (Family Farming), which intends to recognize the specificity of family farming, adopting support measures that create positive discrimination in its favour - that could apply to AF as there seems to be no discrimination for the type of farming made in either of these.[244][245]

The Fundo Florestal Permanente program managed by the Institute for the Conservation of Nature and Forests, grants financial support to spread awareness and information; defence of the forest against fire; promotion of forest investment, management and planning; ecological, social and cultural functions of the forest; and applied research, experimentation and knowledge. It specifically mentions AF by stating, “awareness campaigns aimed at target audiences of the agroforestry sector and, in addition, to school populations and the general public.”[246]

---

[242] Poseur.portugal2020.pt. (n.d.). *PO SEUR*. [online] Available at: https://poseur.portugal2020.pt/ [Accessed 31 Jul. 2021].
[243] www.fct.pt. (n.d.). *FCT - Fundação para a Ciência e a Tecnologia*. [online] Available at: https://www.fct.pt [Accessed 31 Jul. 2021].
[244] DGADR - Direção-Geral de Agricultura e Desenvolvimento. (n.d.). *Direção-Geral de Agricultura e Desenvolvimento*. [online] Available at: https://www.dgadr.gov.pt/estatuto-do-jovem-empresario-rural-jer [Accessed 31 Jul. 2021].
[245] DGADR - Direção-Geral de Agricultura e Desenvolvimento. (n.d.). *Direção-Geral de Agricultura e Desenvolvimento*. [online] Available at: https://www.dgadr.gov.pt/agriculturafamiliar.
[246] Diário da República Electrónico, Quarta-Feira, 20 de Outubro, 2021. Regulamento do Fundo Florestal Permanente, Portaria n.º 77/2015. Diário da República n.º 52/2015, Série I de 2015-03-16. [online] Available at: <https://dre.pt/web/guest/legislacao-consolidada/-

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement 862993.

The Public Interest Arbor[247] protects isolated tree specimens or arboreal ensembles which, due to their representativeness, rarity, size, age, history, cultural significance or landscape setting, may be considered of relevant public interest and their careful conservation is recommended. The classification of trees as a public interest is an essential instrument for the knowledge, safeguarding and conservation of elements of national heritage and exceptional value. At the same time, it can be an important source of valorisation and dissemination of this same heritage, serving as a stimulus for greater involvement of society in general in its inventory and protection. This classification gives groves a status similar to that of built heritage. No Tree of Public Interest may be cut or pruned without prior authorization from the Institute for the Conservation of Nature and Forests, and all work is carried out under its technical guidance.

Decree-Law No. 169/2001 protects cork oak and holm oak forests. This law consists of 27 articles establishing tree protection, specifying the requirements to be met in order to perform AF, silvopastoralism and to combat desertification. It defines authorised activities and regulates the cases in which tree logging and cork exploitation are authorised by the General Directorate of Forests.[248]

Portugal also has national guidelines on which tree species can be planted[249], but the general rules are that indigenous species can be planted without legal restrictions, with the exception of those resulting from forestry planning and management instruments, instruments for the planning and management of protected areas and other special programmes. Non-indigenous species already introduced have their own specific sets of rules: naturalized non-invasive can be used, with the exception of restrictions arising from specific legislation, forest management plans, instruments for the planning and management of protected areas and other special programmes; naturalized invasive species are prohibited in tree planting or reforestation; species of interest for afforestation can be used without legal restrictions other than those already mentioned in relation to naturalised non-invasive species; and all other species are prohibited, with the exception of cases that have been approved by the Government of the Republic. Finally, non-indigenous, non-introduced species are prohibited except for cases that have been favourably determined by the Government of the Republic.

/lc/114448809/202012170312/diploma?_LegislacaoConsolidada_WAR_drefrontofficeportlet_rp=indice.> [Accessed 20 October 2021].

[247] Instituto da Conservação da Natureza e das Florestas. Arvoredo de Interesse Público — ICNF. [online] Available at: <http://www2.icnf.pt/portal/florestas/aip> [Accessed 20 October 2021].

[248] Diário da República Electrónico, Quarta-Feira, 20 de Outubro, 2021. Decreto-Lei n.º 169/2001. [online] Available at: <https://dre.pt/pesquisa/-/search/332749/details/maximized> [Accessed 20 October 2021].

[249] www.icnf.pt. (n.d.). *ICNF - Instituto da Conservação da Natureza e das Florestas*. [online] Available at: https://www.icnf.pt/florestas/plantasesementes/especiesarboreas [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

There are also further legislations for wood coming from thinning, clear cuts and other silviculture practices[250]; for the management of riparian gallery management under public domain areas which list among other things to ask permission to the Agência Portuguesa do Ambiente[251]; for protected areas (for example the PN Montesinho does not allow forestry actions at certain times of the year so as not to disturb the avifauna); for the cutting of vegetation which requires authorisation; and for resinous areas which must be converted to natural habitat after final cutting.[252]

Case Study: *Montado* Agroforestry in Portugal

Portugal's most important traditional AF system is the *montado*, which is characterised by low density trees combined with agriculture or pasture. The two primary tree species found in *montado* systems are cork oak (*Quercus suber*) and holm oak (*Quercus rotundifolia*). Production activities such as cereal crops cultivated in long rotations, combined with fallowing, and extensive livestock grazing; and raising cows, sheep, goats, cattle and the Iberian pigs (in some cases even turkeys and chickens) all occur under these trees. The open tree cover is maintained through natural regeneration and trees are rarely planted. Trees have a direct value as a fodder crop for the livestock (providing acorns and leafy branches in autumn and winter when herbage production is low), and an indirect value as shelter against the cold of winter and the heat in summer. According to the 2010 National Forest Inventory (NFI), 716,000 and 413,000 ha are devoted to cork oak and holm oak, respectively. Most of the *montado* area is in the south-east of Portugal, with large farms around 100-500ha, although some areas also exist in the north of the country where farms are much smaller, some as small as 1 hectare.

Cork oak trees are a long-term investment, since they are harvested for the first time after 20 years, and then again, every 9 years after that. Further, the first two harvests cannot be used for natural cork stoppers, the main use for cork. Therefore, the highly sought-after industrial product is not obtained until the tree is 40 years old. Farmers are required to wait for the return on their investments but the short timeframe of subsidies, including those given by the CAP, don't allow this, making these systems less attractive to farmers and therefore, leading to abandonment. Cork oaks can be harvested around 15 times in their 150-to-200-year lifetime creating stable ecosystems for hundreds of years, unlike other agricultural and AF systems where trees are cut every few years. The *montado* system provides many ecological services such as water retention, soil conservation, carbon storage, biodiversity, providing

[250] [Diário da República Eletrónico. (n.d.). Decreto-Lei 31/2020, 2020-06-30. [online] Available at: https://dre.pt/home/-/dre/136900600/details/maximized [Accessed 31 Jul. 2021].
[251] [apambiente.pt. (n.d.). Domínio Hídrico | Agência Portuguesa do Ambiente. [online] Available at: https://apambiente.pt/agua/dominio-hidrico [Accessed 31 Jul. 2021].
[252] [Diário da República Eletrónico. (n.d.). Resolução do Conselho de Ministros 179/2008, 2008-11-24. [online] Available at: https://dre.pt/web/guest/pesquisa/-/search/440076/details/normal?q=Plano+de+Ordenamento+do+Parque+Natural+do+Montesinho [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

habitat and resources for many species, and contributing to the local rural economy. Further, the shrub control done by livestock ensures that the state does not need to mow mechanically in order to control fire risk, reducing emissions.[253]

Cork oak has been protected in Portugal since the 12th century when these lands were favoured as hunting grounds for royalty. In the 18th century, these systems started to become of interest economically for cork stoppers for the wine industry. Everything that occurs within the *montado* forest requires authorisation by the National Forest Authority—approval is required for mowing and pruning; it is forbidden to plough under trees to protect soil and roots; and trees cannot be cut until they have died, and even once they do, permission is required for removal. Any agricultural and livestock activities in the understory need to be managed in a way that protects the roots of these oaks.[254]

While *montado* has a lot of policy support related to conservation, cultural heritage, tourism, legal protection of trees and even agri-environmental schemes, the CAP livestock payments found within Pillar I cause the intensification of livestock grazing which has large ecological impact on the *montado* ecosystems. Management practices have been found to be the leading cause for the decline of these systems, as removing many of ecosystem services that make these systems so impressive. Livestock breeds, density, length of time in pasture, and shrub control techniques have all been found to cause significant impacts.[255] While there are no specific policies for the cork industry, there are government supported programs that promote cork abroad and find new uses for it.[256]

In recent years, the *montado* has been greatly impacted by climate change in both its regeneration (seedlings die both when they are naturally occurring or artificially planted because of the severe droughts); and pests are increasing which impact the tree by burrowing into the wood.[257]

The *montado* represents a highly diversified and biodiverse land use that upholds rich and stable ecosystems for hundreds of years. Unlike many other agricultural landscapes, including other AF systems, it creates natural succession which is vital to create habitats for birds, pollinators, helpful insects and other animals. The legislation found in Portugal is exemplary in its protection of AF and its ecosystem services yet, it needs to continue to expand to ensure that the decline of *montado* does not continue due to legislative and market forces.

[253] Data sourced from interview with staff from UNAC — União das Organizações de Agricultores para o Desenvolvimento da Charneca.
[254] Ibid.
[255] Godinho, S. et al. Assessment of environment, land management, and spatial variables on recent changes in *montado* land cover in southern Portugal. Agrofor. Syst. 90, 177–192 (2016).
[256] Data sourced from interview with staff from UNAC — União das Organizações de Agricultores para o Desenvolvimento da Charneca.
[257] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.


Cultivated plants for materials


Reared animals for nutrition


Reared animals for materials or energy


Surface or groundwater used for nutrition, materials or energy


Carbon sequestration


Nitrogen fixation


Carbon cycling


Pest and disease control


Enhanced soil fertility


Reduced erosion


Hydrological cycle and water flow regulation


Wind protection


Fire protection

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.


Pollination and or seed dispersal


Regulation of temperature, light, humidity, and transpiration


Increased animal welfare


Aesthetic value


Recreation


Educational value


Recovery of marginal areas


Grassland management


Biodiversity

6.1.13.2.1.2 Forest Farming

Forest farming is permitted in Portugal unless the trees were planted under an afforestation scheme. If so, agricultural use, including livestock grazing, is not permitted during the period of support. Otherwise, there are no restrictions, and grazing is seen as beneficial to reduce fire risk. For example, OPERAÇÃO 7.3.2.1 considers communal shrubs/forest areas (*baldios*) eligible for extensive grazing payments and the Institute for Nature Conservation and Forests promoted the "sapper goats" projects, using goats for.[258] The *montado* is classified as forest land and is fully accessible for grazing.

[258] www.icnf.pt. (n.d.). ICNF - Instituto da Conservação da Natureza e das Florestas. [online] Available at: https://www.icnf.pt/apoios/fundoflorestalpermanente/candidaturas2019 [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.13.2.2Mixed Farming

Jovem Empresário Rural (Young Rural Entrepreneur) and *Agricultura Familiar* (Family Farming) could also apply to MF, see above for description. Otherwise, there are no direct policies for MF.

6.1.14 Romania

In Romania, like in most other European countries, AF was practiced traditionally for centuries although the concept and term itself is new and often unknown to farmers. The main AF systems practiced in Romania are forestry shelterbelts for both crop and waterway protection; pastures with trees; and the taungya system. The taungya system cultivates crops in rows of trees while the forest plantation is still young. This is done in order to establish an ecosystem right away that provides maintenance work, improves soil quality and diversifies production to include commodities beyond wood. This has been shown to increase the diameter and height of young trees. However, the most popular form of AF practiced in Romania is shelterbelts for crop protection, which are now being expanded to reduce the impacts of climate change.[259] Further, following de-collectivisation in the early 1990s, extensive sheep husbandry has been occupying the outskirts of many urban areas such as roadsides and abandoned plots.

6.1.14.1 CAP

AF was not supported through Measures 222 or 8.2 within the CAP. Nevertheless, during the 2014-2020 CAP, Romania granted green payments for AF through EFAs. Terraces, landscape features, buffer strips, areas with short rotation coppice, afforested areas, areas with green cover and areas with nitrogen fixing crops, were all possible options for the activation of these provisions.

Although the CAP Strategic Plan has not yet been released, agricultural ministers have shared that there will be a focus on sustainability, climate and environmental goals in order to reduce the vulnerability of farmers and encourage them to be active in achieving goals set out by different European Strategies such as the European Green Deal. Though AF has not yet been directly mentioned by Romanian ministers, AF has been included from the commission as an area that Romania should focus on while creating their next strategy. Further, there are intentions to include measures to support mixed family farms.

There will be special attention paid to Natura 2000 sites in Romania through the Prioritized Action Framework in the new CAP. This will be displayed in a few ways. First, riparian forests, which are

[259] Factors of success and failure in the transition into agroforestry, n.d. AGROFORESTRY SYSTEMS IN ROMANIA. [online] National Institute for Research and Development in Forestry, Bucharest Romania(4th European Agroforestry Conference Agroforestry as Sustainable Land Use). Available at: <https://www.repository.utl.pt/bitstream/10400.5/18657/1/EURAFIVConf_Mihaila_E_et_all_page_21_25.pdf> [Accessed 2 August 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

the most vulnerable and degraded forest habitats in Romania, will have CAP subsidies to fill the gap in policy that does not protect them under the national forestry registry. Next, there will be a biodiversity-friendly formulation of GAEC for the next funding cycle where minimum buffer-strips along water courses are mandatory in-between agricultural land and water protection zones, and where a non-intervention (non-production) regime is introduced. Currently, landscape elements are covered by GAEC rules but no additional conditions are applied. In the next funding cycle, farmers will receive direct payments for maintaining landscape elements in agricultural land, with mandatory rules on management. Current CAP funding for HNV grasslands, traditional farming practices, and the preservation of isolated and groups of trees or shrubs on grassland will continue.

6.1.14.2 National Policies

6.1.14.2.1Agroforestry

Most of the AF financial support found in Romania is for the afforestation of shelterbelts. This can be found through the following policies:

a) the land improvement fund which was established according to the Land Fund Law no. 18/1991, and republished with subsequent modifications and completions, especially in regards to forest shelterbelts, provided in art. 2 lit. a), b) and e), according to art. 94 of Law no. 26/1996;

b) allocations from the state budget, according to art. 88 of Law no. 18/1991, which was republished with subsequent amendments and completions, and art. 94 of Law no. 26/1996, for the forest protection shelterbelts provided in art. 2 lit. a), b) and e);

c) allocations from the local budgets of communes, cities, municipalities and counties, for the shelterbelts provided in art. 2 lit. b), d) and e);

d) non-reimbursable external financial sources, within the SAPARD program or other programs, for the forest protection shelterbelts provided in art. 2 lit. a) -c) and e);

e) Art. 21 from the Ministry of Agriculture, Food and Forests will allocate every year the necessary funds for the construction of shelterbelts for the protection of agricultural lands in order to prevent and combat the phenomenon of drought and desertification.[260]

Small and medium farms have different rules for hedgerows than large-scale farms. While large-scale farms require forest windbreaks and shelterbelts that are a maximum of 5-10 trees in width with a distance of 50-150m, small and medium farms can have a width of 1 tree with a smaller distance of 10-50m.

[260] www.cdep.ro. (n.d.). LEGE nr.289 din 15 mai 2002 privind perdelele forestiere de protecţie. [online] Available at: http://www.cdep.ro/pls/legis/legis_pck.htp_act_text?idt=35288 [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.14.2.1.2 Forest Farming

According to Article 53 from the Protection of Forest law, grazing is forbidden in forests, in shelterbelts protecting forests, within perimeters where degraded land is being improved or in landslide areas. An exception can be made by the managing authority if:

a) it takes place for a limited time;
b) it is practiced only in certain perimeters of the forest;
c) the local public authorities have agreed to the request;
d) the consent of the owner has been obtained;
e) and only if it is requested in duly justified cases.

Grazing in stands under regeneration, in young plantations and protected forests is never allowed.

6.1.14.2.2Mixed Farming

MF is predicted to be included in the new CAP for Romania.

6.1.15 Serbia

AF and MF Systems have a long tradition in Serbia, especially in the central and southern parts of the country. This is especially due to the natural conditions, as well as the settlement patterns. Today, most farms in Serbia are small-scale with a mixed landscape of livestock, fruit trees, arable crops (especially cereals) and forest land all existing in a single parcel.

The primary AF association in Serbia is the Serbian Association of Agroforestry which was founded by 10 researchers from the Institute of Lowland Forestry and Environment.[261]

6.1.15.1 National Policies

6.1.15.1.1 Agroforestry

Serbia does not have any specific AF policies.

AF systems would fall under two specific laws, other than agricultural policy—the Forest Law and the Nature Protection Law that protects rare and invasive trees. The Forest Law regulates the preservation, planning, cultivation and general use of forests which apply to all forest land, regardless of ownership. Forest management and thus the cutting of woody vegetation, individual trees and rare trees is regulated by Article 22 and 23. Based on these regulations a program is

[261] EURAF. (2012d). Serbia. [online] Available at: < https://euraf.isa.utl.pt/pl/node/1751>. [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

adopted for the territory of one or more municipalities for a period of ten years and is made on the basis of the determined condition of forests in the field.[262] The Nature Protection Law lays out rules for the preservation of landscape elements. Article 18 is the one that most applies to AF which states that it is important to protect meadows, pastures and forest edges. Special attention is given within this article to the importance of biological and landscape diversity, which is enhanced by the protection of marginal habitats, hedges, borders, individual trees, groups of trees, meadow belts and any other ecosystem that include woody, meadow or swamp vegetation. When enlarging agricultural land, care must be taken to preserve these existing landscape elements and if necessary, to create new marginal habitats in order to ensure the biological and landscape diversity of ecosystems. The law also recognises the Monument of Nature as something that needs to be protected, which can include, among other things, rare or significant specimens of individual trees or groups of trees, and tree lines. All actions and activities that endanger its features and values are prohibited. Measures for the protection of natural monuments and the manner of its use are determined in more detail by the act on the proclamation of a protected area.

The manner of using the forest is additionally defined if it is located in a protected area (national park, nature park, special nature reserve) which includes an obligation to prepare a Protected Area Management Plan. The management plan determines the manner of implementation of protection, use and management of the protected area, guidelines and priorities for protection and preservation of natural values of the protected area, as well as development guidelines, taking into account the needs of the local population.[263]

Serbia is also preparing the IPARD III PROGRAM of the European Union, which is the Instrument for Pre-Accession Assistance in the Field of Rural Development for 2021 to 2026. Serbia is in the preparation phase of this programme. The programme will support organic agriculture, diversification of economic activities in rural areas, and the production and processing of products, with possibility for MF to apply and achieve funds.

6.1.15.2.1.2 Forest Farming

Forest farming is allowed in Serbia. If the farmer owns the land, they can graze freely but if it's public or private land, they need to ask permission from the owner or manager.

According to Article 52 of the Forest Law grazing can be done provided that the grazing practice is coherent with the forest management plan in question; if the forest is not in the regeneration phase; and if the grazing is under the constant supervision of the livestock owner. The forest land owner

[262] www.pravno-informacioni-sistem.rs. (n.d.). Zakon o šumama: 30/2010-61, 93/2012-28, 89/2015-12, 95/2018-267 (dr. zakon). [online] Available at: https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/reg/viewAct/1babc52a-a987-44f8-af85-8897406ae65c.

[263] www.paragraf.rs. (n.d.). Zakon o zaštiti prirode. [online] Available at: https://www.paragraf.rs/propisi/zakon_o_zastiti_prirode.html [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

determines the conditions under which grazing can be done (grazing time, type of livestock, number of heads, amount of compensation, ways to drive livestock, etc.).

6.1.15.1.2 Mixed Farming

No policies were found for MF in Serbia.

6.1.16 Spain

Spain has a vast establishment of AF and MF systems, both traditionally and contemporarily, each with its own particular name. For example, the name *dehesa* refers to a silvopastoral system with trees of the *Quercus* genus, the primary AF system of the Iberian Peninsula. The system known as *pomarada* is linked to apple plantations in the north of Spain where animals graze between trees, while *Soutos* are systems of chestnut trees grazed by both ruminants and pigs for the consumption of chestnuts.[264]

The most popular system is the *dehesa*, because it is the one that occupies the largest territory and is responsible for an emblematic product for Spain, the production of Iberian pigs. From this animal, internationally recognised high quality products such as acorn-fed Iberian ham are obtained. The *dehesa* is one of the most extensive, traditional, diverse, ancient and well-known AF systems in Europe, covering around 3.5-4.0 Mha between Spain and Portugal, of which 2.2 Mha are located in Extremadura. This ecosystem is of great value, because in addition to hosting a great environmental and cultural heritage, it constitutes the base of diverse economic activities that generate great socio-economic and cultural value.[265]

In Catalonia systems of olives and vineyards grazed by sheep still exist, as well as in Extremadura. They are currently changing to super-intensive crops with trellis cultivation and drip ferti-irrigation.

The Spanish Agroforestry Association (AGFE) was created in 2016 with four main aims: (i) to promote the adoption of AF systems and practices in Spain; (ii) to work for the adequate application of the CAP to AF systems; (iii) to create a place for researchers and interested actors, such as farmers, livestock breeders, foresters, companies and technicians to meet and, (iv) to participate in the activities of the European Agroforestry Federation EURAF.[266]

---

[264] Ruiz J, and Beaufoym, G. (2015) Informe sobre la elegibilidad para pagos directos de la PAC de los pastos leñosos españoles, Plataforma por la Ganadería Extensiva y el Pastoralismo.

[265] Den Herder, M., Moreno, G., Mosquera-Losada, R. M., Palma, J. H., Sidiropoulou, A., Freijanes, J. J. S., ... & Burgess, P. J. (2017). Current extent and stratification of agroforestry in the European Union. Agriculture, Ecosystems & Environment, 241, 121-132.

[266] Agfeagroforestry.eu. 2021. *La Asociación | Agfe Agroforestry*. [online] Available at: <https://agfeagroforestry.eu/la-asociacion> [Accessed 25 October 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.16.1CAP

Within Spain, agricultural policies are characterised at the autonomous community level, rather than country level. There are 17 parliaments that establish different measures within the national and European legislative framework.

While Measure 222 was only activated by C. Valenciana, Measure 8.2 was budgeted and activated by a few more regions in the 2014-2020 CAP. Nevertheless, this measure was controversial, particularly during the first few years, because of the maximum tree density rule that states that in order for a parcel of land to be determined arable it should not exceed 100 trees per hectare. In the case of Spain, a crown diameter of more than 4 m and 5 m in height could not be exceeded. While this density limitation never impacted fruit trees, since 2018 it also does not affect other trees as long as the trees are producing food for livestock in the form of fruit, leaves or branches. In the years prior to 2018, this limitation did affect numerous producers in the *dehesas.* In those regions where the *dehesa* has greater representation, a regulatory change had to be initiated so that the wooded lands, whose fruits were used to feed the livestock, were eligible.

Further, green payments could also be given to farms with more than 15 ha of arable land that allocated 5% of their area to EFA. Of the 19 eligible EFAs, Spain activated 4, one of which was for agroforestry areas, although funding can only be received if the system was established with Measure 8.2. Therefore, to receive this subsidy, it is a necessary prerequisite that the regions have activated Measure 8.2. In Spain, six Autonomous Regions out of 17—Andalusia, Asturias, Extremadura, Galicia, Basque Country, and Valencian Community—have placed Measure 8.2 in their RDP. Of these only Andalucia, Asturias, Extremadura and Galicia have activated it, with farmer uptake in Asturias and Galicia. Of the other 15 EFAs proposed by the EU, but not activated in Spain, there are 6 that include elements typical of AF systems, such as riparian strips, isolated trees, aligned or in forests, wooded margins and strips, and woody crops for energy production.

Within the forestry measures (from 8.1 to 8.6), Measure 8.2 has the lowest budget, with only 1.69% of the total budget dedicated to forestry sub-measures in the RDPs as a whole.

Due to the heterogeneity in the CAP Strategic Plans within Spain, only two autonomous regions and their policies will be discussed here—Extremadura and Catalonia.

In Extremadura, the *dehesa* system covers about 2 million ha of land, about 50% of the whole regional territory. The measures activated by RDP are Measure 10 on agri-environment and climate which aims to integrate production, quality livestock, indigenous breeds, steppe birds and conservation agriculture with herbaceous crops; Measure 11 on organic farming in rainfed croplands, livestock and beekeeping; Measure 13 to help areas with natural and other specific limitations; Measure 4.4.2 to promote tree regeneration in *dehesas*; and Measure 8.2.

In Catalonia, Measure 8.3 is activated where silvicultural improvement actions are eligible concepts. These measures include subsidies for shrub clearing, which could allow subsidizing a previous or

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

initial phase of forest thinning, although the complete transformation to woody pasture or grassland are not directly eligible actions.

The Strategic Plan for the new CAP has not yet been released but the ministry website does mention that AF will be included. Two proposed eco-schemes are especially relevant: 1. to improve pasture sustainability, increased carbon sink capacity and fire prevention by promoting extensive grazing and 7. to increase practices for the improvement of soil conservation through living plant covers in woody crops.[267]

6.1.16.2 National Policies

6.1.16.2.1Agroforestry

No AF policies beyond the CAP were found in Spain.

6.1.16.2.1.2 Forest Farming

Forest farming is legal in Spain, especially since *dehesas* are considered forest land. Other types of forests can be grazed legally and this land use practice is becoming more prominent within Spain to control biomass in summer to prevent fires. This is especially prevalent since machines cannot easily access these areas but animals can. This type of land management is being done with goats and donkeys in Cáceres and Granada.

6.1.16.2.2Mixed Farming

No MF policies were found for Spain.

6.1.17 Sweden

Sweden is dominated by forestland, with over 69% of the country's area devoted to them. Agriculture, including pasture, together accounts for 16% of land use. Parts of Sweden were almost deforested in the late 19th century which caused The Forestry Act to be enacted in 1903 which is still in existence today. The most important clause in this act is that wherever trees are felled they need to be restocked.

Traditional AF in Sweden includes alley cropping, hedgerows, riparian buffers, and most of all, forest farming where animals, cattle, sheep and goats are grazed in extensive forests that were commonly owned and therefore freely grazed. A system referred to as 'summer farms' was popular in Sweden from 1500-1850 and is now expanding once again because of the cultural and natural value of these

[267] www.mapa.gob.es. (n.d.). Plan Estratégico de España para la PAC post 2020. [online] Available at: https://www.mapa.gob.es/es/pac/post-2020/default.aspx [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

systems, along with their management being supported by subsidies in the CAP. These systems include the free grazing of cattle, sheep and goats in mountainous areas for meat, milk, cheese and butter productions. Today, there are around 250 summer farms, with 15,000ha and 3,000 goats, sheep and cows. Further, due to climatic conditions, livestock systems are an important land use system in Sweden making silvopastoral systems particularly appealing. Sweden maintains, along with Finland and Norway, the largest AF system in Europe, reindeer husbandry.[268]

The primary AF association in Sweden is Agroforestry Sverige made up primarily of practitioners and the general public.[269]
Mixed farming remains popular in Sweden—many farms include livestock, arable crops, semi-natural grassland and forests all on one parcel.

6.1.17.1 CAP

Measure 222 and 8.2 were not implemented in Sweden. However, there are traditional land uses that can be classified as AF systems that are included in their RDP within Measure 10 for agri-environmental measures. Within this measure 'summer farms' and semi-natural pastures receive support. Semi-natural pasture subsidies are based on ecological and cultural values, and different levels of payments can be received depending on the specifics of the land use.[270] Greening payments can also be activated within Sweden under EFAs. Support is given to the management and preservation of semi-natural pasture, mown meadow, forest pasture, mountain pasture and mosaic grazing. However, forest pasture and mosaic pastoralism are not entitled to basic single payment schemes, while semi-natural pasture, mown meadows and mountain grazing are. Basic payments allow the cultivation of only specific tree species on arable land such as non-food crops for biofuel, berries, fruit trees and nut trees.[271]

There is a popular national political opinion in Sweden that less subsidies need to be allocated to the agricultural sector, and in some political arenas the abolishment is even considered, dedicating all farming subsidies to environmental protections. The Swedish government often brings this goal to EU negotiations. Historically, this is due to the fact that Sweden has held higher environmental protections and standards for animal welfare than other EU MS. Most of the farming support at the moment in the Swedish RDP is given to organic farming.[272]

AF is not predicted to be included in the new CAP Strategic Plan. No mention of MF was found.

[268] EURAF. (2012d). Sweden. [online] Available at: https://euraf.isa.utl.pt/countries/sweden [Accessed 31 Jul. 2021].
[269] EURAF. (2012d). Sweden. [online] Available at: https://euraf.isa.utl.pt/countries/sweden [Accessed 31 Jul. 2021].
[270] Ibid.
[271] Pasquier, L. (2020). Barriers and Bridges for Establishing Agroforestry: A qualitative study of Swedish land use policy in relation to agroforestry. Department of Physical Geography, Stockholm University.
[272] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.17.23 National Policies

6.1.17.2.1Agroforestry

While there are no laws that particularly inhibit AF systems from being implemented, there is a lack of national AF support found in Sweden. Afforestation is rarely conducted on forest pastures and the extraction of timber is done through conventional selection cutting. Therefore, forest pastures, which must contain older woody perennials for biodiversity purposes, become protected landscape elements. Any land use alteration must always be reported to the managing authority in question including planting woody perennials on agricultural land, which as a general rule prohibits the major alteration of the natural environment.[273]

6.1.17.2.1.2 Forest Farming

Landowners can keep animals in both natural and plantation forests, and in some cases may even qualify for Pillar II schemes, but fencing is required for animal husbandry to protect against predators. Government entities do sometimes provide financial support for creating enclosures in forest land. A major caveat though is the right to public access law, *Allemansrätten.* This law was officially established in Sweden in 1940, but has been present since the Middle Ages, allowing anyone to move freely across all land—private or state. The law focuses on the landscape being a single resource that should be accessible to everyone and has a collective responsibility. Therefore, land and water, and any resources such as flowers, berries and mushrooms can be picked freely. Because of this law, enclosing forest pastures is difficult since the public needs to be able to move through it.[274][275]

Case Study: Reindeer Husbandry in Fennoscandia

Reindeer husbandry is the largest AF land use practice found in Europe, accounting for 41,400,000ha. This type of husbandry is practiced in the Fennoscandian area of Sweden, Norway and Finland with 14, 16 and 11 million ha respectively. In terms of AF, reindeer husbandry is a silvopastoral system where herds of reindeer are kept primarily for meat production, but this type of land-use practice has cultural importance for the Sámi people (the only Indigenous people left in Europe) which extends beyond this economic lens. The Sámi have been herding reindeer for thousands of years in a region they call Sápmi.[276]

[273] Ibid.

[274] Pasquier, L. (2020). Barriers and Bridges for Establishing Agroforestry: A qualitative study of Swedish land use policy in relation to agroforestry. Department of Physical Geography, Stockholm University.

[276] [Bunikowski, D. (2015). SSmi Reindeer Husbandry - Legal-Philosophical and Cultural-Anthropological Dimensions. SSRN Electronic Journal.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

After the first boundaries were drawn into what is known today as Sweden, Norway and Finland, the Sámi started having issues accessing their traditional land, following the habits of their reindeer (as they had always done) and obtaining their rights of self-determination. Since then, many agreements have been made by these countries in order to allow this land practice to continue, regardless of borders.

Reindeer husbandry and forestry are the primary land uses of the boreal forests, and conflicts often arise between these two activities, especially since modern forestry can have a negative impact on the availability of lichens, the only food source for reindeer in winter. This is especially due to clear-cutting, which removes old forest where lichens grow, making additional forage necessary. Further, the preference of *Pinus contorta* in forestry, which sheds a larger number of needles than *Pinus sylvestris,* also impedes the growth of lichens. While there are conversations occurring at a state and regional level to remove these trees, private companies are continuing to plant them. Beyond the forestry industry, there are many competing land-uses which are causing significant pressure to the livelihood of the Sámi and preventing them to follow the reindeer's migrational cycles—including roads, railways, fences, industry, mines and hydroelectric power.

A 2011 report by the United Nations Development Program stated that the amount of fragmentation and disturbances is so grave, that reindeer management may become impossible in a few years. While Scandinavian governments provide varying compensations for this, the Sámi viewpoint, like almost all Indigenous Peoples, states that money cannot compensate for the loss of land.[277]

Sámi reindeer herding has been occurring for thousands of years in Northern Fennoscandia, encompassing a culture and land-use pattern where humans move in harmony with the cycles of the reindeer herd. This land use practice is not only an exemplary example of AF that has resisted the agricultural currents of change that wiped out many of these systems in Europe, it is also important for ecosystems.

Reindeer herding has eight seasons according to the natural activities of reindeer, which moves them to different parts of the territory. In spring, summer and fall they eat grass, herbs and leaves which are rich in vitamins and minerals, while in winter they eat lichens which are rich in carbohydrates. In order for lichens to grow at their full capacity they require the perfect environment, where snow isn't too deep but also where no ice is present, which has become a challenge in recent years with changing weather patterns. Their lack of access to many of their traditional pastures means that they are not able to follow these traditional

[277] Riseth, J.Å., Labba, N. and Johansen, B. (2004). Sustaining Sámi Reindeer Management in Northern Fennoscandia. Paper WG9, XI World Congress of Rural Sociology, 25-30.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

patterns, nutrient needs, and that lichen is overgrazed since they are forced to feed on the same lands every year.[278]

Sweden, Finland and Norway all have differing policies for the Sámi people and their reindeer. The first reindeer herding law in Sweden was passed in 1886 to both allow reindeer to roam freely and to regulate the conflicts that were occurring between herders and farmers. In the 1920's a policy shift happened after increasing pressure from the Norwegian government to stop reindeer herders from grazing over the border. Further, in 1928 another reindeer herding law was passed which limited membership rights to herding. Individuals could now only have the right to reindeer herding if their parents or grandparents were herders as their primary occupation. In 1971 further changes were made, requiring individuals to spend at least 50% or more of their labour on herding, or they would lose their right to this membership. These restrictions also favoured larger herders and pushed out smaller ones.[279]

The Swedish Constitution gives the Reindeer Management Right (RMR) only to the Sámi people. This RMR requires one to hold membership in the Reindeer Herding Community (RHC). In total there are 51 RHCs—33 larger 'mountain' RHCs which migrate from mountain to coastal areas, 10 forest RHCs which are relatively stationary and eight concessionary RHCs with a different set of rights. While the RMR applies to all land - state and private - it is spatially limited to the traditional grazing area—the northern half of the country. In 2007, Sweden adopted the United Nations Declaration on the Rights of Indigenous Peoples reinforcing the land rights the Sámi already had.[280]

In most government documents, especially those related to environment and conservation, there are clauses that mention that reindeer herding and the Sámi people need to be taken into consideration when making decisions, but it does not specify much beyond this. Mountains are also mentioned as landscapes where reindeer grazing is vital and that reindeer husbandry is of highest national interest and something the country cannot lose.

In Finland, in 1898, the reindeer herding cooperatives were established into law, and then in 1932, the first Reindeer Herding Act was created. Today, Reindeer husbandry in Finland is allowed universally, not only for the Sámi. The Finnish primary regulating body for reindeer husbandry is the Association of Reindeer Herding Cooperatives. Further regulations apply to the Sámi people and reindeer husbandry, including: the Act on the Sámi Parliament

[278] Ibid.
[279] www.laits.utexas.edu. (n.d.). Reindeer Herding in Sweden. [online] Available at: https://www.laits.utexas.edu/sami/diehtu/siida/herding/herding-sw.htm. Finally in 1982, grazing was declared an equal right to any popular rights.
[280] Löf, A. (n.d.). Challenging Adaptability Analysing the Governance of Reindeer Husbandry in Sweden. *Department of Political Science Umeå 2014*.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

(974/1995), the Sámi Language Act (1086/2003), the Reindeer Husbandry Act (848/1990), Reindeer Husbandry Decree (883/1990), Mining Act (621/2011), and The Water Act of 1961.

The most current Reindeer Act, established in 1990, maintains reindeer herding cooperatives and ensures that there is no breach of territory from one area to another. This Act includes different measures including requiring by law for herders to migrate to summer pastures.

The land rights of the Sámi in Finland remain an unresolved and major issue in the eyes of the UN Human Rights Committee.

The policy consequences for the Sámi people also created issues with gender. While women in Sámi culture were traditionally regarded as equal to men, Finnish laws determined gender roles that formally did not exist. In 1945, government policies began making women invisible in a livelihood that they had always played a key role within. Since 1978, reindeer ownership has been registered under the husband's names since the Reindeer Herding Act only gave rights to the heads of the household, which means women don't directly receive subsidies and grants. The Act was amended in 1996 and ownership rights were extended to spouses but no discussions were made on what occurs after divorce.[281]

As mentioned above, reindeer husbandry is the biggest AF system in Europe and therefore represents an important land use practice with many proven ecosystem services. The reliance on reindeer to consume lichen that only grow in old-growth forests is also an immense source of protection for such forests that have in many other regions of Europe been replaced with plantations. It is important that polices protect and expand this system, rather than continue to disincentivize it, as is the case in Finland and to a lesser degree, in Sweden.

Reared animals for nutrition

Reared animals for materials or energy

Surface or groundwater used for nutrition, materials or energy

Nitrogen fixation

[281] Kuokkanen, R. (2009). Indigenous Women in Traditional Economies: The Case of Sámi Reindeer Herding. Signs: Journal of Women in Culture and Society, 34(3), pp.499–504.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.


Enhanced soil fertility


Fire protection


Pollination and or seed dispersal


Increased animal welfare


Aesthetic value


Educational value


Spiritual enrichment


Recovery of marginal areas


Grassland management


Biodiversity

6.1.17.2.2Mixed Farming

No MF policies were found.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.18 Switzerland

Within Switzerland, the most common way of farming is mixed—by grazing cattle on the same farm that arable crops are being grown, usually in small-scale farms. Many traditional forms of AF can also be found such as grazed orchards with cattle, forest pasture in the northwest, and grazed chestnuts in the Tessin. Traditionally, the landscape was almost wholly covered with fruit trees, especially apple trees for the production of cider, but in the 1950s these trees started to be removed from the landscape. Today around 8% of land is devoted to AF in Switzerland.

Since Switzerland is not part of the EU, agricultural policies are different. The current legal framework is based on the agricultural policies of 2018-2021 with three agricultural payment frameworks, which were implemented without legislative changes. The next agricultural policy update will be from 2022 onwards.[282]

The two main AF associations found in Switzerland are IG Agroforst, which was founded in the German-speaking religion of Switzerland in 2011, and Plateforme Agroforesterie Romande, founded in French-speaking part in 2017.[283]

6.1.18.1 National Policies

6.1.18.1.1 Agroforestry

AF systems, in both their traditional and more modern forms, are supported by several biodiversity strategies found throughout the country. A policy called landscape quality protects traditional orchards, riparian buffers, hedgerows, as well as the promotion of trees through other landscape elements such as alley tree rows and living fences made of trees.[284]

Switzerland's direct payment regulation provides subsidies for annual maintenance, as well as labour-economy recognition. Trees are assigned so-called Standard Labour Factors (SAK) and only farmers who achieve a minimum SAK are qualified to direct payments. Unlike many other countries in Europe, Swiss farmers does not receive any support for energy wood since the required need is covered by traditional forestry. Therefore, valuable species such as oak and lime tree do not receive any subsidies.

---

[282] BLW, B. für L. (n.d.). *AP 22+*. [online] www.blw.admin.ch**.** Available at: https://www.blw.admin.ch/blw/de/home/politik/agrarpolitik/ap22plus.html [Accessed 11 Aug. 2021].
[283] EURAF. (2012). *Switzerland*. [online] Available at: https://euraf.isa.utl.pt/countries/switzerland [Accessed 11 Aug. 2021].
[284] www.agridea.ch. (n.d.). *Biodiversitätsförderung auf dem Landwirtschaftsbetrieb – Wegleitung*. [online] Available at: https://www.agridea.ch/old/de/publikationen/publikationen/pflanzenbau-umwelt-natur-landschaft/beitraege-und-bedingungen-im-oekoausgleich/biodiversitaetsfoerderung-auf-dem-landwirtschaftsbetrieb-wegleitung/ [Accessed 31 Jul. 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

After 2022, Switzerland will transition to a new agricultural policy which is predicted to include further measures for AF. The Federal Office for Agriculture is in the process of creating proposals for how AF can be further included in the Direct Payments Regulation schemes. In addition, under the direction of AGRIDEA and Bio Suisse, a new “Agroforestry Resource Project" is currently being developed in western Switzerland.

6.1.18.2.1.2 Forest Farming

Forest farming is forbidden except in the North-western part of Switzerland (Jura), where a system called Wytweiden exists, where horses and cattle are grazed together in lightly planted fir forests.

6.1.18.1.2 Mixed Farming

As mentioned above, MF is the typical way of farming in Switzerland, with grassland occupying much more space than arable land (70% of Farmland is grassland in Switzerland). Switzerland has a direct payment regulation where mixed forms of farming are promoted at an equal level with conventional forms. This type of balancing measure is found throughout many other policies in Switzerland, therefore creating a wide policy support for MF.

6.1.19 United Kingdom

As of 2021 the United Kingdom (UK) has left the EU and has since signed a trade and partnership agreement with the EU.

Following the EU exit (called Brexit), direct farm subsidy payments which were previously provided under the CAP will be replaced by a “public money for public goods” approach mediated and implemented by an Environmental Land Management scheme (ELM). While the new Agricultural Bill (2020) is still in review, it will be sure to include ELM and is expected to make provisions for AF. However, these policy instruments and mechanisms are still being worked out (with an aim of being operational by 2024-2027) and will vary depending on the devolved administration within the UK.

To develop and refine elements of the ELM process, the Department for Food, Farming and Rural Affairs (DEFRA), has commissioned a range of ‘Test and Trial’ programs to assess what the ELM scheme will include and how it will be implemented. Initially, AF was not included as a unique programme within ELM but this has recently changed, with the implementation of a specific ELM Agroforestry test group being coordinated by a consortium that consists of: The Organic Research Centre, The Soil Association, The Woodland Trust and Abacus Agriculture. This consortium has been tasked with providing information to DEFRA on preferred farmer payment mechanisms and guidance for increasing AF uptake post-Brexit. This research is on-going and valuable to the Agromix project and the policy workshops planned in England. Since agriculture and forestry is a devolved policy within the four nations of the UK, different policies for nations of England, Wales, Scotland and Northern Ireland will emerge.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement 862993.

Mixed farming is to date, not included within the ELM scheme.

ELM is planned in three Tiers:

- Tier 1 will pay for any management changes directed at improving the environmental performance of farms
- Tier 2 will pay for the management of land specifically for environmental purposes
- Tier 3 will pay for large-scale environmental changes such as afforestation or the creation of new wetlands

6.1.19.1.1 Agroforestry

In the UK, the current extent of AF is low, with just 3.3% of agricultural land being used in this manner[285]. According to a recent study by the Organic Research Centre[286], the top 10 reasons farmers in the UK are inhibited from taking up AF systems are as follows:

1. Lack of conceptual understanding and knowledge of AF (top factor: rank score 85%)
2. Grants, subsidy, funding opportunities for AF or lack thereof (tied second: rank score 70%)
3. Lack of practical understanding and knowledge of AF (tied second)
4. Establishments costs (tied third: rank score 65%)
5. Capital investment requirements (tied third)
6. Management and maintenance costs (tied third)
7. Reduced profitability and loss of yield (tied third)
8. Lack of economic understanding of AF (tied third)
9. Access to case studies and demonstrative farms (tied third)
10. Clashes with existing agricultural processes and activities (tied third)

Interestingly, a lack of coherent policy does not feature on this list. This perhaps alludes to the plethora of other factors farmers must consider before policy begins to play a role in their decision making.

Prior to Brexit, the CAP Pillar II, Article 23 of the Rural Development Regulation 1305/2013 (Establishment of agroforestry systems), Sub-measure 8.2 provided for AF. However, this was left as an individual MS issue and one that the UK declined to adopt. NI Tree planting was provided for under Measure 8.1 Afforestation. The Woodland Creation Scheme offers 80% of the planting and 60% of the maintenance costs over ten years, but a minimum of 400 trees per hectare is required, which is too dense for AF. Funding can also be applied for under Measure 10 Agri-Environment

[285] Herder, M.D et al. 2017. "Current Extent and Stratification of Agroforestry in the European Union." Agriculture, Ecosystems & Environment 241: 121–32

[286] Organic Research Centre ORC (2021) 'Increasing adoption of agroforestry in the UK' Available online: https://www.organicresearchcentre.com/wp-content/uploads/2021/06/ORC-2020_Policy-Brief_Agroforestry_barriers.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Climate if the trees are being planted around sources of ammonia or as riparian buffers or on floodplains.

The Basic Payments Scheme clarified its provision for AF in December 2020 for the transitional period of 2021 onwards, which are as follows[287]:

Trees are eligible if they are:

a) individual trees scattered within an agricultural parcel;

b) lines of trees (of a maximum of two trees wide) on an agricultural parcel;

c) groups of trees on an agricultural parcel that are not adjacent to a boundary; and

> *the area underneath the canopy is used for agricultural activity (this condition is met where it is suitable for cultivation or grazing of livestock);*
>
> *more than 50% of the area underneath the tree canopy is covered by grasses, other herbaceous forage or arable land.*

or

d) groups of trees on an agricultural parcel that are adjacent to a boundary and;

> *the area underneath the canopy is used for agricultural activity (this condition is met where it is suitable for cultivation or grazing of livestock);*
>
> *if unsuitable for cultivation, the entire area under the canopy is accessible to farm animal for grazing; and*
>
> *more than 50% of the area underneath the tree canopy is covered by grasses, other herbaceous forage or arable land*

The UK's Climate Change Committee (CCC) estimated that AF could result in carbon emissions savings of 5.9 MtCO2e per year by 2050, representing 13% of current emissions from the agricultural sector[288]. It also recommends that the hedgerow network should be increased by 40%. With the most recent survey (Countryside Survey) recording around 300,000 miles of 'managed' hedgerows, this means creating at least 120,000 miles of new and restored hedges.

[287] DEFRA 'Agroforestry and the Basic Payment Scheme. Available online: https://www.gov.uk/guidance/agroforestry-and-the-basic-payment-scheme.
[288] Climate Change Committee UK (2020) 'Land Use: Policies for net Zero UK' Available online: https://www.theccc.org.uk/publication/land-use-policies-for-a-net-zero-uk/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.1.19.2.1.2 Forest Farming

Allowing animals to graze the forest is permitted in the UK under specific regulations when permission is granted by the landowner or land management company. Conservation grazing is considered an effective way to manage and maintain specific habitats such as heathland, wetland, wood pasture and more. Permits must be acquired to graze animals on these habitats, this is obtained from the Forestry Commission or specific organisations relating to the land in question.

In England, there are a few remaining areas of common land where it is permitted to graze your animals whereby individuals must adhere to the rules and legislations set out by the groups that manage them, such as the New Forest, Dartmoor and others.

In Scotland, crofting is a traditional form or agriculture which permits grazing in woodland. There are over 1000 common grazing areas covering over 500,000 ha of Scotland. Grazing committees are set up to manage the common grazing and crofters have responsibility to submit regulations to the relevant commissions where appropriate[289]

6.1.19.1.2Mixed Farming

There is no clear indication for MF in the UK.

MF is indirectly supported by the EU/UK regulation on organic farming of 1991, and all its consequent updates. MF is within the broader ethos of organic (ecological, biological, agroecological) farming but it is not legally required to certify organic. The only requirement found that applies with the organic certification scheme states that at least some livestock be bio-dynamic organic (Demeter); however, this is a private standard.

Despite not having specific policies relating to MF, the following national policies may impact on the uptake of MF.

Farmers and landowners must adhere to several rules if their land is categorised as a 'Nitrate Vulnerable Zone' (NVZ), this includes about 55% of the land in England. DEFRA reviews these NVZs every four years to monitor the change in nitrates and make any necessary amendments. If your land is a NVZ, strict rules apply to nitrogen application[290] and storing manure[291]. These rules are enforced by the Environment Agency.

---

[289] Crofting Commission Scotland 'The Crofters (Scotland) Act 1993 as amended by the Crofting Reform (Scotland) Act 2007, the Crofting Reform (Scotland) Act 2010 and the Crofting (Amendment) (Scotland) Act 2013' Available online: https://crofting.scotland.gov.uk/common-grazings.

[290] DEFRA Guidance 'Using Nitrogen in Nitrogen Vulnerable Zones' available online: https://www.gov.uk/guidance/using-nitrogen-fertilisers-in-nitrate-vulnerable-zones.

[291] DEFRA Guidance 'Storing organic manures in nitrogen vulnerable zones' Available online: https://www.gov.uk/guidance/storing-organic-manures-in-nitrate-vulnerable-zones.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

The integration of buffer zones in arable zones may also impact upon MF uptake given available space in field margins and allowing areas to rest from arable cropping rotations but could be used for livestock.

In addition, government support for anaerobic digestion may support mixed farming as farmers are able to add an income stream by selling manure to the plants.

6.2 Non-European countries

To support and contrast the European policy inventory, a global overview of policy tools and mechanisms that support MF and AF systems and value chains was required. The aim was to document novel policy approaches, in-direct effects and unintended consequences, and collate a catalogue of MF and AF adapted best practices. While the review provides detail about a range of policies in a number of non-European countries, it does not aim to be comprehensive. Rather, it serves to highlight aspects of policies and regulations from which lessons could be learned and methods adopted, as well as those which need developing. The review accepts that challenges of navigating complex and disparate government websites, and language barriers mean that there could be gaps in the policies described below.

Countries were chosen with a view to get a broad picture of distinct country policies, focussing on innovative approaches and examples. To narrow the research scope, questions were followed in a 'snowball' type approach. For example, 'which country has the highest amount of AF', 'which country produces the most cocoa or coffee', 'which country has the highest diversity of agricultural products' etc. The countries were also selected based on their diverse regions and climates as well as policy contexts, making their comparison helpful for understanding the diverse contexts present across the globe.

6.2.1 Ecuador

Agriculture plays a key role in Ecuador, accounting for 9.2% of annual GDP and around 29% of formal employment[292]. The agricultural sector is particularly dominant in foreign currency generation, accounting for 42% of Ecuador's total export[293]. Agricultural production is concentrated to two crops, bananas and shrimp which, in 2018 accounted for 73% of the sector's exports. As such, Ecuador is susceptible to volatilities in the global market for these products, as well as changes in climate affecting production.

[292] Ministry of Agriculture and Livestock (2018) Available online: https://www.agricultura.gob.ec/biblioteca/
[293] EMIS Insights (2020) 'Ecuador Agriculture Sector Report 2020/2021' Available online: https://www.emis.com/php/store/reports/EC/Ecuador_Agriculture_Sector_Report_20202021_en_677368710.html

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Ecuador is a densely forested country. From a total land area of 27.7 million hectares, an estimated 9.87 million hectares is forest cover, 17% of which is primary production forest[294]. Ecuador is considered one of the world's 'megadiverse' countries - the Amazonian region in particular includes large tracts of intact natural forest with global conservation significance. Over the last century, Ecuador has experienced one of the highest rates of deforestation in Latin America and like in many other countries in the region, forest conversion to agriculture is the principal driver of deforestation, followed by agro-industry (oil palm), logging, mining and infrastructure development.

In 2008, Ecuador was the first country in the world to write into its constitution the rights of nature, stating "Persons and people have the fundamental rights guaranteed in this Constitution and in the international human rights instruments. Nature is subject to those rights given by this Constitution and Law"[295]. Article 71 in the chapter 'Rights for Nature' goes on to say "Nature or Pachamama, where life is reproduced and exists, has the right to exist, persist, maintain and regenerate its vital cycles, structure, functions and its processes in evolution."

Ecuador has now registered roughly 67% of its forests as protected areas and off limits for timber production or harvesting. There are strict regulations prohibiting harvesting or transportation of timber, but illegal logging continues[296].

The Ministry of Agriculture and Livestock is the principle governing body that manages agricultural production and exports. However, the Ministry of the Environment, Water and Ecological Transition as well as the Forest Service are influential in management and export decisions.

6.2.1.1 Agroforestry

There are no specific AF policies in Ecuador to date. However, agricultural and forestry laws are currently being updated and a number of changes to resource management have occurred since the Rights of Nature were ratified in the Ecuadorian Constitution. An overview of those policies are as follows:

- *Articles 10 and 71-74 of the Ecuadorian Constitution*[297]- recognise the rights of ecosystems to exist and flourish, giving people the right to petition on behalf of ecosystems and requiring of the government to remedy violations of these rights. The Constitution guarantees the participation of Indigenous Peoples and communities in decision-making for activities carried out in or on their territories. Article 74 also states that "environmental services are

[294] Forest Legality Initiative (2014) 'Ecuador Risk Tool' Available online: https://forestlegality.org/risk-tool/country/ecuador#tab-products
[295] Government of Ecuador (2008) 'Constitution of the Republic of Ecuador' Article 10 Available online: https://constitutionnet.org/sites/default/files/ecuador_constitution_english_1.pdf
[296] Mohebalian, P. M. and Aguilar, F. X. (2016) 'Additionality and design of forest conservation programs: Insights from Ecuador's Socio Bosque Program', *Forest Policy and Economics*, 71, pp. 103–114. doi: 10.1016/j.forpol.2015.08.002.
[297] Government of Ecuador (2008) 'Constitution of the Republic of Ecuador' Article 74 Available Online: https://constitutionnet.org/sites/default/files/ecuador_constitution_english_1.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

not susceptible to appropriation; that their production, provision and use will be regulated by the National Government".

- *The National Plan for Living Well (Buen Vivir) 2010 – 2013*[298] included many development priorities, one of which was reducing the deforestation by 30% by 2013.

- *National Forest Policy 2000* [299] and *Forest Governance in Ecuador 2011* - approximately 67% of Ecuador's forest are registered as protected areas and off limits for harvesting timber.

- *The Environmental Management Law 1999* and *The Forest Law (Article 39)*[300] - state that Indigenous and Afro-Ecuadorian Peoples will have priority in the use of community lands and forestry products, and those authorities must be consulted before issuing environmental policies on conservation of reserves.

- *Law for the Promotion and Development of the Production, Commercialization, Extraction, Exportation and Industrialization of Palm Oil and its Derivatives 2020*[301] – this new piece of legislation establishes mechanisms for the commercialization of palm oil, which could include price stabilization mechanisms, a committee to promote the sector and sanctions for non-compliance. The law prohibits the cultivation of palm oil in water protection areas, use of banned pesticides, and establishment of plantations in protected areas. Critics say the law doesn't go far enough to protect environmental and social contexts of palm oil cultivation and its impacts on communities, water sources and soil degradation.

- *Socio Bosque Programme 2008*[302] - aims to incentivize conservation of privately and community owned native forests through a payment for ecosystem services (PES) scheme. The scheme aimed to reduce deforestation and alleviate poverty by providing payments per hectare of forest biannually, based on 20-year contracts.

- *National Forestry Restoration Programme*[303] - Ecuador planned to restore 500,000 additional hectares by 2017 and increase this total by 100,000 hectares per year until 2025

Surprisingly, while Ecuador is a major exporter of cacao and timber, and the first country in the world to introduce the 'Rights of Nature' into its constitution, there was little data available to

[298] Republic of Ecuador (2010) 'National Secretariat of Planning and Development' Available online: https://englishversionbuenvivir.files.wordpress.com/2017/01/resumen-plan-nacional-buen-vivir-ingles.pdf
[299] Government of Ecuador 'National Forest Policy' 2000 Available online: **https://ecuadorforestal.org/**
[300] Forest Legality Initiative 'Risk Tool' Online tool, available at: https://forestlegality.org/risk-tool/country/ecuador
[301] Borja S., (2020) ' Ecuador's palm oil law a boon for producers, but not people and planet' Online article: https://news.mongabay.com/2020/12/ecuadors-palm-oil-law-a-boon-for-producers-but-not-people-and-planet-groups-say/
[302] Mohebalian, P. M. and Aguilar, F. X. (2016) 'Additionality and design of forest conservation programs: Insights from Ecuador's Socio Bosque Program', *Forest Policy and Economics*, 71, pp. 103–114. doi: 10.1016/j.forpol.2015.08.002**.**
[303] INFOFLR International Union for Conservation of Nature Accessed online: https://infoflr.org/countries/ecuador

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

conduct a thorough AF policy review in Ecuador. For example, when searching in Scopus for Ecuador + agroforestry + policy, only 9 documents came up. Similarly, in FAOLEX, no results were found when searching under the key word of agroforestry or mixed farming. It was also not clear from the data reviewed, the extent or impact the Rights of Nature policy has had on agricultural production in Ecuador.

The policies found were wide-ranging but contradictory. There is ample scope for Ecuador to implement AF policies which incentivise AF as a sustainable and resilient land use that can be practiced within native forests and overseen by local communities and Indigenous groups. Commercialisation of products from MF and specifically AF systems, needs to be overseen and price points adapted for the domestic market. Decisions and policies should be made in conversation with local farmers to ensure that the policies are suitable for farmers, not just from an environmental protection point of view.

6.2.1.1.2 Forest Farming

Forest farming is traditionally practiced in Ecuador but there are limited ways in which it is recognised within policy. Forest grazing seems to be permitted as per the laws detailed above, *The Environmental Management Law 1999 and The Forest Law (Article 39)* as they state that Indigenous and Afro-Ecuadorian Peoples will have priority in the use of community lands and forestry products and those authorities must consult before issuing environmental policies of conservation of reserves. The review could find no specific policies or legislation either permitting or prohibiting forest grazing.

6.2.1.2 Mixed farming

MF is a traditional form of smallholder farming and can be found in the mountainous regions of Ecuador, particularly in the 'chakkras' or home gardens. This review could find no specific policies aimed at MF in Ecuador. Discussing with a researcher in Ecuador, MF is ubiquitous in small holder farming systems in the mountainous regions.

6.2.2 Chile

Due to Chile's geographic location and topography, the country is able to produce a vast array of agricultural products. Chile is now one of the top 10 agricultural exporters in the world, with main exports including wine, fruits, dairy and fish products[304]. The country primarily focusses on high export value products such as cherries, cranberries, hazelnuts and other high value fruits. This works particularly well given the country is in the southern hemisphere and can export to USA and Europe in their winter months.

[304] Ministry of Agriculture, Government of Chile (2018).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Forestry and tree products play a key role in the Chilean economy as the third most important economic activity in the country[305]. 22% of Chile (16 million ha) is covered by forests, 27% of which are primary forests. Forestry products account for a 5th of Chile's annual exports, but the forests are predominantly privately owned (25% owned by the State, the rest private) by a few major companies who supply principally for the paper industry. This expansion puts Chile's native forests at risk. Natural forests, which cover 14.1 million ha are primarily owned by small and medium-sized landowners, the majority of which are highly degraded.

Policy is set by both the Ministry of Agriculture and Environment. The Forest Service of Chile (CONAF) and the Institute of Forest Research (INFOR) both operate under the Ministry of Agriculture and support the conservation of protected areas and sustainable use of forest ecosystems.

6.2.2.1 Agroforestry

Chile represents an exciting opportunity for AF, given that so much of the country is already used for forestry and could be improved via an ecosystem approach. The most common AF systems in Chile are silvopastoral systems (44.4%) and windbreaks (43.7%)[306].

Some of the policies that directly or indirectly impact AF are as follows:

- *Forest Law (1931)* - This was the first piece of legislation that was aimed at conservation. It was designed in part to limit the destruction of forests, giving power to the President to establish parks and natural reserves. This law did not take into consideration forest dwellers or Indigenous communities who were making a sustainable living off the forests and arguably didn't achieve much in terms of conservation.

- *Law 701 SIRSD (Fomento Forestal y el Sistema de Incentivos a la Recuperacion de Suelos Degrados) (1974)[307]* - this law created funding for forest planting, but was also extended to plantations. In 1998 DL701 was amended to include small holders and encourage planting on degraded soils and slopes with financial incentives.

- *Political Constitution of Chile (2005)[308]* - This constitution wrote into law that "all individuals have the right to live in a pollution-free environment" and obliges the State to "safeguard the preservation of nature. The law may establish specific restrictions to

[305] Christian Salas, Pablo J. Donoso, Rodrigo Vargas, Cesar A. Arriagada, Rodrigo Pedraza, Daniel P. Soto (2016) 'The Forest Sector in Chile: An Overview and Current Challenges' *Journal of Forestry,* 114, 5, 562–571.
[306] Peredo Parada, S. et al. (2020) 'Agroforestry in the Andean Araucanía: An Experience of Agroecological Transition with Women from Cherquén in Southern Chile', Sustainability, 12(24), p. 10401. doi:10.3390/su122410401.
[307] CONAF (2020) 'DL 217 y sus reglamentos' Available online: https://www.conaf.cl/nuestros-bosques/plantaciones-forestales/dl-701-y-sus-reglamentos/
[308] Natural Resource Governance Institute 'Political Constitution of Chile' (2005) Available online: https://www.resourcedata.org/document/rgi-political-constitution-of-the-republic-of-chile

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

exercise of certain rights and liberties in order to protect the environment" (Section 19, number 8).

- *Native Forest Recovery and Forestry Development Act (2007)*[309] - regulates the use of native forests and promotes sustainable forest management. It took 15 years to be developed, finally being approved by parliament in 2007. With the development of the Native Forest Law, the government formed an ad hoc commission to negotiate between key actors (including industry and non-governmental organizations), to try and obtain consensus on the future of native forests. The proposal that emerged allowed a degree of forest conversion (25% of the areas with less than 45-degree slopes), offered incentives for its management (which the 1931 Forest Law did not do) and provided support for small- to medium-sized owners (addressing social equity, unlike Decree Law 701).

- *Law Nº20.283 on Native Forest Recovery and Forest Promotion (2008)*[310] - this law aims to secure the protection, recovery and improvement of native forests and specifically encourages the use of native plants in order meet environmental policy goals

- *Climate Change Adaptation Plan for the Agricultural and Forestry sectors (2013)* - The Adaptation Plan for the Agricultural and Forestry sectors aims to strengthen the activities carried out by the Ministry through its services and organisations, which mostly have components of adaptation to climate change and identify those areas where there is still lack of knowledge and technology to move towards the implementation of adaptation activities, in order to intensify the research and development work in this area.

- *National Strategy on Forests and Climate Change 2017-2025 (2013)* [311] - aims to link Chile's forestry initiatives with the existing carbon market, specifically through the generation and commercialization of emission reduction certificates (carbon credits), operationalized through the 'Platform for Generation and Trading of Carbon Credits in the Chilean Forestry Sector', created by CONAF in June 2012. The platform seeks to reduce the different technical, financial, administrative and institutional barriers to the generation of forestry carbon credits. The Strategy also aims at attracting foreign investment and financial support for the reforestation and forest protection activities through for example the REDD+ mechanism, it also calls for introducing a payment for environmental services (in particular carbon sequestration) of forests. The proposed

[309] Government of Chile, Ministry of Environment, Forestry Institute, INFOR (2007) 'Native Forest Recovery and Forestry Development Act' Available online: https://bibliotecadigital.infor.cl/

[310] Global Regulation https://www.global-regulation.com/translation/chile/649994/law-on-the-recovery-of-native-forest-and-forestry-promotion.html

[311] Ministry of Agriculture, Chile (2013) 'National Strategy on Forests and Climate Change 2017-2025' Available online via https://www.climate-laws.org/geographies/chile/policies/national-strategy-on-forests-and-climate-change-2017-2025

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

measures and requirements are expected to be adopted as binding by the proposed Forestry Development Act, currently discussed in the National Congress.

Chile, with its high diversity and endemism, alongside having highly diversified climatic regions and productive forests (both for timber and agriculture) could very much become a leader of AF. Both INFOR and CONAF are investing in research and development of these systems. There is scope to unify Chile's National Strategy on Forests and Climate Change with ambitious targets and policies for AF systems.

6.2.2.1.2 Forest Farming

Forest farming takes place in Chile in the form of traditional agricultural practices. Livestock grazing in native forests is a historical practice [312]. Forest farming has a bad reputation for degrading native and primary forests. Forests have been protected (in favour of corporations or completely off limits) since the Forest Law of 1931. After a long struggle, forests are now recognised as central to many communities' way of life.

- *Native Forest Recovery and Forestry Development Act (2007*) - 15 years in the making, this act regulates the use of native forest and promotes conservation while recognising that forests are not just a wood resource; that communities depend on them and are able to use them, for example through forest farming. One of the key aspects of the law is to provide funding for owners of small, forested areas in order to help finance sustainable logging or conservation projects. This fund could be further developed to allow for community-based forest farming and or AF.

6.2.2.2 Mixed farming

MF is not common in large-scale farms in Chile, though it is a historic practice, and cattle are grazed on rotation in small, family-run operations. Usually, small-scale farmers operating at the local or domestic level employ this method of farming. There doesn't appear to be any major efforts to establish or promote more mixed cropping (livestock and crops) systems. No MF policies were found for Chile either in FAOLEX or on the Ministry of Agriculture's website.

[312] Agroforestería - Silvopastoral Systems in Northern Argentine-Chilean Andean Patagonia: Ecosystem Services Provision in a Complex Territory (no date). Available at: https://agroforesteria.infor.cl/index.php/documentacion/publicaciones/148-silvopastoral-systems-in-northern-argentine-chilean-andean-patagonia-ecosystem-services-provision-in-a-complex-territory (Accessed: 23 September 2021).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.2.3 India

In India, the agricultural sector contributes about 17% of GDP and employs about 47% of the total national workforce [313]. Land and farm holding size is predominantly small; 85% of holdings are less than 2 ha and represent 45% of the total cropped area. At the same time, 5% of farmers have holdings larger than 4 ha, but these occupy roughly 32% of all arable land [314]. The total geographic area is 328.7 million ha, of which 140.1 million ha is registered as net sown area and 198.4 million ha as net cropped area.[315]

Individual states have constitutional responsibility for their agricultural sector but the central government develops national approaches to policy and provides funds for implementation at the state level. There are a few key areas of policy where the central government is wholly responsible, international trade policies being one.

There are many government bodies and institutions involved in agricultural and food policy. The primary body is the Ministry of Agriculture, Cooperation and Farmers' Welfare but other important ministries include the Ministry of Chemicals and Fertilizers, The Ministry of Commerce and Industry, the Ministry of Water Resources, River Development and Ganga Rejuvenation, the Ministry of Consumer Affairs, Food and Public Distribution and the Ministry of Environment, Forest and Climate Change. There are further influential directorates such as the Directorate of Cashewnut & Cocoa Development and the Department of Animal Husbandry Dairying and Fisheries.

Both MF and AF are traditional land use systems in India which have been practiced for thousands of years. Traditionally people relied on these interconnected systems for the resulting co-benefits of nutrient recycling, food, fodder, fuel, fibre and fertilizer. Most forms of AF are part of Indigenous traditional knowledge[316].

Agricultural policies are many and complex in India. In 2020, the Government of India (GOI) amended three key trade and farming bills with an ambition of doubling farmers' income by the year 2022 and securing supply. However, these amendments were met with huge resistance by farmers protesting from the end of 2020 until the writing of this report. The amendments were as follows:

- *Essential Commodities (Amendment) Bill* (2020)[317] - Ministry of Consumer Affairs, Food & Public Distribution. In marketing regulation, the Essential Commodities Act, 1955 (ECA) provides for the control of production, supply, distribution and pricing of essential

[313] Ministry of Labour and Employment, 2016; Ministry of Agriculture and Farmers' Welfare, 2017
[314] Agricultural Census India, 2017
[315] Land Use Statistics 2014-2015, Government of India
[316] Chavan *et al.,* 2015.
[317] Ministry of Consumer Affairs, Food and Public Distribution, Government of India (2020) 'Essential Commodities (Amendment) Bill Available online: https://pib.gov.in/PressReleasePage.aspx?PRID=1657657.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

commodities. They include foodstuffs, many kinds of seeds and fertilisers. The ECA also maintains or increases supplies of essential commodities, and secures their equitable distribution and availability at fair prices. The Amendment "aims to remove fears of private investors of excessive regulatory interference in their business operations"

- *Farmers' Produce Trade and Commerce (Promotion and Facilitation) Bill* (2020) - Ministry of Agriculture & Farmers Welfare.

- *Farmers (Empowerment and Protection) Agreement of Price Assurance and Farm Services Bill* (2020) – Ministry of Agriculture & Farmers Welfare

Ultimately, these amendments deregulate the agricultural sector and encourage farmers to sell directly to large buyers (companies, retailers, etc). The strength of the resistance to these amendments caused the government to suspend the laws for 18 months and form a new committee which includes representatives from the government and farmers to discuss their concerns.

6.2.3.1 Agroforestry

India has a long tradition of AF and research intro the practice. The 1st Seminar on Agroforestry was organized by the Indian Council of Agricultural Research, New Dehli in 1979. Currently, the All India Coordinate Research Project on Agroforestry (ICAR) has 37 research centres over India, covering most of the agro-climatic regions of the country. In addition to ICAR, the Indian Council of Forestry Research and Education (ICFRE) and its institutes are also engaged in AF research.

India is an important example for AF, especially for other 'developing' countries. The practice has received a lot of attention for its ability to contribute to economic growth, poverty alleviation and ecosystem service provisions. The sustained investments into research have demonstrated the potential of AF in the country, but the uptake has not been as impressive as it could be - the potential for AF remains untapped and many forms of AF systems have not been adopted[318]. Most attribute this to a mix of different factors, among which is the knowledge of how these systems work and interact with other crops, as well as a lack of research in the socioeconomic processes of AF systems. There are examples of AF uptake such as poplar-based systems in Punjab, Mango-teak in Karnataka and poplar and eucalyptus on embankments and wastelands[319], all of which highlight the potential of AF in India, but they make up a very small percentage of agricultural land use.

In 2014, India became the (apparent) first country in the world to issue a nationwide policy for AF. The Ministry of Agriculture has the mandate for AF in India with an Agroforestry Mission located

318 Puri, S. and Nair, P. K. R. (2004) 'Agroforestry research for development in India: 25 years of experiences of a national program', Agroforestry Systems, 61(1), pp. 437–452. doi: 10.1023/B:AGFO.0000029014.66729.e0.

319 Dhyani, S. K. and Handa, A. K. (2014) 'Agroforestry in India and its Potential for Ecosystem Services', in Dagar, J. C., Singh, A. K., and Arunachalam, A. (eds) Agroforestry Systems in India: Livelihood Security & Ecosystem Services. New Delhi: Springer India (Advances in Agroforestry), pp. 345–365. doi: 10.1007/978-81-322-1662-9_11.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

within the Department of Agriculture and Cooperation (however, this review could not find the stated Agroforestry Mission online).

Some of the policies that directly or indirectly impact on AF in India are as follows:

- *Agricultural Export policy 2017* [320]- This policy is aimed at doubling the agricultural exports and integrating Indian farmers and their products with global value chains. The objectives are as follows:
  - To double agricultural exports from $30+Billion USD to $60+Billion USD by 2022
  - To diversify export basket, destinations and boost high value and value added agricultural exports
  - To promote novel, Indigenous, organic, ethnic, traditional and non-traditional agricultural product exports
  - To provide an institutional mechanism for pursuing market access, tackling barriers, sanitation and phytosanitary issues
  - To double India's share in world agri-exports by integrating with global value chain
  - Enable farmers to benefit from export opportunities in overseas markets

- *National Forestry Policy 1988*[321] - The principal aim of the policy is to encourage environmental sustainability and ecological balance. Deriving economic benefits from nature must be subordinate to this aim. The principal aim is supported by several objectives:
  - Maintaining and restoring ecological balances
  - Conserving the natural heritage of the country by preserving the remaining natural forests with their vast variety of flora and fauna
  - Conserving soil and water to mitigate floods, droughts and reduce siltation in reservoirs (the last was turning out to be an issue because India had built several dams in the first 30 years of independence)
  - Extending sand dunes
  - Increasing forest cover
  - Increasing productivity and efficiency of resource utilization, to meet both local population needs and national needs

- *National Agroforestry Policy 2014* (NAP)[322] - AF is defined in this policy as "a land use system which integrates trees and shrubs on farmlands and rural landscapes to enhance productivity, profitability, diversity and ecosystem sustainability." It is recognised as a critical pathway to meeting the previous *National Forestry Policy's* ambition of increasing forest or

[320] Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India (2018) 'Annual Report 2018-2019'.
[321] Government of India (1988) 'National Forestry Policy' Available online: https://www.india.gov.in/national-forest-policy-1988.
[322] National Agroforestry Policy (2014) Government of India Available online via: https://www.climate-laws.org/geographies/india/policies/national-agroforestry-policy-2014.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

tree cover to 33% from the present level of less than 25%. One of the key motives behind NAP is to bring together all the various programmes admissions of AF in India under one platform to better facilitate awareness raising and to improve the role of the financial and insurance sector. Although NAP makes recommendations for credit and market facilities, the policy is not clear about how to achieve these objectives.

The key objectives of the policy are as follows:

- Encouraging and expanding tree plantations in complementarity and integrated manner with crops and livestock to improve productivity, employment, income and livelihoods of rural households, especially small holder farmers.
- Protecting and stabilizing ecosystems and promoting resilient cropping and farming systems to minimize the risks during extreme climatic events.
- Meeting the raw material requirements of wood-based industries and reducing the import of wood and wood products to save foreign exchange.
- Supplementing the availability of agroforestry products (AFPs), such as the fuel-wood, fodder, non-timber forest products and small timber of the rural and tribal populations, thereby reducing the pressure on existing forests.
- Achieving the target of increasing forest and tree cover by promoting ecological stability, especially in the vulnerable regions.
- Developing the capacity and strength of research in AF, creating a massive people's movement for achieving these objectives and minimizing the pressure on existing forests.

- *Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006*[323] - This act tries to recognize marginal and tribal communities' rights over forest lands in which and of which they were traditionally dependent. The Act aims to (partially) correct the injustices caused by colonial-era forest laws, some of which are still in place today, despite amendments (see National Forestry Policy 1988 above). The act identifies four types of rights:
  - The right to ownership of land farmed by tribal peoples or forestry dwellers (up to a maximum of 4 hectares). No new land is granted, only for land being presently cultivated.
  - The right of forest dwellers to extract 'minor forest produce' and grazing areas.
  - To rehabilitate peoples in case of illegal eviction, outside forces of displacement and to basic amenities. Subject to restrictions for forest protection.
  - The right to protect, regenerate or conserve community forest resources which have been traditionally protected and conserved for sustainable use

  This Act therefore facilitates both AF and MF practices on a small scale for Indigenous forest dwellers.

[323] Government of India (2006) 'Scheduled Tribes and Other Traditional Forest Dwellers Act' Available online: https://ruralindiaonline.org/en/library/resource/the-scheduled-tribes-and-other-traditional-forest-dwellers-recognition-of-forest-rights-act-2006/.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Despite the positive policy environment and the multiple benefits from AF systems, the majority of Indian farmers have been hesitant to adopt AF systems on a large scale due to financialisaton issues, long cropping periods and perhaps, lack of awareness, as well as increased legal complications.

Considering India has been investing into AF research for over 30 years and has a substantial national AF policy in place since 2014, the lack of uptake and overall land use is surprising. There is enormous potential for India to maximise AF systems.

6.2.3.2 Forest Farming

Forest grazing is permitted in India under the S*cheduled Tribes and Other Traditional Forest Dwellers Act of 2006* (reference as above), section 3.i (d) states 'community rights of uses or entitlements such as fish and other products of water bodies, grazing (both settled or transhumant) and traditional seasonal resource access of nomadic or pastoralist communities;'. 41% of forest in India is classed as "degraded," due to reliance on fuel wood and cattle grazing.[324]

6.2.3.2 Mixed farming

MF is a very traditional form of farming in India, whereby animals are integrated into the cropping system to benefit from nutrient cycling and to provide a 'living bank' with the animals acting as a type of insurance policy should, for example, crops fail. As the majority of farmers are small-scale (less than 2ha), most farmers have elements of MF in their systems and as such, finding robust statistics on area under MF systems was challenging. Both on-farm and between-farm mixing is commonplace in India.

There is no evidence to suggest that India has any specific policies for MF. Neither could the review find policies related to integrated-crop-livestock uptake. In 2013, the Government of India launched the 'National Livestock Policy', a sectoral national policy. This policy makes no mention of MF or the integration of crop and livestock and instead focuses on improving productivity, financing, research and development, conversation of animal biodiversity, animal health, increase demand of animal products, and improving the investment environment.

Case study: Andhra Pradesh Community-managed Natural Farming

In the state of Andhra Pradesh, the National Policy for Agroforestry is contrasted with a perhaps more effective policy mechanism at the state level, the 'Andhra Pradesh Community-managed Natural Farming' (APCNF) initiative. What started as an agroecological movement called 'Zero Budget Natural Farming Movement (ZBNF) in nearby Karnataka, has now spread

[324] Forest Legality Country Tool, India Available online: https://forestlegality.org/risk-tool/country/india#tab-resources.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

across manyparts of the country as a rural movement composed of middle and small landholders[1]. In Andhra Pradesh, this agroecological movement was launched by the local government in 2016 with an aim to convert 6 million farmers and 8 million hectares to agroecology farming by 2027.

ZBNF is an agroecological farming approach that promotes growing crops in harmony with the surrounding environment through use of both AF and MF systems, though this is not the stated goal. It was developed by *guru* Subhash Palekar in the 1990s and has two main principles, one being agronomic and the other structural. The first, ZBNF is about improving the soil fertility through a number of principles such as diversification, nutrient cycling, increasing agrobiodiversity and limited disturbance to the soil[325]. Secondly, ZBNF has a structural approach in that it eschews social external inputs such as financing, credit markets and corporations. Self-reliance and autonomy are fundamental to its success, according to its founder.

ZBNF has proven more popular than organic certification for some farmers as it represents less water usage and is more time and resource efficient. Simple soil and seed inoculations or treatments are its foundation, and all the ingredients are found locally. The 4 key principles or 'wheels of ZBNF' are as follows[326]:

Jivamrita: A fermented microbial culture derived from cow dung and urine, jaggery, pulse flour, and soil - stimulates microbial activity to make nutrients bioavailable; protect against pathogens

Bijamrita: a microbial coating for seeds, based on cow dung, urine, and lime – protects young roots from fungus and seed borne or soil borne diseases

Acchadana- mulching: Covering the top soil with cover crops and crop residues - Produces humus, conserves top soil, increases water retention, encourages soil fauna, prevents weeds

Whapahasa: Soil aeration, a result of jivamrita and acchadana- represents the changes in water
management brought about by improved soil structure and humus content - Increase water availability, water use efficiency, increase resilience to drought

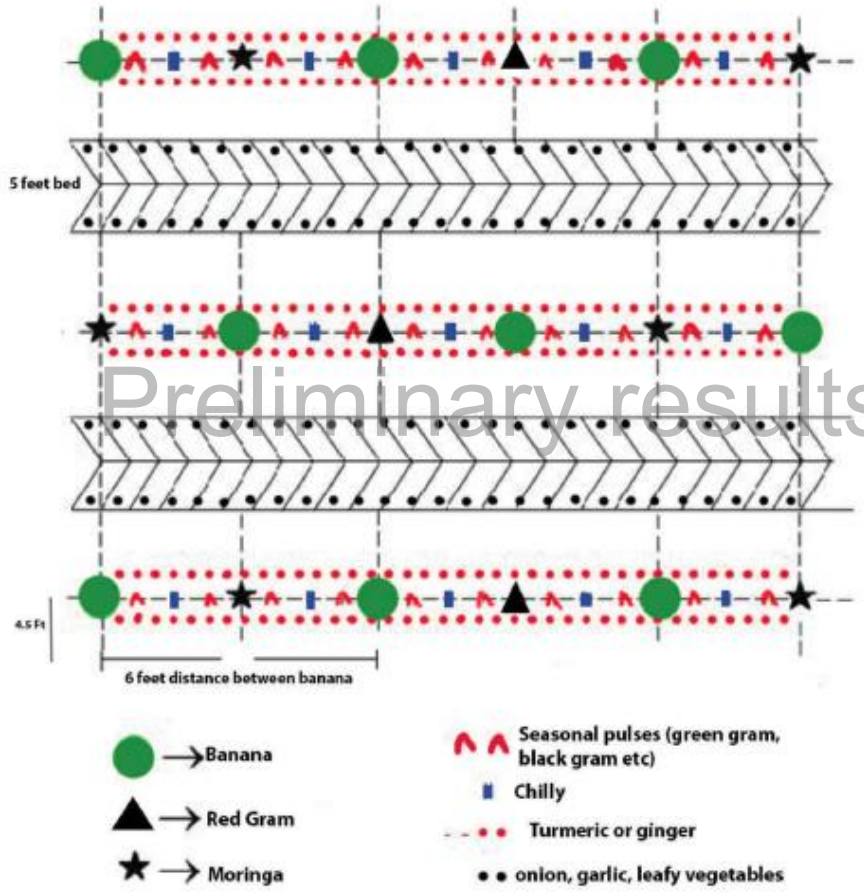
Palekar claims that the urine and dung from one cow are enough for 30 acres of land, making cow ownership by individual farmers unnecessary. Both MF and AF are integral parts to this system, both through the use of manures and intercropping with trees.

[325] Palekar, S. 2006. The principles of spiritual farming II. 2nd ed. Amravati: Zero Budget Natural Farming Research, Development & Extension Movement, Amravati, Maharashtra, India.
[326] APZBNF. 2018. Zero budget natural farming. Http://Apzbnf.in/Faq/. http://apzbnf.in/faq/.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

In terms of design, we see an agroforestry type model emerge, that also benefits from animal inputs (cow dung and urine, though very minimal). Trees are integrated into different canopy layers in strips, intercropping crops and trees, including riparian buffers and edge strips. Figure 5 is a version of the design.

Figure 5: A version of the 5-layer Palekar model for ZBNF, taken from BNNMurali [327]



[327] BNNMurali. 2016. Zbnf Layout Plans. https://agricultureforbetterfarming.wordpress.com/2016/07/04/zbnf-plants-planting-layout-plans-2016/.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

APCNF is investing resources in farmer-led agroecology, supporting collective and participative learning, working with youth, supporting women-led organizations and ultimately facilitating farmers to gain back authority, autonomy and get out of debt.

APCNF is supported by two federal funds, the RKVY (launched in 2007 to facilitate States' public investment in agriculture) and the PKVY (launched in 2015 to support organic farming and improve soil health), as well as a large grant from APPI (a foundation of the Indian billionaire Azim Premji).

Inspired by Andhra Pradesh, other states are now drawing up initial budgetary allocations. Many of these are applying for national and external funding. This queries the deeply agroecological nature of the ZBNF in that it aims to de-link farmers from credit markets, as such this 'scaling up' remains to be seen in terms of financialization. Policy support should be welcome to move from 'islands of success' to state or even country wide adoption[328], however, there is need for caution in where and how the funding is mobilized.

Ecosystem services apparent in this policy approach:

Cultivated plants for nutrition (i.e crops for consumption)

Cultivated plants for materials (i.e crops for biomass)

Cultivated plants for energy (i.e crops for fuel)

Carbon sequestration

[328] Gregory, L., J. Plahe, and S. Cockfield. 2017. The marginalisation and resurgence of traditional knowledge systems in India: Agro-Ecological 'Islands of Success' or a wave of change? South Asia: Journal of South Asian Studies 40 (3):582–99

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.


Nitrogen fixation


Carbon cycling


Pest and disease control


Enhanced soil fertility


Reduced erosion


Wind protection


Fire protection


Pollination and or seed dispersal


Regulation of temperature, light, humidity, and transpiration


Biodiversity

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.2.4 USA

Agriculture is a major industry in the USA, a major net exporter of food. The US is the second largest agricultural trader in the world, after the European Union. According to the US Department of Agriculture (USDA), agriculture, food and related industries contributed 5.2% towards GDP in 2019. Production has continued to increase and now agricultural output grows faster than domestic demand for many products. As such, the US relies on export markets to sustain prices. Export revenue has increased from $46 billion in 1994 to $136.7 billion in 2019. Like all major food producing countries, agricultural production is a major use of available land and covers just over half of the U.S.[329].

Farmers in the US have typically received very high levels of federal support, not dissimilar to the EU. US agricultural policy follows a 5-year legislative cycle that is commonly known as the US 'Farm Bill'. The Farm Bill governs farming, food and nutrition, and rural communities, as well as aspects of bioenergy and forestry.

In the 2014 Farm Bill however, direct payments and subsidies were completely removed, though price support still exists for some products, such as diary. The Farm Bill instead moved towards providing subsidised insurance for yield and loss.

The United States is an interesting comparison for the EU given its similar production and export figures. It also represents similar policy models in that there is one overarching policy (the federal Farm Bill in the USA, and CAP in the EU) but individual states also have policy mechanisms that can work against or in tandem to the broader policy. The US has also followed a similar, if not more extensive, de-coupling of livestock and crop production to the EU, which is now being addressed and considered with new insights to the environmental benefits of mixed production.

6.2.4.1 Agroforestry

AF systems have been used by Indigenous and First Nation peoples for centuries. Currently however, the land under AF system is minimal, less than 1% of agricultural land is in AF systems, compared to about 10% of EU.

Policy support for AF is found at the Federal level, mainly through the USDA and the National Agroforestry Centre. In 2011, the USDA launched its Agroforestry Strategic Framework 2011-2016 which outlines the mission, goals and approach to AF with contributions from 8 agency members of the USDA AF Executive Steering Committee (AESC), the USDA Interagency Agroforestry Team (IAT) and the National Agroforestry Centre (NAC). However, there is limited policy information or details on the financing of AF, and there is still a lack of a formal AF policy in the US. The USDA budget for AF (2011-2012) was $333 million, less than 1% of the total USDA budget.

[329] U.S Department of Agriculture (2019) Ag and Food statistics: Charting the Essentials Available online: https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/land-and-natural-resources/.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Policies that directly or indirectly impact upon AF development in the country are as follows:

- *2018 Farm Bill*[330] –
  - Environmental Quality Incentives Program - financial and technical assistance to address natural resource concerns and deliver environmental benefits such as improved water and air quality, conserved ground and surface water, increased soil health and reduced soil erosion and sedimentation, improved or created wildlife habitat, and mitigation against increasing weather volatility
  - Conservation Stewardship Program - maintain and improve existing conservation systems and adopt additional conservation activities to address priority resources concerns
  - Agricultural Conservation Easement Program - manage financial risk through diversification, marketing or natural resource conservation practices
  - Conservation Reserve Program
  - Continuous Conservation Reserve Program
  - Conservation Technical Assistance – providing information on reducing pollution in waterways by using riparian buffers

- *Strategic Framework (2019-2024)*[331]
  - Reach out - Ensure all landowners and communities have access to the latest tools and information that support agroforestry adoption
  - Investigate – Conduct interagency, multidisciplinary research to advance agroforestry science and technologies
  - Integrate - Facilitate the integration of agroforestry information, research, tools, and technologies to meet the goals and objectives of USDA agencies

Policy is still lagging for conversation and the dominant cropping systems are still very de-mixed. Another big barrier to converting to AF in the US is the dominance of leased land (39%) and the structures that impinge on tenant farmers to invest in trees on farms. For MF, a particular concern is fears over food safety regulations with integration.

There is exciting scope however, for the US to divert farming payments and revenue to help farmers transition to these systems. This would have a great environmental impact on agriculture in the US. There is still a lack of general prevalence of integrated systems in addition to the policy conditions that would support their uptake. Tying insurance programs to the adoption of agricultural practices such as MF and AF, as well as investing in research and development, could greatly strengthen the uptake of such systems.

---

[330] Forest Department, US Department of Agriculture 2018 Farm Bill, Available online: https://www.fs.usda.gov/managing-land/farm-bill.
[331] USDA Strategic Framework 2019 – 2024 Available online: https://www.usda.gov/sites/default/files/documents/usda-agroforestry-strategic-framework.pdf.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.2.4.1.2 Forest Farming

Forest farming in the USA is predominantly in the form of livestock grazing. The US Forest Service grants permits for forest grazing by livestock following stringent application process through the bureau of land management. There are 3 main types of access, term grazing (ten years), temporary grazing and livestock use permits.

6.2.4.2 Mixed farming

In 1974, 52% of agricultural land and 19% of farms used a crop-grazing rotation, by 2012 only 7% of farms and less than 2% of land were using this rotational method[332]. However, there is renewed interest in integrating crop and livestock (ICLS), with farmers and ranchers like Gabe Brown, who are making their voices heard in farming communities and beyond about the benefits of these integrated systems.

Policies that directly or indirectly impact upon MF development in the country are as follows:

- *2014 Farm Bill* – Conservation Stewardship Program and Environmental Quality Incentives Program both provide financial and technical assistance to several ICLS related activities such as: not burning crop residue and instead using it as feed; transition to organic cropping; intensive rotational grazing where pasture can be rotated with crops and nutrient and feed management.

- There are zero import tariffs for fertilizers and very low import tariffs for livestock feeds[333]

- *Food Safety Modernization Act 2011*[334] – this act provides for the safe production of crops for human consumption and includes rigorous rules around the presence of animals and use of animal excrement on cropland that produces directly for human consumption.

[332] Garrett, R.D. et al. (2017) 'Policies for Reintegrating Crop and Livestock Systems: A Comparative Analysis', Sustainability, 9(3), p. 473. doi:10.3390/su9030473.
[333] United States International Trade Commission (2015) Harmonized Tariff Schedule of the United States; DC, USA.
[334] Food and Drug Administration (2015) FSMA Final Rule on Produce Safety; FDA: Washington, DC, USA.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.2.5 Ghana

Agriculture is a key sector for Ghana, though it is primarily practiced informally. 80% of Ghana's agriculture is smallholder, rainfed farmers[335]. Around 20% of Ghana's GDP comes from agriculture and accounts for over 30% of export earnings. However, Ghana remains a net importer of agricultural products, mainly consumer commodities such as rice, wheat, sugar and poultry. With an estimated total land mass of 238,000 km2, 57% is classified as agricultural land, 24% of which (58,000km2) is under cultivation.

The Ministry of Food and Agriculture is the lead ministry for the sector, responsible for non-cocoa crops and livestock. The responsibility of policy is spread over several agencies including: The Agricultural Research Institutes of the Council for Scientific and Industrial Research under the Ministry of Environment, Science and Technology and Innovation and the National Agricultural Research Systems.

Cocoa falls under the responsibility of the Ghana Cocoa Board (COCOBOD), along with shea butter and coffee. These are the primary export crops of Ghana and for this reason are managed separately. Ghana is the second largest producer of cocoa in the world, accounting for about 20-25% of the world's supply of cocoa[336]. COCOBOD determines domestic purchasing price of cocoa beans and monitors and regulates the operations of the industry. Cocoa is mainly exported as a raw product, with very little processing or value added done in country. It is a very important crop for the country in terms of income, foreign exchange earnings and livelihoods as well as being a driver of economic growth. Despite this however, Ghana has one of the lowest productivity rates for growing cocoa and it continues to fall[337].

Deforestation is a major issue in Ghana, as well as illegal mining. Many policies integrate natural resource management and these topics, but little is found on AF or MF specifically. Despite having one of the most extensive legal regimes for management of natural resources in the region, Ghana continues to have one of the highest rates of deforestation in the region of 2.1% (135,000 ha/yr)[338]

The Ministry of Lands and Natural Resources oversees the country's management of land, forest, wildlife and mineral resources. The Forestry Commission (re-named and re-established under the Forestry Commission Act, 1999 Act 571) is the agency under the Ministry and is responsible for the sustainable development and management of Ghana's forests and wildlife.

6.2.5.1 Agroforestry

[335] Ministry of Economy and Industry, Embassy of Israel (2020) 'Agriculture sector in Ghana review'.
[336] Ghana Cocoa Board (2018) '49th Annual Report and Financial Statements' Available online: https://cocobod.gh/resources/annual-report.
[337] Ghana COCOBOD (2015) 'The future of Ghana's cocoa sector, building in robustness and resilience to What IF? Scenario Planning report', Accra, Ghana.
[338] Ghana REDD+ Strategy (2016-2035).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Despite having a National Agroforestry Policy (NAP) since 1986, AF in Ghana does not have an 'institutional home'; it is not administered under any one governing body. Adoption among farmers remains low, with minimal uptake throughout the country[339]. Practices are mainly limited to the 'taungya' system, whereby patches of degraded forests are given to farmers to cultivate food crops, while they plant and care for seedlings of timber species provided by the Forestry Commission until the tree canopy is closed.

According to WorldAgroforestry.net, Ghana launched the 'Ghana Agro-Forestry Network' in 2012. This review found news articles[340] confirming the above but since then, no website or mention of such a network in Government websites or policy documents. Neither could this review find the NAP available for review online.

Speaking with a researcher at the Forestry Research Institute of Ghana, the author of this review found that key issue for farmers were around land tenure and rights to trees. Currently, all trees are owned by the state, and as such, it is unclear who benefits from the tree products. This also means that farmers are unlikely to want to invest in AF systems.

Policies that directly or indirectly impact upon AF development in the country are as follows:

- *National Forest Policy 1986* – this review could find no details or source for this policy
- *Forestry Commission Act of 1999 – Act 571*[341] - the commission focuses on regulating, conservation and management of forest resources through 4 key priorities:
    - Regulating the utilization of forest and timber resources
    - Managing forest reserves and protected areas
    - Facilitating private sector and other organisations with implementation of forest and wildlife policies
    - Developing forest plantations and restoring degraded forests
- *Ghana Cocoa Forest REDD+ Programme*[342] – this is a landscape approach to policy which is aimed at reducing deforestation driven by the expansion of cocoa farming and therefore reducing emissions from deforestation and degradation. The implementation of this policy is based on 6 key pillars:

[339] Obeng, E. and Weber, M. (2014) 'Socio-economic factors affecting agroforestry adoption in Ghana', Ghana J. Forestry, 30, pp. 43–60.
[340] Modern Ghana (2012) Ghana Afro-Forestry Network Launch' Available online: https://www.modernghana.com/news/421738/ghana-agro-forestry-network-launched.html.
[341] Forestry Commission Act of 1999, Act 571, Ministry of Lands and Natural Resources, Ghana (1999) Available online: http://elibrary.jsg.gov.gh/fg/laws%20of%20ghana/2%20REP/FORESTRY%20COMMISSION%20ACT,%201999%20ACT%20571.htm.
[342] Reddsis.fcghana.org. 2021. *Ghana Reddsis*. [online] Available at: <https://reddsis.fcghana.org/> [Accessed 25 October 2021].

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

- Forest reserve, rehabilitation and restoration
- Institutional coordination, monitoring, reporting and verification
- Landscape planning and management of plans
- Increasing yields
- Improving risk management and finance, particularly in insurance for farmers
- Legislative and policy reforms to include customary norms and practices

- *Cocoa and Forest Initiative Joint Framework for Action*[343] - this framework commits the Government of Ghana and private companies to work together to end deforestation and promote forest protection, as well as creating restoration in the cocoa supply chain. The framework has 3 core themes:
  - Forest protection and restoration
  - Sustainable production and livelihoods
  - Community engagement and social inclusion

- *Ghana Forest and Wildlife Policy 2012*[344] – This is the main policy of the forestry sector which focusses on the conservation and 'sustainable development' of forest and wildlife resources for ecosystem services. The policy focuses on:
  - Conserving biological diversity, enhancing carbon stocks and preserving ecosystems
  - Promoting the rehabilitation of degraded landscapes through plantation development and community forestry (AF)
  - Promoting the development of viable forest and wildlife-based industries and livelihoods
  - Promoting training, research and development that support sustainable forest management

- *Ghana Forest Plantation Strategy 2016-2040*[345]- The Ghana Forest Plantation Strategy (GFPS) aims to restore or rehabilitate deforested and degraded landscapes through planting and promoting on farm forestry (AF). Tree seedlings are given to farmers under this programme for farm boundaries, riparian buffers and landscape restoration. The goal of the GFPS is to "achieve sustainable supply of planted forest goods and services to deliver a range of economic, social and environmental benefits" this is done through the:
  - Establishment of forest plantations
  - Support for AF with goal of covering 3.75 million hectares of agricultural landscape by 2040

[343] Cocoa and Forests Initiative (2017) 'Cocoa and Forest Initiative Joint Framework for Action' Available online: http://cfighana.mlnr.gov.gh/

[344] Ministry of Lands and Natural Resources, Republic of Ghana (2012) 'Ghana Forest and Wildlife Policy' Available online: https://www.fornis.net/node/547.

[345] Ministry of Lands and Natural Resources, Republic of Ghana, Forestry Commission 'Ghana Forest and Plantation Strategy Annual Report' (2019) Available online: https://drive.google.com/file/d/1xMXVTsuWEHZ6X3LEAKbRHX5vt4McBD0m/view.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

- Rehabilitation of existing forest plantations
- Promotion of investments in forest plantations
- Creation of employment opportunities
- Improvement of governance in management and regulation of forest plantations

There is much potential for AF systems in Ghana. However, policy must be brought together in a more coherent manner, as well as within the financial incentives provided. Non-alignment in policies is an issue, particularly in the agriculture and forestry sectors. Value chain assessment must also be carried out to ensure that value is added within the country and that the domestic market can also access products from AF systems. Land tenure and tree rights are also critical to enabling AF systems. Without security of tenure of land or trees, and grey areas when it comes to harvesting non wood forest products, farmers are reticent to plant trees.

6.2.5.1.2 Forest Farming

Forest farming is practiced throughout Ghana informally, with households allowing cattle to graze through forests. According to the UNDP Community Rights to in Ghana Forest Law[346], communities and landowners have communal rights to access forests for non-timber products and sociocultural benefits (e.g., shrine) on a subsistence basis. Illegal logging continues to be a huge issue in Ghana with an estimated 70% of timber harvesting being illegal [347].

6.2.5.2 Mixed farming

MF, in the traditional sense, is practiced throughout the country. Most rural households keep livestock, thus maintaining a mixed crop-livestock system in most communities. Many households rely on the sale of the various livestock species or products to make up for shortfalls in household budgets. As in many other countries, livestock here counts as living insurance.

There was little to no policy evidence found for MF or integrated crop-livestock systems. No evidence was found to suggest any policy or legislation on FAOLEX or Government websites.

[346] UNDP ' Community Rights in Ghana Forest Law' Available online: https://www.undp.org/content/dam/ghana/docs/Doc/Susdev/Community%20Rights%20in%20Ghana%20Forest%20Law%20-%20brochure.pdf.

[347] Forest Legality 'Ghana Forest Management', Available online: https://forestlegality.org/risk-tool/country/ghana#tab-management.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.3 International policies and cross-border initiatives

This section aims to give a brief overview of some of the most prominent global, cross-border initiatives and international policies that could, or do, relate to forestry and AF. This is included in the review to give a wider, global context to the extent and importance of forestry (and therefore AF management). As this review serves as a baseline reservoir for future discussions around pan-European policy, considering other cross-border initiatives may shed light on best practices or what to avoid in future CAP developments.

In the global context, Europe is one of the most highly deforested continents, having cut down large swathes of forest prior to the industrial revolution as the need for agricultural land increased, as well as wood for fuel and timber. However, some EU and non-EU countries now have a positive net annual change in forest area[348].

Since 2000, more than 60 million ha of tropical forests have been converted to agriculture globally[349]. The primary cause of this deforestation is the cultivation of four agricultural commodities: palm oil, timber, soy and beef. These commodity crops are rarely grown in AF or MF systems, though there is potential to do so.

In response to the rapid rate of forest cover, governments and the private sector are beginning to take heed of civil society, NGOs and public engagement around forest loss. Several initiatives have been developed to address the issue caused by commodity agriculture such as the Forest Law Enforcement, Governance and Trade (FLEGT), Reducing Emissions from Deforestation and Forest Degradation (REDD+) and national climate frameworks.

This next section takes a look at those cross-border initiatives and international policies, paying particular attention to how they function in the real world, the impacts these instruments have, whether AF and MF are incorporated and if not, whether they could be.

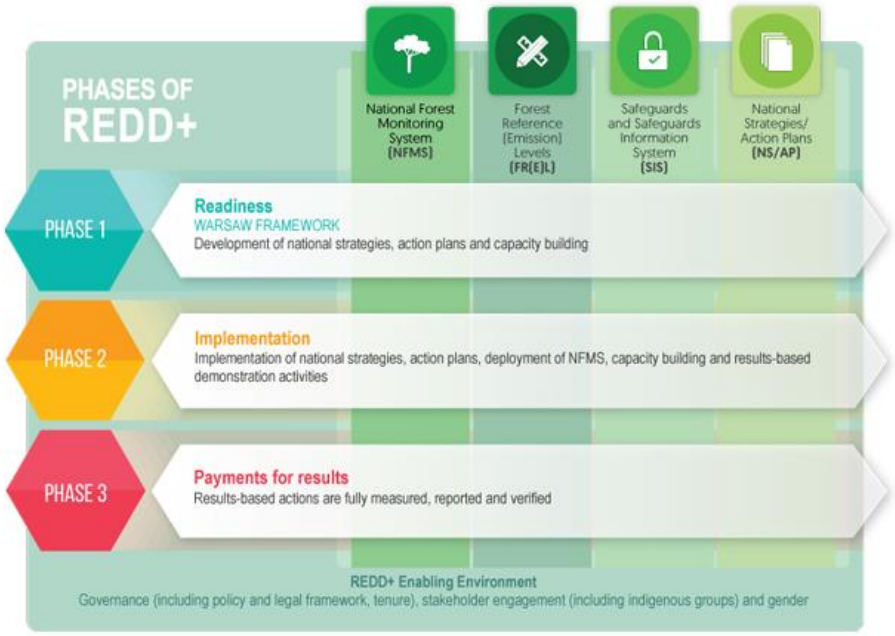
6.3.1 REDD+

The Reducing Emissions from Deforestation and Forest Degradation programme (REDD+) is a framework that was developed by the UNFCC Conference of Parties (COP) in 2013. It is essentially a guide to various approaches for (primarily developing) countries to reduce emissions from deforestation and forest degradation, as well as sustainable management, conservation and improving carbon stocks in forests. REDD+ is voluntary and depends on national governments to implement suggested tool and activities. Countries are required to progress through 3 stages which are detailed in Figure 6 below.

[348] Our World in Data (2015) Net annual afforestation, available online: https://ourworldindata.org/afforestation.
[349] FAO (2016) 'State of the World's Forests, Forests and Agriculture: land-use challenges and opportunities'. Rome.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Figure 6: Phases of REDD+, UNFCC (2019)



Countries which sign up for REDD+ are required to develop a package of actions which should be included in national strategies and action plans. The end goal is that countries limit their emissions from deforestation, improve forests and receive results-based incentives for actions related to reducing deforestation and degradation.

Since its inception, over 50 countries have implemented REDD+ actions and programs and more than 350 REDD+ projects have been initiated[350]. Most of these however, have failed to stop or reverse deforestation trends. Despite this, there is some progress occurring towards some of the goals, with REDD+ funding improving conditions to tackle deforestation in certain countries. For example, improving monitoring capacities, understanding of deforestation drivers, engaging stakeholders and improving governance.

Nonetheless, the program has not been as successful as hoped. Since 2010, the Centre for International Forestry Research (CIFOR) has evaluated the impacts of 18 REDD+ projects in Brazil, Peru, Cameroon, Tanzania, Indonesia and Vietnam. 5 key lessons were drawn from this and are detailed below[351]. First, conditional payments have not regularly been applied on the ground. Second, results are limited in size and scope, focussing primarily on small-holders, not large landowners where the issues exist. Thirdly, land tenure is not adequately addressed. Fourth,

[350] Duchelle, A.E., F. Seymour, et. al. 2018. "REDD+: Lessons from National and Subnational Implementation" Working Paper. Washington, DC: World Resources Institute. Available online at wri.org/ending-tropicaldeforestation.
[351] Ibid.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

distribution of REDD+ payments at the local level have inadvertently favoured more wealthy households given discrepancies in opportunity costs per hectare or forest conserved. Finally, genuine participation between local communities and REDD+ initiatives and plans is lacking, leading to local disenfranchising.

In summary, REDD+ does not go far enough in its re-imagining of resource use and access to land and forested land. Instead, REDD+ promotes a business-as-usual approach, which gives governments opportunities to hide behind grandiose statements and initiatives which do very little to conserve and protect forests, while ignoring the real damage being done by multinationals. The drivers of the system are not addressed. REDD+ should focus on transformational change rather than reformist reforms, with proper financing behind it.

6.3.2 FLEGT

The EU is one of the largest consumers of timber products in the world. As such, the EU has a responsibility to ensure that the procurement of timber products is legal and not contributing to illegal logging or deforestation. The FLEGT (Forest Law Enforcement, Governance and Trade) was established in 2003 to reduce illegal logging by improving governance and promoting trade in legally produced timber. Currently, FLEGT works with 15 countries to improve the sustainability and transparency of their procured timber.

The FLEGT sets out 7 measures which aim to prevent the importation of illegal timber into the EU, to improve the supply of legal timber, and increase demand from sustainable and responsibly managed sources. The 7 measures are as follows[352]:

1. Supporting timber-producing countries – financial and technical support is available for countries that want to address illegal logging via assurance systems, building government capacity and transparency, and developing reform policies
2. Promoting trade in legal timber – this is done via engaging major timber consumers (private companies) to explore ways to develop multilateral frameworks that restrict illegally harvested wood from entering their supply chains. Voluntary Partnership Agreements (VPAs) between the EU and timber-producing countries also promote legal timber. VPA's help to improve forest governance and provide a framework of policies and agreements that is legally binding between the two countries. VPAs can help secure employment, increase revenues and safeguard the rights of forest peoples.
3. Promoting environmentally and socially beneficial public procurement policies – this is essentially ensuring that all public infrastructure projects funded by the EU MS are using legal timber that is FLEGT-certified

[352] EUFLEGT Facility (2021) 'What is the EU FLEGT Action Plan?' Available online: https://www.euflegt.efi.int/flegt-action-plan.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

4. Supporting private-sector initiatives – FLEGT issues guarantees to the private sector which licenses the fact that the timber products used are legal and come from a country where the forest laws have been agreed upon
5. Financing and investment safeguards – this seem the weakest of all the measures whereby FLEGT 'encourages investors' to use strong due-diligence procedures to limit effects of investments in the forest sector and to avoid areas where land ownership is disputed
6. Using existing or new legislation – the EU Timber Regulation was adopted in March 2013. The regulation prohibits the sale of illegally harvested timber on the EU market and details procedures to minimise the risk of illegal wood entering the market.
7. Addressing conflict timber – the FLEGT includes actions to agree on international definition of conflict timber and to ensure EU aid programmes consider the role of forests in conflicts

In 2014, the European Commission (EC) commissioned an independent evaluation of FLEGT for its first 11 years (2003-2014). In 2016 the report was published, concluding that the EU FLEGT Action Plan is 'a relevant and innovative response to the challenge of illegal logging and that improved forest governance in all target countries. The report details out 10 key lessons learnt which range from project design, governance, policy implementation and market leverage.

This review could find no evidence to suggest that AF or MF are considered within the context of FLEGT. Potential for combining AF policies within FLEGT could further enable poverty reduction, increase food security and sustainable supply of timber production.

6.3.3 Africa Oil Palm Initiative

The Africa Oil Palm Initiative (AOPI) is a regional programme of the Tropical Forest Alliance (TFA) 2020, a global partnership to remove deforestation from the supply chain of soy, beef, palm oil, and paper and pulp. Palm oil is the most widely used vegetable oil in the world, with about half of all packaged products in supermarkets containing the product. Palm oil is associated with massive amounts of deforestation and destruction of primary forests (in Indonesia and other parts of Asia, in particular). With demand set to increase, Africa is touted as the next hot production spot. With this in mind, the AOPI has been created to protect Africa's forests and those who make their livelihoods from it.

Despite palm oil traditionally being grown in a mixed AF system for local demand and livelihoods, the increased global demand has led to more intense production with many plantation systems now in operation. This has increased large scale production, increased deforestation and removed Peoples from their land. The question is whether this commodity crop can be grown in a sustainable manner and in AF systems.

Seven African Governments have agreed to protect over 70% of Africa's Tropical Forests from unsustainable palm oil development. They have pledged to protect forests and shift production to

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

sustainable palm oil. This represents over 250 million hectares of tropical forests, 13% of global total[353].

The Initiative seeks to achieve sustainable palm oil through the development of national and regional policies that considers the development plans of member countries, while also addressing environmental targets, land use, greenhouse gas emissions, and create social indicators on issues such as land tenure and the rights of Indigenous Peoples. Notably, the pledge places sustainability, human rights and collaboration with industry, Indigenous Peoples and civil society groups, centrally in the agreement. There is little concrete information on this in practical terms, however. Additionally, the UN Right to Food is not included within the human rights aspect of the agreement.

Côte d'Ivoire, as a member of APOI has also included crops such as cocoa and rubber to assess their levels of deforestation. APOI was asked to input into the country's redevelopment of its forestry policy, which now includes AF. The review could find no assessment on APOI or evidence for improvement since its implementation.

There is little to no evidence suggesting that APOI is considering MF or AF systems when developing sustainable oil palm production, which is a missed policy opportunity.

6.3.4 Nationally Determined Contributions

Nationally Determined Contributions (NDCs) are non-binding national plans that highlight an individual country's climate actions including their GHGE reductions, policies and measures intended to achieve the global goals set out in the Paris Agreement of 2015. The goals of which are: to be climate neutral by 2050; limiting global warming to well below 2C; reduction in emissions of GHG; increase adaptation to effects of climate change and adjust financial flows so they can be combined with reduced GHGE.

As of July 2016, 189 countries (out of 193) had submitted either an NDC or an INDC (Intended Nationally Determined Contributions). According to an FAO analysis, almost 90% of countries' NDCs reference the agricultural sectors (including land use and forestry) as major contributions to mitigations targets or actions[354]. Agriculture, changing land-use and forestry (LULUCF) are among the most referenced sectors in the countries' contributions. Looked at collectively, LULUCF is considered in 89% (168 out of 189 countries) of NDCs. This again confirms the critical role that agriculture and food systems have to play in the climate crisis.

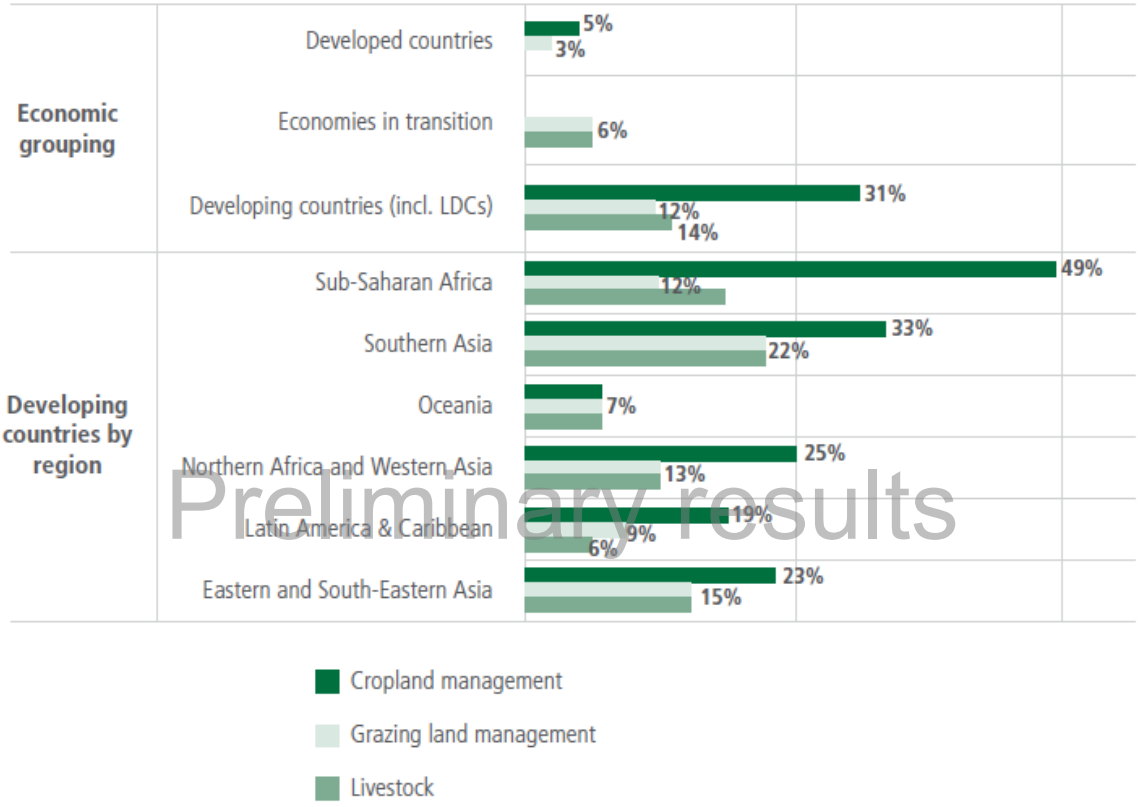
[353] UNFCC 2016 Press Release 'Seven African Governments Agree to Protect Over 70% of Africa's Tropical FOrests from Unsustainable Palm Oil Development. Available online: https://unfccc.int/files/meetings/marrakech_nov_2016/application/pdf/africa_palm_oil_initiative_news_release_en_0900_utc_sent.pdf.

[354] Food and Agricultural Organisation of the UN (2016) 'The agriculture sectors in the Intended Nationally Determined Contributions: Analysis' Environment and Natural Resources Management Working paper No. 62, Rome.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

Cropland management is discussed by 43 countries. Integrated systems such as AF are mentioned in 39 countries' NDCs and 16 refer to climate smart agriculture. Figure 7 below shows the limited attention given to specific policies but also the grouping between developing and developed countries with developed countries giving a lot less focus on these agricultural policies.

Figure 7: Percentage of countries that refer to concrete policies and measures in agriculture by type of activity. Source: FAO analysis (2016) The agriculture sectors in the Intended Nationally Determined Contributions: Analysis.



Despite the obvious recognition that agriculture and land-use are of critical importance to achieving NDCs, most countries do not expand upon their NDCs beyond a simple description, with little attention given to specific policies, measures or incentives that could be used to reach these targets. 54% of countries do not elaborate on agricultural actions for achieving their targets. As such there is a lot of 'wiggle' room when it comes to interpreting these NDCs and countries' contributions. There is no concrete road map or integrated approach to reaching the targets listed. The lack of clarity in agricultural targets, especially means there is room for interpretation and will most likely lead to a lack of coherence and inability to reach these targets. AF could be much more utilised in these policies; MF is not discussed.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

6.3.5 Trees on Farms for Biodiversity

Trees on Farms for Biodiversity (TonF) is funded by the International Climate Initiative (IKI) and implemented by the World Agroforestry Centre (ICRAF) in partnership with the Centre for International Forestry Research (CIFOR), Centro Agronómico Tropical de Investigación y Enseñza (CATIE), International Union for Conservation of Nature (IUCN), UFZ and Leibnitz Universität Hannover. It is an initiative that spans across 5 countries; Uganda, Rwanda, Honduras, Peru and Indonesia. The goal of which is to increase trees in the farmed landscape – AF.

According to the TonF website, the organisation operates through five key methods, none of which are legislative:

1. Increase knowledge of the links between trees, agriculture and biodiversity
2. Provide tools for practitioners, operational road maps and investment scenarios for 5 countries
3. Prepare a biodiversity assessment tool to measure the contribution of trees on farms for biodiversity and sustainability
4. Assess a range of funding and investment options for increasing investment in trees in agriculture
5. Create road maps and business plans for local partners

It is perhaps an oversight that this initiative does not engage with the policy landscape, at least directly. On requesting further information from the organisation with regards to their biodiversity assessment tool and investment scenarios, no response was given. As such, it was not possible to assess the impact of this initiative.

6.3.6 Summary

Upon reviewing the above cross-border initiatives and agreements, it is evident that AF and MF systems are not yet embedded in the policy landscape at this level. It appears to be a missed opportunity to not include these land-use systems in such large scale, well-funded initiatives. This lack of recognition for AF, in particular, could be due to a lack of understanding of how to best integrate these systems and a lack of available finance. It could also be that those who were included in the creation of such initiatives are not thinking from an agricultural point of view. This evidence confirms the lack of policy coherence and shines a light on the disparate groups of decisions makers and the trade-offs around goals.

Most of the initiatives this review analysed and included focus on limiting, halting or sectioning off the use of forests and forest products, as opposed to working with communities and integrating forest use with people. The agreements detailed above, in particular NDCs, are not well described or detailed, with limited resources made available to review these policy instruments. One could argue that these mechanisms are not addressing the issues (over consumption, financialisaton of land) and are ‘sticking plasters’ that governments and businesses can hide behind. This makes it

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement 862993.

seem that progress is be occurring, but in fact multinationals are continuing their environmental degradation by growing crops on huge scales not for direct human use.

There is also a lack of recognition of food production and food systems within all the initiatives reviewed, again confirming the traditional split between forestry and agriculture. There is huge potential for AF to be included in cross-border initiatives and better integrated into FLEGT, APOI, REDD+ and in particular, NDCs. This review recommends as a starting place, that NDCs are required to include AF and MF as land-use options.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

7 Conclusion

Agroforestry and mixed farming as multifunctional systems that can address issues around food security, climate change and land degradation are gaining traction and interest amongst farmers and policy makers alike. Despite the known benefits and direct policies aimed at developing these systems, they remain in a minority, both in Europe and around the world.

With soil water and air-pollution and planetary boundaries in mind, agriculture and food system redesign must happen faster than in the last 10 years and AF and MF systems could be at the centre of this transition. The inventory of policy above is based on the following key documents: the priorities of the European Commission for the future Common Agricultural Policy (CAP) (EC, 2018) for the 2021–2027 period, and the European 'Green Deal' (EC, 2019) with the main components of 'Farm to Fork' and 'Biodiversity Strategies'. The inventory serves to give a snapshot of current policy mechanisms. The gaps in which highlight the extreme complexity in policy making when trying to meet multiple goals.

While Europe can produce a large part of the food for its population, it has also become a major importer of feed crops (soybean), vegetables and fruits, using large areas of agricultural land outside the continent. Europe also exports different food commodities such as milk and powder milk, poultry, pork, cereals, and high added-value foods and beverages. This export (and European consumption) of milk, poultry, and pork depends on the import of protein-crops like soybean for protein-rich livestock feed. With the intensification of agriculture in the past five decades, yields have increased, but the rate of increase is declining. Meanwhile, environmental problems have emerged and unfortunately their rate of increase is not declining. They are slowly and steadily building up like the loss of biodiversity and natural habitats, pesticide contamination of soils, water, and food, and eutrophication of water bodies. Ongoing biodiversity loss in many countries in Europe (with a large degree directly related to agriculture) includes habitat, pollinator, insect, and bird population loss. Without a radical redesign it is unlikely the rate of decline will change and biodiversity can regenerate.

From the above review, it is evident that there is the need for a joined-up policy that connects food systems, agriculture and rural development and health, for a holistic vision on environmental, economic, social, cultural and political sustainability. All countries have numerous national policy goals. A review of these goals shows that they concern health, the environment, economy and society, and that there are connections between the goals. This mapping shows that, despite concerns about policy inconsistencies, there is already a recognition of explicit connections between the overarching public policy goals of different parts of government, as reflected at the international level in the sustainable development goals (SDGs). For example, the nutritional quality of the foods produced and sold in the food system affect diet-related health goals, while the ways in which food is grown and distributed affect environmental goals, and employment and income generation in agriculture affects economic goals for producers and farmers.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

As a result of these connections, food systems emerge as a potential common space for advancing co-benefits for all of these policy goals efficiently and effectively. Despite this potential, policies and actions designed to address these challenges often conflict and may undermine each other. For example, efforts to reduce sugary drink and meat consumption in Europe create challenges for economic interests and may be viewed as destroying jobs and farmers' livelihoods (arguments broad forward before from tobacco growers and industry when there were effort to reduce smoking in advertising). Restrictions on neonicotinoid insecticides as a means of protecting pollinators such as bees have been viewed as limiting the economic potential of farming. The economic benefits of rearing livestock are viewed as conflicting with efforts to reduce greenhouse gas emissions. Even connections between health and sustainability face conflicts, such as harvesting fish to improve diets while maintaining sustainable fish stocks.

After a broad analysis of the Policy in 17 European countries and 5 non-European ones, we can conclude the following:

- There are several studies and research on the effects of agroecological practices on climate change adaptation and mitigation, management of natural resources, conservation and restoration of biodiversity and enhancement of ecosystem services. However, there are very few rigorous studies on effect of policies to the -increased- use of agroecology practices and principles and the resulting **impacts on economic and social aspects.**

- The few policies that support directly MF and AF systems approach them with a **specific technical/agronomic aspect** and not with further agroecological principles in mind e.g. failing to incorporate socio-economic aspects.

- The **non-European policy approaches to MF and AF** are very interesting and give inspirations, but none of them are specific enough for European or EU conditions. In a global setting the EU policy process is unique. However, mutual exchange and learning especially regarding EU policy consequences outside Europe are very important, also for MF and AF policies.

- Our mapping reveals a **strong lack of financing** for MF and AF. Only Belgium, France, Hungary, Ireland, Italy (some regions), Portugal, Spain (some regions), Switzerland, (UK) have activated CAP measures on Agroforestry.

- The potential for AF is seen in respect to carbon sequestering ecosystem service providers but not as major **food system change driver**. MF is not recognised within policy as having the potential to meet sustainability or food security goals, but few policies specifically support MF directly.

- Re-integrating crop and livestock (MF) has potential to address many ecological, economic and social objectives for agriculture but little is known about prevalence of these systems and the policy needs around them.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

- In our review, **Good Practices examples** can be found within current models (e.g. in Hungary, Switzerland. Hungary) and should be improved for the future. This will be picked up in the further tasks of the policy workpackage and how knowledge from Good or Best Practice examples can be shared including potential insights from the ELMs agroforestry and agroecology test trials currently done in different parts of the UK (see UK section).

- Policies specifically related to **gender** were not found in either the AF or MF fields, although there is research interest that links (species, mixing crop, landscape and marketing) diversity to the presence of diverse gender role.

It is our recommendation that both AF and MF should be deeply embedded within agricultural practice, both in the EU and non-EU. Policy coherence and alignment with other sustainability and food security and food sovereignty goals must not be over-looked. Both MF and AF systems are also agroecological systems and their implementation must adhere the principles of agroecology in Europe. Those extend into the socio-political aspects of the food system re-design. Policy makers need to take all these considerations into account when co-developing policy.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.