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EXECUTIVE SUMMARY

This report outlines a sustainable financing scheme for agroforestry, emphasising payments for ecosystem services. With the growing ambition of the European Green Deal to address the challenges of climate change, environmental degradation and food security, policy initiatives and sustainable practices are needed to transform the European Union (EU) into a more resource-efficient economy. As a multifunctional land use, agroforestry could be at the centre of this transition due to its environmental, economic and social benefits. To promote the uptake of agroforestry in Europe, it is essential to develop innovative financial instruments and policies based on payments for ecosystems, which recognise the co-benefits of agroforestry practices and reward farmers for providing them.

In this context, this study proposes a sustainable financing scheme for agroforestry that integrates ex-ante payments, action-based payments, result-based payments, and advisory services. The scheme aims to overcome financial and knowledge barriers, while being practical and flexible, to accommodate various scenarios and project scales. It is underpinned by key design principles, including project preparation, objectives setting, baseline and additionality, permanence, monitoring, reporting and verification (MRV), farmer and stakeholder engagement, recognition of co-benefits, and flexible financing mechanisms. The report details the prototype of a five-year agroforestry project, including phases and iterative steps, which is expected to serve as a guide for future agroforestry initiatives. It proposes a methodological approach for designing a sustainable financing scheme for agroforestry. Key steps include identifying environmental results related to ecosystem services, mapping land management practices, estimating associated costs, developing measurable indicators, identifying financing mechanisms and setting payment rates based on an economic valuation of ecosystem services.

This study examines public and private financing mechanisms for agroforestry, emphasising the need to combine different sources of funding to cover the costs of establishing and managing agroforestry systems, rewarding farmers for environmental results, and providing advisory services to farmers. It proposes a flexible approach to setting payment rates based on the costs of specific land management practices and an economic valuation of ecosystem services. The establishment of agroforestry systems can be funded though the Common Agricultural Policy (CAP) pillars I and II instruments, such as eco-schemes and agri-environmental-climate measures (AECMs), or indirectly through other income support schemes and rural development measures, State aid, the private sector (e.g., agri-food companies), or through a combination of these options. Advisory services, which can be provided by a range of entities and facilitated by public policies, are key for the successful planning, implementation, and management of agroforestry projects. Developing a network of qualified advisors is a high priority and requires technical expertise, local knowledge, community involvement and policy support.

The scheme aims to encourage farmers to adopt and maintain agroforestry practices that enhance environmental sustainability. The CAP instruments, such as eco-schemes and AECMs, can finance the ongoing costs of agroforestry projects by providing farmers with a guaranteed annual action-based payment for adopting agroforestry practices for their presumed environmental benefits. The proposed approach to setting payment rates for environmental results is based on an economic valuation and quantification of the ecosystem services provided by agroforestry systems. This holistic approach requires the development of measurable indicators with clear thresholds, baseline measurement and data collection, a flexible payment structure that recognises co-benefits and exceeding targets, and a robust MRV system to measure on-farm results. Public instruments such as the CAP are not explicitly designed to link payments to environmental results. In addition, voluntary carbon markets are not sufficient to promote payments for a wide range of ecosystem services, and agri-food companies' financial incentives in the supply chain are generally not linked to specific environmental results. In light of these considerations, integrating payments for environmental results into the CAP, particularly within eco-schemes and AECMs, is essential to build a more effective and targeted approach to support the adoption and maintenance of agroforestry with payments for ecosystem services.

In summary, the proposed scheme prioritises farmer involvement, flexibility, adaptability, and innovation in land management practices, aiming to achieve long-term agricultural and financial sustainability for farmers and environmental sustainability at the EU level. The practical application of the scheme in the living labs as part of the ReForest project will ensure real-world case studies and testing of the scheme to tailor it to the needs and local conditions of agroforestry practitioners.

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LIST OF ACRONYMS AND ABBREVIATIONS

Abbreviation	Definition
AECMs	Agri-environmental-climate measures
BISS	Basic income support for sustainability
CAP	Common Agricultural Policy
CISYF	Complementary income support for young farmers
EFAs	Ecological focus areas
Eq	Equivalent
EU ETS	EU Emissions Trading Systems
EU	European Union
FAO	Food and Agriculture Organisation
GAECs	Good agricultural and environmental conditions
Ha	Hectare
MRV	Monitoring, reporting and verification
Mt	Metric tonnes
NGO	Non-governmental organisation
pH	Potential of hydrogen
RDPs	Rural development programmes
SOC	Soil organic carbon
SMRs	Statutory management requirements
WP	Work package

1. INTRODUCTION

This report outlines a sustainable financing scheme for agroforestry, emphasising payments for ecosystem services provided by this land use type. With the growing ambition of the European Green Deal to address current challenges related to climate change, environmental degradation and food security, policy initiatives and sustainable practices are needed to transform the European Union (EU) into a more integrated and resource-efficient economy. As a multifunctional land use, agroforestry systems could be at the centre of this transition due to their environmental, economic and social benefits. Recent studies show the urgent need for a policy framework that links food systems, agriculture, forestry and rural development for a holistic approach to environmental, economic and social sustainability (e.g., Donham et al., 2022; Hajdukovic, 2023). To achieve this transition, the socio-economic value of the ecosystem services provided by agroforestry systems needs to be identified and integrated into farm financial models. The policy landscape for agroforestry is growing, with support embedded in the Common Agricultural Policy (CAP) and key EU legislation such as the European Green Deal, the Biodiversity and Farm to Fork strategies, and the EU Forestry strategy for 2030.

To promote the uptake of agroforestry systems across Europe, it is essential to develop innovative financial instruments and policies based on payments for ecosystem services that recognise the co-benefits of agroforestry practices and reward farmers for providing them. This requires a holistic approach to land management, taking into account climate change mitigation and biodiversity in synergy with the achievement of other sustainability objectives. In light of these considerations, this report proposes a sustainable financing scheme for agroforestry that emphasises payments for ecosystem services and integrates ex-ante payments, action-based payments, result-based payments, and advisory services. The proposed scheme is underpinned by key design principles and aims to overcome financial and knowledge barriers, while being practical and flexible, to accommodate various scenarios and project scales. A comprehensive strategic framework for policy formulation has to align with wider sustainability objectives and promote the integration of agroforestry into the European agricultural landscape. The development and design of the scheme is based on scientific research, policy analysis and the active involvement of agroforestry practitioners, policymakers and stakeholders. This inclusive approach will ensure the integration of different perspectives and enhance the scheme's credibility. The report also invites policymakers, farmers, and stakeholders to explore practical solutions for the nexus of food production, climate change mitigation and biodiversity enhancement.

The remainder of the report is divided into five different sections. Section 2 describes the background and methodology and defines the objectives and expected outcomes of the study. Section 3 presents the framework for a sustainable financing scheme for agroforestry, outlining its key elements and design principles. Building on this framework, section 4 proposes a scheme that integrates ex-ante payments, action-based payments, result-based payments, and advisory services. It also details the prototype of a five-year agroforestry project, including phases and iterative steps, which is expected to serve as a practical guide for future agroforestry initiatives. The section outlines a methodological approach structured around six key steps to design and implement a sustainable financing scheme for agroforestry. These include identifying environmental results related to ecosystem services, mapping land management practices, estimating associated costs, developing measurable indicators, identifying financing mechanisms, and setting payment rates based on an economic valuation of ecosystem services. Section 5 provides an overview of the potential public and private financing mechanisms and sources for agroforestry to cover the costs of establishing and managing agroforestry systems, rewarding farmers for environmental results, and providing advisory services to farmers. It proposes a flexible approach to setting payment rates based on the costs of implementing specific land management practices and an economic valuation of ecosystem services. This subsection also discusses the policy recommendations and expected changes for the European agroforestry sector. Finally, section 6 provides a summary of the findings of this study and the concluding remarks.

2. BACKGROUND, OBJECTIVES AND METHODOLOGY

2.1 BACKGROUND AND MOTIVATION

ReForest is a research and innovation project, integrating social science (co-creation, stakeholder engagement, knowledge transfer), ecosystem science (ecosystem services), agronomy (productivity), technology development (remote sensing and neural networks), and economics (business models, value chains, finance and policies). The project's overall objective is to improve the sustainability of food production in the EU by co-creating solutions to key barriers that prevent farmers from adopting agroforestry more widely. The most critical barriers to agroforestry adoption in Europe include the lack of knowledge and experience, the impact of tree planting on farm business, and unclear policy support positioned between agriculture and forestry. Farmers need policy support for several reasons.[1] Firstly, the average income of farmers remains significantly lower than the average income of the rest of the EU economy. Secondly, farming is risky and often costly because agriculture depends more on weather and climate than other sectors. There is also an obvious time lag between consumer demand and farmers' ability to increase supply. Finally, farmers are under pressure from increasing global trade in food products and trade liberalisation. Globalisation and fluctuations in supply and demand have also made agricultural market prices more volatile, adding to farmers' concerns. These business uncertainties in agriculture and the importance of securing food production in the EU justify the important role of the public sector in providing a safety net for farmers' incomes and enabling them to adopt sustainable practices such as agroforestry.

With this in mind, the ReForest project aims to promote the adoption of agroforestry systems by accelerating effective and sustainable financing of the agroforestry sector at the national and EU levels. Carbon sequestration and biodiversity enhancement are good examples of ecosystem services for which enabling payments can incentivise farmers to adopt agroforestry systems. Payments for ecosystem services can make business models for agroforestry farms more attractive by internalising the value of carbon sequestration and biodiversity enhancement. This will require strong legislative, institutional and policy support for agroforestry to overcome the barriers to its wider uptake in Europe.

2.2 A SUSTAINABLE FINANCING SCHEME FOR AGROFORESTRY

The sustainable financing scheme for agroforestry aims to support the introduction of new agroforestry systems on agricultural land and the maintenance of existing systems in European countries. The scheme is underpinned by a holistic approach emphasising payments for ecosystem services provided by agroforestry systems. Given the urgent need to promote sustainable practices to address the climate and environmental challenges, this report aims to contribute to the development of financial and policy frameworks to promote the widespread adoption of agroforestry across Europe.

Agroforestry is now receiving considerable attention from the farming community and is recognised as a multifunctional land use practice with multiple environmental, social and economic benefits. Agroforestry systems can help mitigate climate change, protect soils, enhance biodiversity and water quality, and improve the overall condition of the landscapes.[2] Farmers who adopt agroforestry practices can also diversify their production, reduce certain costs and improve their productivity.

[1] European Commission (n.d.). Agriculture and rural development Income support explained. Available at: https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/income-support-explained_en

[2] Jose, S. (2009). Agroforestry for ecosystem services and environmental benefits: An overview. *Agroforestry Systems*, *76*, 1-10. https://doi.org/10.1007/s10457-009-9229-7

Although agroforestry is a traditional form of land use, its definition in the regulatory environment is often rudimentary or non-existent and differs across countries. The Food and Agriculture Organisation (FAO) of the United Nations gives the following definition of agroforestry:[3] "*Agroforestry is a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence*". According to the FAO, agroforestry can also be defined as: "*A dynamic, ecologically based, natural resource management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels*".

In other words, agroforestry allows farmers to continue to produce food while significantly improving the environmental sustainability of their operations.

Motivated by the need to make agroforestry practices economically viable, the proposed scheme addresses the financial barriers associated with the high up-front and ongoing costs of establishing and managing agroforestry systems. It integrates ex-ante payments, action-based payments, result-based payments, and advisory services. The scheme aims to encourage the uptake of agroforestry by recognising, quantifying and financially rewarding farmers' efforts to enhance the provision of ecosystem services such as carbon sequestration, biodiversity enhancement and soil health. By offering ex-ante and action-based payments to farmers during the project and assigning a tangible economic value to ecosystem services through structured payment mechanisms, the scheme aims to sustain agroforestry practices and encourage their widespread adoption.

Under the scheme, the provision of advisory services is essential to guide and advise farmers on optimal farm solutions, tree and species selection, and appropriate management throughout the lifecycle of the agroforestry project. The proposed scheme aims to create an enabling environment for the wider adoption of agroforestry through financial incentives, risk reduction, and expert support. It prioritises farmer involvement, flexibility, adaptability, and innovation in land management practices, aiming to achieve long-term agricultural and financial sustainability for farmers and environmental sustainability at the EU level.

2.3 Objectives and expected outcomes

This report is the fourth deliverable of the "Work package (WP) 5 Finance and policy". It builds on the findings of the "D5.1 Mapping report on agroforestry sector finance and policy 1" and "D5.2 Mapping report on agroforestry sector finance and policy 2". The main aim of WP5 is to promote the adoption of agroforestry systems by accelerating effective and sustainable financing of the agroforestry sector at the national and EU levels. To this end, this report proposes a sustainable financing scheme for agroforestry based on payments for ecosystem services provided by agroforestry systems.

The objectives and expected outcomes of this report are to:

- Outline a comprehensive, flexible and practical sustainable financing scheme for agroforestry, accommodating various scenarios and project scales, with an emphasis on payments for ecosystem services provided by agroforestry systems;
- Develop a framework for a sustainable financing scheme for agroforestry and provide details of the elements of a prototype agroforestry project, including its phases, actions and iterative steps, expected to serve as a practical guide for future agroforestry initiatives;

[3] Food and Agricultural Organisation of the United Nations (2015). Agroforestry. Available at: https://www.fao.org/forestry-fao/agroforestry/80338/en/

- Present a rigorous, science-based approach that focuses on identifying environmental results related to ecosystem services, mapping land management practices, estimating associated costs, developing measurable indicators, identifying financing mechanisms and sources, and setting payment rates based on an economic valuation of ecosystem services;
- Identify potential public and private financing mechanisms and sources to cover the costs of establishing and managing agroforestry systems, rewarding farmers for environmental results, and providing advisory services to farmers;
- Develop a sustainable financing scheme for agroforestry that can be applied in the living labs as part of the ReForest project to ensure practical case studies and thorough testing of the scheme to tailor it to the needs and local conditions of agroforestry practitioners;
- Contribute to the development of policy frameworks that link food systems, agriculture, forestry and rural development for a holistic approach to environmental, economic and social sustainability to promote the uptake of agroforestry across Europe;
- Increase the involvement of farmers, agroforestry practitioners, regional authorities, financial institutions and EU/national policy experts in the co-creation of financial instruments and policies at European, national, regional and local levels.

2.4 METHODOLOGICAL APPROACH

The development and design of the sustainable financing scheme for agroforestry is underpinned by scientific research and policy analysis to ensure its credibility, effectiveness and long-term viability. This strong foundation can position the scheme as a potential strategy for promoting sustainable agroforestry practices that provide various ecosystem services under evolving conditions in European countries. This study systematically integrates scientific research, policy analysis, and stakeholder engagement to inform the development of a sustainable financing scheme for agroforestry. This methodological approach ensures that insights from different perspectives, including academic research, official policies, experience of agroforestry practitioners, and practical knowledge, are integrated into the scheme's design, implementation, and future refinement.

This study draws on information and secondary data gathered from policy documents, scientific papers, online sources (e.g., websites of EU institutions) and previous EU-funded agroforestry projects, such as AGROMIX. It also builds on the findings from the extensive research carried out in the two previous studies of ReForest “D5.1 and D5.2 Mapping report on agroforestry sector finance and policy 1 and 2”, which provide a solid scientific knowledge base and policy analysis. These studies laid the foundation for the scheme's development by identifying the gaps in existing financing mechanisms and policies for the European agroforestry sector and the opportunities for improvement. Information on relevant EU policies and legislation was obtained from the European Commission’s website and law databases such as EUR-Lex. The full list of references can be found in Appendix 1.

To create a fit-for-purpose scheme, it is essential to actively involve farmers and policymakers in its design. Their involvement will ensure that the financing scheme reflects their practical knowledge and experience, addresses their specific challenges and needs, and is contextually relevant. The practical application of the scheme in the living labs of the ReForest project will ensure real-world case studies and thorough testing. The financing scheme that proves promising from the perspective of agroforestry practitioners will be communicated to the financial industry and policy stakeholders involved in the project through specific events, workshops, policy papers and direct communication. Finally, the key findings will be disseminated through publications to bridge the gap between practice and academic research for wider impact and knowledge sharing.

3. FRAMEWORK FOR A SUSTAINABLE FINANCING SCHEME FOR AGROFORESTRY

This section sets out the foundational framework for a sustainable financing scheme for agroforestry. It covers the contextual background and potential of agroforestry as a multifunctional system, defines the scope and the aim of the financing scheme, and outlines the key elements, challenges, and design principles that are essential for its development. This conceptual framework forms the basis for the development of the financing scheme, which is outlined in section 4.

3.1 CONTEXTUAL BACKGROUND AND POTENTIAL OF AGROFORESTRY

Agroforestry deliberately integrates woody vegetation (trees or shrubs) with crops and/or livestock on the same plot of land. Den Herder et al. (2017) estimate that the total area under agroforestry in the EU-27 countries is approximately 15.4 million hectares, representing about 3.6% of the territorial area and 8.8% of the utilised agricultural area. This indicates a significant presence of agroforestry systems across Europe, including different systems such as arable, livestock (the largest) and high-value tree systems. For example, Spain and Portugal have large areas of Dehesa and Montado in their drylands, while in south-eastern Europe, there are permanent crop and pastoral systems. Wood pasture and bocage (hedgerow) landscapes are prevalent in northern countries and can also be found in many western, central and eastern countries.[4] In addition, new agroforestry systems have been established on both arable and grassland farms across Europe.

Agroforestry systems can provide numerous environmental, economic and social benefits. They can help mitigate climate change, protect soils, enhance biodiversity and water quality, and improve the condition of the landscapes. Agroforestry can positively modify croplands' microclimate and water balance, thereby reducing drought damage and increasing resilience to climate impacts.[5] Furthermore, farmers can benefit from diversified production and income sources, reduced costs and increased land productivity. Much of the literature focuses on investigating the potential of agroforestry to sequester carbon. The AGFORWARD project estimated the carbon sequestration potential of agroforestry in the EU (plus Switzerland) to be at 0.3 - 27 t CO_2-e/ha/year or a total of 7.7 - 234.8 Mt CO_2-e/year. This estimate does not include below-ground SOC, which means that the total sequestration potential of agroforestry is likely to be underestimated. In addition, agroforestry systems can potentially reduce nitrogen-related emissions on land where trees are planted.[6]

The impact of agroforestry on climate change mitigation is influenced by several factors, such as the type of agroforestry system implemented, the local climatic conditions and the type of land use.[7] As highlighted in Feliciano et al. (2018), the potential of agroforestry lies in its role in supporting climate change mitigation with soil and above-ground carbon benefits through practices such as silvopastoral, silvoarable, forest farming and home gardens. In addition, agroforestry holds great promise for scalability as it can be applied to a wide range of farm types. Overall, the existing scientific literature provides clear evidence of the untapped potential of agroforestry as a sustainable practice.

[4] COWI, Ecologic Institute and IEEP (2021). Technical Guidance Handbook: Setting up and implementing result-based carbon farming mechanisms in the EU. Report to the European Commission, DG Climate Action, under Contract No. CLIMA/C.3/ETU/2018/007. COWI, Kongens Lyngby. Available at: https://www.ecologic.eu/18122

[5] Jacobs, S. R., Webber, H., Niether, W., Grahmann, K., Lüttschwager, D., Schwartz, C., Breuer, L. and Bellingrath-Kimura, S. D. (2022). Modification of the microclimate and water balance through the integration of trees into temperate cropping systems. *Agricultural and Forest Meteorology*, *323*, 109065. https://doi.org/10.1016/j.agrformet.2022.109065

[6] García de Jalón, S., Graves, A., Palma, J. H. N., Williams, A., Upson, M. and Burgess, P. J. (2017). Modelling and valuing the environmental impacts of arable, forestry and agroforestry systems: A case study. *Agroforestry Systems*, *92*, 1059-1073. https://doi.org/10.1007/s10457-017-0128-z

[7] Kay, S., Graves, A., Palma, J. H. N., Moreno, G., Roces-Díaz, J. V., Aviron, S., Chouvardas, D., Crous-Duran, J., Ferreiro-Domínguez, N., García de Jalón, S., Măcicăşan, V., Mosquera-Losada, M. R., Pantera, A., Santiago-Freijanes, J. J., Szerencsits, E., Torralba, M., Burgess, P. J. and Herzog, F. (2019). Agroforestry is paying off - Economic evaluation of ecosystem services in European landscapes with and without agroforestry systems. *Ecosystem Services, 36*, 100896. https://doi.org/10.1016/j.ecoser.2019.100896

3.2 Aim and scope of the scheme

The introduction of agroforestry into conventional farming systems and the maintenance of existing systems offer the potential for additional climate benefits and the provision of ecosystem services. However, achieving these benefits cost-effectively requires careful selection of locally appropriate agroforestry systems and rewarding the provision of environmental public goods beyond carbon sequestration. With a clear understanding of the potential of agroforestry, it is imperative to address the critical need for sustainable financing of agroforestry, with payments for ecosystem services at its core. Effective financial instruments and policies are needed to make agroforestry systems an economically viable business for farmers and to secure the provision of ecosystem services. This requires a holistic approach to land management, addressing both climate change mitigation and biodiversity in synergy with the achievement of other sustainability objectives.

In this context, this report explores the potential of a hybrid carbon farming scheme for agroforestry. This innovative approach combines action-based payments to farmers for adopting agroforestry practices for their expected environmental benefits with an additional result-based payment if these benefits can be demonstrated. A result-based approach links payments directly to measurable indicators of the environmental benefits delivered, regardless of the specific farming practices adopted. However, the high variability of carbon sequestration and other biodiversity outcomes across different geographical areas and vegetation types makes it even more challenging to establish a robust and credible monitoring, reporting and verification (MRV) system for agroforestry, which is a requirement of the proposed sustainable financing scheme for agroforestry. To ensure a significant uptake of agroforestry, the hybrid scheme should be complemented by ex-ante payments and advisory services to farmers from the start of the agroforestry project. This will require ongoing skills and capacity development during the scheme's design, including training advisers and consultants. The scheme should incentivise farmers, considering the time needed to realise the benefits of agroforestry. Finally, it should include design features to ensure the environmental benefits are sustained over time.

3.3 Main beneficiaries of the scheme

The proposed sustainable financing scheme for agroforestry aims to benefit farmers and the wider society through its positive environmental impact. Farmers and land managers are the main beneficiaries of the scheme, receiving financial incentives and advisory services to adopt and maintain agroforestry practices, which can allow them to diversify their income sources and increase the resilience and productivity of their farms. The scheme can also provide opportunities for knowledge exchange, learning and networking among agroforestry practitioners. Agroforestry systems provide climate and environmental benefits, acting as public goods that directly benefit society. Consumers enjoy enhanced food security, while local communities experience economic and social development through job creation, improved livelihoods and social inclusion.

Policymakers can benefit from science-based policy recommendations and the alignment of agroforestry initiatives with sustainability objectives, providing effective solutions for environmental protection and climate resilience within agricultural policy frameworks. Private sector companies can find market opportunities and strengthen their corporate social responsibility by contributing to the financing of agroforestry projects with clear climate and environmental objectives. Finally, the scientific community can benefit from research and innovation opportunities in agroforestry practices and ecosystem services, and the possible future implementation of agroforestry pilot projects. Overall, this scheme embodies a holistic approach to sustainable agroforestry and can foster innovation and knowledge exchange between farmers, local communities and stakeholders.

3.4 SUSTAINABLE FINANCING SCHEME FOR AGROFORESTRY: KEY ELEMENTS

Several key elements must be considered when developing a sustainable financing scheme for agroforestry, as identified in scientific studies and policy documents (COWI, Ecologic Institute and IEEP, 2021; Guimarães et al., 2023). It is necessary to design a scheme that can be tailored to the needs and local conditions of agroforestry practitioners and to determine the extent to which the co-benefits of agroforestry are included in the scheme. Building on the scientific literature and policy documents, the framework outlines key elements for a sustainable financing scheme for agroforestry.

Objective: Incentivise the management of existing agroforestry systems and the introduction of new agroforestry systems on agricultural land in all European countries.

Coverage: Existing long-established agroforestry systems under threat and locations within existing arable, grassland, horticultural and permanent crop systems in Europe, where soils and climatic conditions are suitable for the introduction of new locally adapted agroforestry systems.

Scalability: Agroforestry is a system that can potentially be applied to a wide range of farm types.

Climate change mitigation potential: The mitigation potential of agroforestry varies widely depending on the type of system, soil, climate, tree species and density, and other local factors. Estimates of the carbon sequestration potential of agroforestry at EU level range from 0.3 to 27 t CO_2-e/ha/year.

Climate actions: Sustainable practices that maintain, enhance or introduce woody components integrated with agricultural production to increase carbon stocks and sequestration potential in biomass and soils without increasing carbon dioxide emissions in the short term.

Co-benefits: Enhanced biodiversity and water quality, reduced soil erosion and nutrient leaching, improved soil health and water retention, improved animal welfare, preserved or enhanced habitats and landscape features, and diversified income streams for farmers.

Concerns: Potential carbon leakage through displacement of production, risk of non-permanence due to reversibility of changes, potential negative impacts of agroforestry on biodiversity and water balance.

MRV

- Indirect methods for measuring carbon sequestration in above-ground woody biomass exist (e.g., Woodland Carbon Code, remote sensing). Actual values of carbon sequestration also depend on the final use of the wood and the local definition of the baseline for assessment. Measuring carbon stored below ground is complex, and techniques for measuring soil organic carbon (SOC) changes under agroforestry have not yet been fully validated.
- Validating techniques for measuring changes in SOC in the below-ground biomass and developing appropriate MRV methods for monitoring other ecosystem services are key steps in measuring the overall environmental impact of agroforestry systems.

Potential of agroforestry for result-based payment

- While agroforestry has potential for result-based schemes, the implementation and scalability of these schemes depend on several factors, including the availability of data to establish baselines for systems and the development of reliable monitoring and reward mechanisms.
- Result-based payments can encourage wider uptake of agroforestry by rewarding farmers for meeting targets that reflect biodiversity and other ecosystem services beyond carbon sequestration. Recent studies provide evidence of the potential of agroforestry for result-based payments for biodiversity co-benefits, as in the case of Montado (e.g., Guimarães et al., 2023).

3.5 MAIN CHALLENGES

Several challenges are associated with the development and design of sustainable financing schemes for agroforestry that deserve careful consideration. These include:

Technical implementation

- The design of carbon farming schemes faces several technical challenges, including the duration of the carbon removal, the integration of co-benefits, ensuring additionality and the permanence of the ecosystem services, measurement uncertainty, the identification of potential impacts on biodiversity, and the accuracy, complexity and high cost of MRV systems.
- Developing a financing scheme for agroforestry that is appropriate for different farming systems, geographical areas, ecological conditions, and local communities is highly complex.
- Incorporating co-benefits into payment structures presents significant challenges, including added complexity, increased costs, difficulties in monitoring and developing appropriate indicators for each co-benefit, and providing adequate financial compensation.
- The time required to implement land management practices to achieve environmental results and to observe changes in measurements of the indicators can be very long.
- Potential trade-offs between different ecosystem services.
- Quantifying and assigning a tangible economic value to a wide range of ecosystem services is particularly complex. It requires a scientific approach that includes establishing measurable indicators, defining data collection methods, and outlining reporting procedures.

Knowledge and capacity

- The complexity of agroforestry requires specific knowledge and expertise from farmers, policymakers, agroforestry stakeholders and scheme administrators.
- Farmers face learning costs as they need new knowledge and skills to implement agroforestry practices, which requires training, support and practical examples.
- There is insufficient availability of qualified advisors and appropriate advisory services compared to traditional monocrop agriculture.
- Capacity and resources to develop strong advisory support may be lacking.

Farmer and stakeholder engagement

- Involving farmers, agroforestry practitioners, and policymakers in the scheme's development, design and implementation can be challenging due to differing priorities, interests, and levels of commitment.
- The reluctance of farmers to adopt new land management practices due to high initial investment costs and long payback periods.
- Farmers' interests may not always be aligned with the scheme's objectives, which can result in farmers being reluctant to participate in the scheme.

Market and financial risks

- From the farmers' perspective, there is a risk that they will not achieve the expected results and receive the associated payments or will not be able to cover the up-front and ongoing costs, making their agroforestry project economically unviable.
- Farmers may face difficulties accessing markets to sell their agroforestry products or markets that recognise and reward the environmental and social benefits of agroforestry systems, affecting the economic viability of such systems.

- Certain farmers may face risks associated with results-based payment mechanisms and market risks, such as price uncertainties in voluntary carbon markets.

Costs and investment

- Farmers face high up-front and ongoing costs for implementing and maintaining agroforestry systems.
- Scheme administrators incur start-up costs related to mechanism design, scientific research, data collection, baseline establishment, outreach, training activities, and ongoing costs, including monitoring and verification of implemented practices, administration, management of the mechanism, and costs associated with obtaining funding.

Monitoring, reporting and verification (MRV)

- Accurately monitoring, reporting and verifying climate change mitigation results and a wide range of ecosystem services provided by agroforestry systems can be very costly and complex, adding a layer of uncertainty to the financing scheme.
- Including co-benefits into the scheme poses challenges for MRV regarding data collection, baseline definition, indicator selection and financing. Developing MRV systems for both carbon removal and biodiversity is particularly challenging. The cumulative complexity of measuring parameters for multiple objectives can make the cost and burden of MRV too high.
- Ensuring biodiversity outcomes is often difficult because monitoring biodiversity requires reliable data collection over large temporal and spatial scales. It is necessary to establish a baseline for biodiversity, to have sufficient data to measure changes in biodiversity over time, to set targets for biodiversity conservation, and to assess progress in conserving biodiversity.

Financing mechanisms, policy and regulatory frameworks

- The lack of a supportive regulatory, institutional and policy framework can hinder the successful design and implementation of sustainable financing schemes for agroforestry.
- There may be potential conflicts between different policy objectives and interactions with existing agricultural and environmental regulations, which can make the scheme's development, design, implementation and administration very challenging.
- Ensuring adequate access to public and private funding sources for agroforestry projects can be challenging due to varying levels of policy support and funding availability across different countries. This variability is influenced by regional, national, and local policies, the extent of government support for agroforestry initiatives, market and non-market opportunities for payments related to ecosystem services, and the level of private sector commitment to sustainable agriculture and environmental conservation efforts.
- The significant differences in regulations between European countries pose a challenge to the development of financing schemes for agroforestry that can be applied in different countries.

Developing sustainable financing schemes for agroforestry in Europe faces several significant challenges related to technical issues, knowledge and capacity, stakeholder engagement, market and financial risks, costs and investments, monitoring and evaluation, and policy and regulatory frameworks. Overcoming these challenges will require sufficient financial and non-financial resources, policy development, and collaboration between farmers, policymakers, financial institutions, researchers and other stakeholders. In addition, further scientific research is needed to develop accurate indicators, integrate co-benefits and improve data collection and monitoring systems on the performance of agroforestry systems in terms of provision of ecosystem services. These collaborative efforts at multiple levels and stakeholder cooperation can promote the future uptake of agroforestry practices and their potential to deliver multiple environmental, social and economic benefits.

3.6 Sustainable financing scheme for agroforestry: Design principles

This subsection describes the design principles of a sustainable financing scheme for agroforestry, building on the foundations laid by COWI, the Ecologic Institute, IEEP (2021), McDonald et al. (2021), and Scheid et al. (2023). The proposed scheme focuses primarily on the establishment and management of new agroforestry systems. Many scheme elements related to the establishment phase may still be relevant for existing agroforestry systems and serve primarily as reference points for understanding the initial steps and costs involved. While some agroforestry systems may not need all the initial steps, they can benefit from the principles outlined in the establishment phase for planning future expansion and improvements. In addition, advisory services remain relevant for existing agroforestry systems, providing valuable guidance to farmers on how to optimise their land management practices to achieve greater sustainability and productivity over time.

Agroforestry project

Defining the phases and scale of an agroforestry project is an essential first step for its successful implementation and evaluation.

Project implementation

- **Pre-project implementation:** The pre-project implementation phase includes planning, feasibility studies, baseline assessments, understanding the current legislation, engagement of stakeholders, and securing necessary permits and funding. These activities may include conducting surveys, identifying suitable sites, developing agreements with stakeholders, and setting project objectives.
- **Project implementation (years 1-5):** The project implementation phase involves the establishment and management of the agroforestry system, including for example, land preparation, tree planting and protection, regular monitoring, and management practices.
- **Project evaluation (year 5):** The project evaluation phase assesses the project results against pre-defined objectives. Activities may include an assessment of carbon sequestration and its impacts on biodiversity and soil health, economic benefits, and overall project success.

Scale of the project

The scale of the project should be defined in the agroforestry plan. The project will be defined as small, medium, or large based on land area, number of participants, or collaborative efforts involved. Depending on the size of the project, basic, medium or high requirements should be defined.

- **Small-scale projects:** Involve fewer participants and/or cover smaller land areas. These projects are assigned basic or moderate criteria in recognition of their limited scale and likely lower potential impact. Requirements should include monitoring unexpected negative impacts on biodiversity and identifying best practices to maximise biodiversity benefits. They should be accompanied by transparency requirements (e.g., public availability of project documents and information on biodiversity impacts) and an approach to monitoring results.
- **Medium-scale projects:** Cover medium-sized land areas or involve a moderate number of participants. These projects have more comprehensive and stringent requirements than small-scale projects, but these are less stringent than for large-scale projects. Establishing positive or negative lists and quantitative monitoring can supplement the basic requirements. For example, positive lists could limit funding to specific actions using native species, and negative lists could exclude actions near nature reserves.

- **Large-scale projects:** Cover larger land areas and/or involve multiple participants and farms. With their potentially greater impact on climate and biodiversity, these projects are subject to stricter guidelines, comprehensive monitoring, and stringent compliance measures. Stringent requirements should include robust monitoring of the impact on biodiversity of each farm. Biodiversity indicators could include soil biodiversity, biotope value or species level indicators.

Objective setting and eligibility

A financing scheme for agroforestry requires objective setting and assessment of eligibility criteria:

- **Clear objectives:** Set climate and environmental objectives that farmers can understand, monitor and achieve with a reasonable degree of certainty.
- **Broad applicability:** The scheme should be inclusive and applicable to a wide range of farming systems and agroforestry practices so that it has greater potential to deliver climate and environmental benefits, even if the benefits per unit area are small. It should accommodate various farm sizes, types, and socio-economic conditions to encourage widespread adoption.
- **Eligibility criteria:**
    - Farm eligibility should be verified before an agroforestry plan is formulated. The on-site eligibility verification process involves engaging with local agricultural experts and extension services, conducting field inspections, and performing environmental impact assessments to assess existing practices and provide constructive feedback to farmers.
    - The scheme should cover all geographical areas in Europe. This may require an on-site eligibility assessment of farming systems to verify eligibility.
    - Setting appropriate eligibility criteria will help ensure the integrity and cost-effectiveness of the scheme by directing resources to projects with the highest potential for positive environmental impact while avoiding wasteful expenditure on initiatives that may pose risks to biodiversity, water quality, or other environmental factors.

Baseline and additionality

By conducting baseline assessments, ensuring additionality between environmental, regulatory, and financial aspects, and clarifying objectives, the scheme can promote agroforestry practices with positive climate and environmental impacts while avoiding conflicts with other societal priorities.

- **Baseline assessment of the farm:** This involves establishing a baseline for environmental objectives before the project is implemented. This baseline can be used to determine how much carbon the project can store and what other environmental results it can achieve.
- **Additionality:** The scheme should produce desirable results that would not have occurred without it. A sustainable financing scheme for agroforestry must ensure:
    - Environmental additionality: Increased carbon sequestration and provision of measurable ecosystem services in the long term that would not have occurred without the scheme.
    - Financial additionality: Without the scheme's financial rewards for providing ecosystem services, the costs of adopting agroforestry practices would exceed the benefits.
    - Regulatory additionality: Agroforestry practices must go beyond the regulatory baseline to ensure that they contribute to enhancing and protecting ecosystems.

These components ensure that farmers adopt agroforestry practices that have real, measurable and positive impacts on the climate and environment without compromising other societal priorities (e.g.,

food production, water quality, biodiversity conservation). The scheme's objective must be clear to ensure that farmers, policymakers, and stakeholders understand the intended outcomes.

- **Risk of double counting:** Double counting can undermine additionality. This situation occurs when a farmer receives payments from different policies, initiatives or funding sources for the same action, such as carbon sequestration or biodiversity enhancement, leading to a potential overestimation of environmental benefits and financial incentives for a single result. However, there is no double funding if the farmer is simply paid to provide two different public goods. Therefore, the scheme should be clear about its objectives.

Permanence

The permanence of the environmental benefits of agroforestry must be ensured. Permanence means ensuring that the carbon captured by agroforestry practices remains stored over the long term, preventing it from being released back into the atmosphere. Ensuring permanence is essential for agroforestry practices to effectively mitigate climate change by maintaining long-term reductions in greenhouse gas levels. Permanence is a major challenge for carbon storage in agroforestry systems because of the potential risk of intentional or unintentional release of the stored carbon, for example, through changes in land use or unforeseen events such as drought or fire affecting the farmland.

Achieving permanence of carbon sequestration and other ecosystem services is critical to maximising the environmental benefits of agroforestry practices. Farmers should commit to maintaining the land management practices implemented during the project in the long term and continuously monitoring the environmental impacts to ensure the permanence of the benefits provided. In reality, full permanence is impossible to achieve due to the many factors triggering land use change. The scheme should mitigate this risk by incentivising the adoption of long-lasting agroforestry systems.

Monitoring, reporting and verification (MRV)

- **Robust MRV systems** are essential to ensure that agroforestry practices have a real, positive and measurable impacts on the climate and biodiversity. New technological and methodological developments can help progressively improve MRV systems and reduce their costs through public research programmes, the engagement of stakeholders, and private investment, focusing on monitoring the quality, resilience and longevity of trees and soils.
- **Data accessibility:** Ensuring the accessibility of MRV data to farmers, relevant stakeholders, policymakers, and the public is essential to increase accountability and trust in the effectiveness of agroforestry practices in delivering climate and environmental benefits.
- **Reduce uncertainty and costs:** Efforts should aim to reduce costs and uncertainties arising from measurement inaccuracies due to errors, lack of data, modelling assumptions or estimates.
- **Tailored monitoring approach:** No single monitoring approach fits all contexts. Depending on the local context and specific conditions, the scheme may require different monitoring approaches when applied in different locations. The selection criteria for the appropriate approach should be based on scientific robustness, transparency, and expert scientific review.

Payment mechanisms

- **Diverse sources of funding:** The scheme must consider combining different sources of funding to cover the costs incurred by farmers in establishing and managing the agroforestry system and to reward them for the results they achieve. This financial support should be linked to the use of on-site specialist advice from a trusted source for the project's duration.

- **Profitability for farmers:** Adopting agroforestry is economically attractive to farmers when the benefits of payments and co-benefits outweigh their costs. Farmers assess the economic attractiveness based on net benefits after considering the costs of learning new practices, establishing baseline data, and estimating initial and ongoing implementation costs.
- **Multiple payments for environmental benefits:** Multiple payments, with incentives for both climate and biodiversity, will be essential to maximise the environmental benefits of agroforestry. Farmers should receive a result-based payment for each tonne of CO_2-eq permanently sequestered, with an additional reward if other benefits can be demonstrated.
- **Financing the reward mechanisms:** The scheme distinguishes between three payment mechanisms:

    - Payments based on costs: Compensation for the costs incurred by farmers in implementing or changing their land management practices.
    - Market-based reward: These payments are linked to the market value of the ecosystem services provided by agroforestry, such as the sale of carbon credits.
    - Non-market-based reward: Incentives or compensation for ecosystem services through government payments, subsidies and grants that are not related to market values.

- Result-based payments generally consider two factors when determining the level of payment.

These typically include:

    - Assumed costs of delivering environmental benefits: This involves assessing the costs associated with implementing specific land management practices or meeting environmental targets, which may also include costs associated with MRV.
    - The socio-economic value of the environmental results achieved: In some cases, the level of payment could be based on the socio-economic value of the ecosystem services provided by the farmer's activities. This approach considers the wider societal and environmental benefits of agroforestry beyond the costs incurred by the farmer.

It is essential that the result-based payments not only cover the farmers' costs, but also incentivise and reward the provision of ecosystem services, thereby encouraging sustainable practices and beneficial results for both farmers and society. These payment mechanisms should be flexible and adaptable to changing conditions, evolving policies and the development of new knowledge.

Financial and non-financial resources

Setting up and running a financing scheme combining ex-ante payments, action-based and result-payments, and advisory services requires considerable resources, including a multi-disciplinary team, a partnership of organisations, an adequate budget and a significant amount of time.

Farmer engagement and advisory services

Key elements related to farmer engagement and advisory support in the scheme are:

- Active involvement of farmers and agroforestry stakeholders in the design of the scheme;
- Farmers should benefit from training and advisory services from the start of the project to facilitate learning and capacity building. Advisory services should be adaptable to changing conditions, new knowledge, and feedback from farmers to ensure relevance and continuous improvement.

- Local community knowledge and practices should be integrated into advisory services, recognising the value of traditional farming practices and local knowledge in agroforestry.
- Funding for the required advisory services should be secured before the scheme becomes operational.
- Feedback mechanisms should be in place to allow farmers to provide inputs, share experiences, and suggest improvements throughout the project's life.

Environmental results indicators and recognition of co-benefits

Recognising all the co-benefits of agroforestry practices and rewarding farmers for delivering them will be important in scaling up up agroforestry.

This requires the development of accurate and robust indicators for environmental results:

Result indicators for climate benefits

- Using metrics such as tonnes of carbon dioxide equivalent permanently stored in soil and biomass is critical. Indicators of carbon stored above ground in woody biomass are available (e.g., Woodland Carbon Code). However, measuring changes in below-ground carbon is still fraught with difficulty.
- A combination of modelling and direct measurement is essential for accurate monitoring.

Recognition of co-benefits and payment structure

- Recognition of co-benefits such as enhanced biodiversity and soil health is a fundamental principle of the scheme. As not all co-benefits may be aligned with climate indicators, a wide range of indicators must be developed. Integrating all co-benefits into the payment structure ensures farmers are rewarded for meeting multiple result parameters. This holistic approach allows farmers to progressively enhance their performance and payments.

Action-based approach for unmeasurable co-benefits

- When certain co-benefits cannot be measured using standard indicators, an action-based approach can be used instead to recognise these unmeasurable benefits.

Alignment with national objectives

- Farmers' practices should be aligned with the country’s environmental and sustainability objectives. For example, greenhouse gas emission savings from agroforestry can contribute to national emission reduction targets.

Governance

Governance is a requirement for any scheme, encompassing many essential elements to ensure its effectiveness and alignment with overarching objectives. These elements may include:

- **Regulatory framework:** Establish clear and comprehensive regulations for the implementation and objectives of the scheme. The framework should cover key components such as eligibility criteria, performance standards, monitoring and reporting requirements, permanence and additionality criteria, verification and certification procedures, and compliance mechanisms.

- **Stakeholder engagement:** Involvement of different stakeholders, farmers, local communities, government agencies, NGOs, and the private sector actors in the development, design and implementation of the scheme to ensure inclusiveness and participatory approach.
- **Independent oversight:** Involvement of independent bodies or agencies (e.g., third-party certification bodies, government agencies) responsible for monitoring, validating, and certifying projects to ensure the integrity of the scheme, compliance and credibility. Their role may include regular audits, transparent validation processes, and stakeholder involvement in oversight mechanisms to build credibility and trust in the scheme.
- **Transparent processes:** Ensure transparency of procedures, including allocating funds, project selection criteria, and evaluation methods, to promote trust and accountability.
- **Risk management:** Implement strategies to effectively identify, assess, and manage risks associated with the scheme, including financial, operational and environmental risks.
- **Flexibility and adaptability:** The scheme should be flexible and adaptable to changing environmental conditions, market dynamics, technological advances, new knowledge, and policy frameworks to evolve and remain effective over time.
- **Formal evaluation planning**: Develop a plan for collecting baseline data before the scheme's implementation and for formal evaluations at appropriate intervals during its development. This is essential to accurately evaluate the scheme's performance, build confidence, identify problems, and find ways to improve it. All aspects of the scheme's performance should be evaluated, including farmer uptake, climate, environmental and socio-economic impacts, possible negative externalities and equity considerations. This will ensure ongoing evaluation and allow for necessary improvements to the scheme over time.
- **Advisory and expert panels:** Establish advisory boards or expert panels to guide the scheme's administrator on technical issues, policy decisions, and best practices. For example, this could include technical expertise, policy decisions, and lessons learned from best practices.
- **Compliance and monitoring:** Developing robust MRV mechanisms to ensure compliance with set standards and track the scheme's performance against its objectives.
- **Public awareness and communication:** Broad communication and awareness campaigns are used to inform stakeholders about the scheme's objectives, achievements, and benefits.

These elements ensure transparency, accountability, and adaptability and contribute to achieving the scheme's objectives. The level of governance should vary according to the scale of the scheme. Smaller, pilot and experimental schemes may require less formal governance, whereas schemes responsible for spending significant amounts of public money require more formal governance.

Risk mitigation

- **Carbon leakage consideration:** The risk of carbon leakage due to the displacement of a land-use activity to another location, which results in increased carbon dioxide emissions, should be considered. Measures to mitigate such risks should be identified before the project starts.
- **Uncertainty of biodiversity impacts:** Agroforestry practices may have expected positive or uncertain impacts on biodiversity. Practices with uncertain impacts on biodiversity need to be managed with greater caution. However, even standards that promote practices with expected positive impacts must have some basic minimum requirements. These practices should demonstrate that they can significantly reduce net carbon dioxide emissions and provide other ecosystem services without compromising other societal objectives.
- **Risk acceptance by farmers:** Farmers should be prepared to accept the level of risk associated with the scheme, particularly with the result-based component. The risk of not achieving results can be a major factor limiting the scheme's uptake. If the risk is high, the farmer should consider the action-based approach of the scheme as an alternative for the project.

- **Adaptive management:** Participants in the scheme should have an adaptive management approach that allows for adjustments based on ongoing monitoring and evaluation of the agroforestry practices, changing conditions and evolving policy framework.
- **Income diversification:** Farmers can enhance their economic sustainability by diversifying their income from different sources, such as selling marketable products (e.g., non-timber forest products such as fruits, nuts and medicinal plants harvested from agroforestry systems).
- **Technology adoption:** Appropriate stakeholders should promote the role of technology in risk mitigation by encouraging the adoption of innovative technologies for agroforestry system management, monitoring, data collection, and communication within the project.

Indemnity insurance for farmers

- **Insurance:** Farmers participating in the scheme should carry out a thorough risk assessment of their agroforestry practices and must be insured against unforeseen events. Integrating insurance into the scheme requires designing a comprehensive and flexible approach to address the risks faced by farmers when adopting agroforestry practices. The scheme should include explicit requirements for mandatory insurance coverage, and farmers should be provided with guidance on the claims process and available support mechanisms.

The recommended insurance options for farmers:

  - Farmers may consider traditional agricultural and forestry indemnity insurance, which covers livestock, crop and forest losses and protects them against weather-related risks.
  - Farmers may also consider parametric insurance, which provides compensation based on pre-determined parameters following weather or catastrophic events.

Farmers participating in the scheme should ensure they are adequately insured against unforeseen events affecting their farming operations. In addition, they should regularly review their insurance coverage to ensure that it meets the evolving needs of their agroforestry practices. Changes in farm size, introduced crops or livestock, or environmental conditions may require adjustments to insurance coverage. To this end, collaboration between the scheme and insurance providers will be encouraged to tailor insurance products specifically for participants.

Gender and social inclusion

Integrating gender and social inclusion into the scheme's design will ensure equitable access and benefits. It requires recognising and addressing the specific needs, roles, and contributions of women, youth and marginalised groups to promote inclusivity and empowerment in agroforestry initiatives.

3.7 PRACTICAL CONSIDERATIONS FOR THE DESIGN AND IMPLEMENTATION OF THE SCHEME

Collaborative design of the scheme: Tailoring agroforestry financing to local needs

In order to increase the uptake of agroforestry across Europe, it is essential actively involve agroforestry practitioners, policymakers and stakeholders in the design of the scheme from the outset. This collaborative approach allows for the integration of practical knowledge and experience, enables a thorough understanding of the farmers' challenges and needs, and ensures contextual relevance. In addition, stakeholder involvement helps to assess the feasibility of the scheme and to co-create effective solutions. Tailoring the sustainable financing scheme to different agricultural contexts and evolving conditions involves conducting local assessments, adapting flexible financing mechanisms and payment structures, providing capacity building, establishing monitoring systems, and promoting knowledge sharing and collaboration among different stakeholders. By adopting a collaborative and adaptive approach, the scheme can be tailored to the specific needs and local conditions of agroforestry practitioners, ensuring its practical applicability and effectiveness in diverse landscapes.

Regulatory considerations for agroforestry financing within the scheme

When developing a sustainable financing scheme for agroforestry, several regulatory aspects must be carefully considered to ensure compliance and promote the long-term sustainability of projects. Agroforestry projects often overlap with natural habitats, water resources and biodiversity, requiring compliance with environmental regulations. This requires strict compliance of the scheme with existing environmental regulations to prevent negative impacts on ecosystems and biodiversity, and with forestry regulations governing tree planting and land management practices. In addition, alignment with agricultural policies and programmes is crucial for access to funding for agroforestry adoption. Finally, compliance with European policies and legislation is essential for the credibility and effectiveness of the scheme. By complying with these legal requirements, the scheme will be better able to navigate the complexities of evolving regulatory conditions in different countries.

Application of the financing scheme in the context of the ReForest living labs

The scheme will be rigorously tested and refined through its application in the ReForest living labs to ensure that it is closely aligned with the needs and realities of agroforestry practitioners. The living labs provide valuable insights and practical case studies, facilitating continuous improvement of the scheme to maximise its effectiveness. The financing scheme that proves promising from the perspective of agroforestry practitioners will be communicated directly to the financial industry and policy stakeholders involved in the ReForest project through dedicated events, workshops, and policy papers. This important step will mark the transition from theoretical development to practical advocacy.

Development of agroforestry pilot projects and initiatives under the financing scheme

The possible future implementation of agroforestry pilot projects and initiatives under the scheme at local, national or regional level would be an important next step, as they can demonstrate the scheme's impact on the ground. Implementing pilot projects can provide evidence and real-life examples of the effectiveness of financing schemes in different agricultural contexts and local conditions, thus supporting wider implementation and policy formulation. Future pilot projects and initiatives can also provide opportunities for stakeholder engagement, knowledge sharing and capacity building, further strengthening support for the adoption of agroforestry practices across Europe.

Through iterative design, refinement, advocacy and demonstration, the scheme can position itself as a potential strategy for promoting innovation in land management practices while achieving long-term agricultural and financial sustainability for farmers. It aims to promote sustainable agroforestry practices that provide a range of ecosystem services in a variety of changing conditions across Europe.

4. PROPOSED SUSTAINABLE FINANCING SCHEME FOR AGROFORESTRY

4.1 A HYBRID SCHEME WITH EX-ANTE PAYMENTS AND ADVISORY SERVICES

Motivation

The proposed sustainable financing scheme for agroforestry is a hybrid carbon farming scheme complemented by ex-ante payments and advisory services to farmers.[8] It aims to encourage the establishment and maintenance of agroforestry systems by overcoming financial and knowledge barriers. The scheme should give farmers the flexibility they need to innovate and implement optimal land management practices for their farms to achieve environmental results.

A hybrid scheme complemented by ex-ante payments and advisory services to farmers

Three main components

- Ex-ante payment

Farmers receive an ex-ante payment to cover the up-front costs (e.g., planning, preparation of the agroforestry plan, initial investment and establishment costs). A significant part of the payment should be made upon acceptance of the agroforestry project plan to remove up-front financial barriers.

- Hybrid scheme: A combination of action-based and result-based payments

Under the hybrid scheme, farmers are entitled to a guaranteed annual action-based payment for adopting agroforestry practices, recognising their presumed environmental benefits such as carbon sequestration and biodiversity enhancement. Farmers can also receive an additional result-based payment after five years if these environmental benefits can be demonstrated through MRV systems.

- Advisory services to farmers

Farmers should receive regular advice and technical support from a reliable source from the start of the agroforestry project. Advisory services help farmers find the best solutions for their farms and are essential for ensuring the effective planning, implementation and management of projects.

Supporting the establishment and management of agroforestry systems

The sustainable financing scheme for agroforestry aims to support the establishment and management of new agroforestry systems on agricultural land in European countries. It can also be tailored to support the management of existing agroforestry systems. The scheme provides an initial ex-ante payment to cover the up-front costs of introducing new agroforestry systems. This payment could be extended to agroforestry systems undergoing significant expansion or improvement. The hybrid scheme, which combines action-based and result-based payments, can encourage the maintenance and improvement of land management practices, while providing additional payments for demonstrable environmental results. Finally, advisory services support existing and new agroforestry systems by providing advice on how to optimise existing practices and/or integrate new practices. Therefore, while the primary focus of the scheme is on the introduction of new agroforestry systems, its components can be appropriately adapted and applied to benefit existing agroforestry systems.

[8] A more detailed description of the different types of carbon farming schemes can be found in COWI, Ecologic Institute and IEEP (2021) and McDonald et al. (2021).

4.2 Description of an agroforestry project

This section describes the elements of a prototype five-year agroforestry project, including phases and iterative steps, drawing on the research by COWI, the Ecologic Institute and IEEP (2021) and McDonald et al. (2021). It is intended to serve as a practical guide for future agroforestry initiatives. This duration allows sufficient time to establish and manage agroforestry systems, monitor and evaluate their performance, and allow for the necessary maturation of trees and crops. In the pre-project phase, the farmer, with the help of a trusted advisor, develops a plan to sustain the agroforestry initiative. This plan is a detailed roadmap for establishing, managing, financing and evaluating the project. The details may vary depending on factors such as climate, soil conditions and the project objectives. The prototype project outlined in this subsection focuses on establishing and managing new agroforestry systems. Many of the planning elements outlined are relevant to existing agroforestry systems, although the focus is on optimising and managing systems rather than establishing them.

4.2.1 Prior to agroforestry project implementation (year: 0)

There are key planning elements that an agroforestry plan should contain:

Introduction: Provide a brief introduction to the agroforestry project plan, outlining its purpose, objectives, and the context in which it will be implemented. Objectives may include environmental sustainability, biodiversity conservation, climate change mitigation and improving farmers' livelihoods.

Site selection and analysis: Conduct a thorough analysis of the site where the agroforestry system will be established, considering soil characteristics, climate, topography, water availability, local market opportunities and other relevant factors, to assess its environmental, economic, and social potential.

Stakeholder analysis: Conduct a stakeholder analysis to identify and assess the interests, roles, and influence of the various stakeholders involved in or affected by the project, including farmers, local communities, government agencies, NGOs, funding entities and private sector actors. It is important to emphasise how stakeholder collaboration can contribute to the project's success.

Agroforestry system design: The farmer should specify the agroforestry system to be implemented, considering local ecological conditions, climate, and the needs of the target participants. The farmer should also determine the design and arrangement of trees, crops, and/or livestock within the agroforestry system. The plan should also include a map of the area to be planted with trees.

Tree species selection: Define criteria and guidelines for selecting tree species based on their suitability for the site, climate resilience, market demand, and compatibility with crops or livestock.

Capacity building: Outline strategies for building the capacity of the project's participants.

Community engagement and participation: Describe how the project will engage with the local community and encourage their active participation in decision-making, planning and implementation.

Crop/livestock integration: Identify specific crops or livestock to be integrated with tree components.

- **Land management practices** that optimise the use of land for the simultaneous cultivation of trees, crops, and/or livestock. These practices should aim to enhance the agroforestry system's environmental sustainability, biodiversity, and overall productivity.
- **Planting, establishment and management:** Outline procedures for planting, establishing, and maintaining trees.
- **Weed and pest management:** Develop strategies for weed control and pest management to ensure the health of both tree and crop components.
- **Harvesting and yield management:** Define protocols for harvesting agricultural products and tree products to ensure sustainability and maximise yields.

Individual farm assessment and baseline setting:

- **Existing agroforestry systems:** An individual farm assessment to understand the current state of land use, agricultural practices, environmental conditions, and socio-economic aspects.
- **New agroforestry systems:** A field audit to identify the most appropriate location and type of system that is compatible with existing farming systems and environmental objectives.
- **Baseline setting:** The initial field audit provides baseline measurements of environmental indicators to quantify the improvements brought about by agroforestry and serves as a reference point for measuring project impacts.

Environmental results to be achieved may include carbon sequestration, enhanced biodiversity, improved soil health, tree regeneration**,** or enhanced landscape features.

Identification of land management practices to achieve environmental results, while maintaining the agricultural production system. This requires scientific research and validation by farmers.

Financial and economic analysis:

- **Cost-benefit analysis:** Conduct a financial analysis considering the costs associated with establishing and maintaining the agroforestry system and the potential economic benefits.
- **Calculation of costs:** Calculate up-front costs for learning, setting a baseline, initial establishment of agroforestry systems (e.g., planting of trees), completing the management plan, and ongoing costs such as implementation, opportunity and transaction costs.
- **Resource requirements and budget:** Estimate the financial and non-financial resources required for each stage of the agroforestry project. Develop a budget that covers the costs of land preparation, tree planting, maintenance, labour, equipment, and other inputs.

Ensuring access to specialised equipment and machinery for these tasks is critical to the successful adoption of agroforestry practices, especially for farmers who may not have ownership or rental options. While the agroforestry plan covers various aspects of project implementation, it is important to address potential barriers, such as access to equipment. Group ownership of shared equipment within local communities, supported by public and private funding, could be a possible solution.

- **Identification of appropriate financing mechanisms and sources** to cover costs at all stages of the project. Specific funding sources may include CAP support, government support, private sector and potential income generation, or a combination of these funding options. The specialist adviser can assist the farmer in applying for funding.

Environmental and social considerations:

- **Biodiversity and habitat enhancement:** Indicate how the agroforestry system will contribute to biodiversity conservation, habitat enhancement, and other environmental objectives.
- **Social and community impacts:** Address various social considerations, including community involvement, local knowledge, and the potential social benefits of the agroforestry system.

Legal and regulatory compliance: Ensure compliance with local, national and regional laws and regulations and obtain the necessary permits to establish and manage the agroforestry system.

Monitoring and evaluation:

- **Indicators and metrics:** Establish measurable indicators and metrics to monitor the performance of the agroforestry system, such as environmental, economic, and social results.
- **Data collection plan:** Develop a data collection plan, including methods, frequency, and responsible parties, to enable ongoing monitoring and periodic system evaluation.

- **Schedule regular reviews** to assess project progress and adjust strategies as necessary.
- **The appropriate MRV system should be planned and validated** before the plan is approved. The MRV system should be flexible and adaptable to the size and characteristics of the farm.

Risk management:

- **The farmer should conduct a thorough risk assessment** to identify potential challenges and uncertainties and develop risk mitigation strategies and contingency plans to address potential risks. The plan must include a complete list of potential risks related to the farm, the geographical area, the farmer's situation, and the land management practices. This includes consideration of factors such as weather-related risks, pest infestations, market fluctuations, and other potential threats. Areas vulnerable to different types of risk within the agroforestry landscape and the key elements (e.g., trees, crops) to be covered should be identified.
- **Farmers are advised to consider traditional agricultural and forestry indemnity insurance**, which covers crop or livestock losses and protects against weather-related risks. They may also consider parametric insurance, which provides compensation based on pre-determined parameters following weather or catastrophic events.

Timeline and implementation schedule: Outline a clear implementation timeline for the project, including phases, steps, milestones, activities and deadlines that will guide the plan implementation.

Stakeholder engagement and communication

- **Stakeholder identification:** Identify and involve relevant stakeholders, including farmers, local communities, government agencies, funding entities and potential partners.
- **Communication plan:** Develop a communication plan to facilitate information sharing, collaboration among stakeholders, and communication of project progress.

Training and capacity building: Plan to participate in training for farmers and agroforestry practitioners to enhance knowledge of agroforestry practices, management and monitoring skills.

Adaptive management: As agroforestry systems may require adjustments over time, adaptive management strategies may be developed based on monitoring results and evolving conditions.

Documentation and reporting: Establish a system for documenting activities, data, and results. Maintain reporting, evaluation, and future planning records to facilitate knowledge sharing.

Long-term sustainability: The farmer develops a post-project strategy that outlines steps for continued management, potential expansion, or modification based on project objectives and results to ensure the long-term sustainability of the agroforestry system and that environmental benefits are sustained.

Communication and outreach: Plan communication and outreach activities to raise awareness of the project among the target community and relevant stakeholders. Various channels such as workshops, training sessions, and information materials, can be used for communication and outreach.

Ethical considerations: Address ethical considerations related to the agroforestry project, including fair treatment of stakeholders, respect for local community and knowledge, and cultural sensitivity.

Appendices: Include any additional documents or supporting materials, such as maps, technical specifications, data or relevant research findings.

Many of the planning elements outlined are relevant for existing agroforestry systems, although the focus is on optimising and managing systems rather than establishing them.

4.2.2 Agroforestry project implementation (years: 1-4)

The implemention of a five-year agroforestry project involves several key steps to ensure successful planning, implementation, management, monitoring and evaluation of the agroforestry system.

Year 1: Establishment of agroforestry systems

The first year focuses on establishing the agroforestry system. While the specific steps may vary depending on the project objectives, scale, and context, a prototype agroforestry project should typically include activities aimed at laying the foundations for sustainable land use practices and achieving the project's long-term objectives.

Table 1 provides an overview of the activities in the first year.

Project kick-off	Hold an initial project launch or kick-off meeting with stakeholders. The project kick-off meeting communicates the project objectives and expected outcomes and defines the roles and responsibilities of each project participant.
Detailed site assessment	Finalise the project site selection based on the detailed analysis and risk assessment carried out during the planning phase. Confirm or adapt the agroforestry system design based on the specific site conditions.
Baseline data collection	Start collecting baseline data for environmental, economic and social indicators and conduct individual farm assessments for existing agroforestry systems.
Capacity building	Participate in training on agroforestry practices, including tree planting, crop integration and land management. Promote local knowledge sharing through capacity building and collaborative learning that values traditional agricultural practices.
Pilot planting	Initiate pilot planting of selected tree species in a demonstration plot to allow for practical testing of the chosen system design, site-specific adaptations, learning and early adjustments based on observed results.
Establishment of the agroforestry system and farmers support	Establish the agroforestry system with the support of a specialised adviser who helps the farmer with tree planting, crop management and land use. Implement land management practices that optimise land use for the simultaneous cultivation of trees, crops, and possibly livestock.
Resource mobilisation	Secure funding from a variety of sources, such as the CAP, government grants, and private sector initiatives. Establish partnerships with public and private sector entities and research institutions for technical and financial support.
Community Engagement	Engage with local communities during the project planning and implementation process to ensure their participation and the consideration of local knowledge.
Stakeholder communication	Maintain transparent communication with stakeholders, keeping them informed of progress, challenges, and any adjustments made to the project plan.

Table 1: Establishment of agroforestry systems: Main activities. Source: Author's own elaboration, drawing on COWI, the Ecologic Institute and IEEP (2021) and McDonald et al. (2021).

In existing agroforestry systems, while activities such as site assessment and baseline data collection are key to assessing current conditions, the focus is primarily on improving land management practices.

Years 2-4: Management of agroforestry systems

The subsequent years of an agroforestry project focus on the management of agroforestry systems.

Table 2 provides an overview of the main project activities from years 2 to 4.

Scale up planting	Scale up tree planting activities and introduce additional agroforestry components based on lessons learned from the project's first year.
Community engagement	Encourage community involvement through workshops, field days, peer-to-peer learning and participatory decision-making.
Regular data collection, monitoring and evaluation	Undertake data collection, monitoring and evaluation to assess project progress. ○ The farmer and the adviser carry out regular assessments to measure the project's environmental, social, and economic impacts. ○ The adviser visits the farm at selected intervals to assess the quality of the established agroforestry system, the health and maintenance of the woody species, and the added value in terms of other parameters being evaluated and to discuss possible adjustments. ○ Interim measurements can be taken during the project. In particular, carbon sequestration and biodiversity impacts need to be monitored over time, which requires regular measurements.
Capacity building	Continue capacity-building activities for ongoing skills development and use feedback from project participants to improve land management practices.
Adaptive management strategies	Adapt project strategies based on monitoring results to enhance project effectiveness and address emerging challenges due to potential external factors such as changes in climate, market conditions, or policies.
Agroforestry system optimisation	Optimise the agroforestry system based on performance data and stakeholder feedback. This may lead to the introduction of new practices or an adjustment of existing practices to improve on farm results.
Crop/livestock integration	Strengthen the integration of crops or livestock within the agroforestry system.
Financial and economic analysis	Undertake a thorough financial and economic analysis of the agroforestry system, evaluating costs, benefits, and wider economic impacts such as productivity and income generation to improve decision-making.
Stakeholder engagement	Enhance information sharing and collaboration with stakeholders involved in the project.
Market linkages	Various stakeholders, including government agencies, NGOs, farmer groups, private sector partners, research institutions, and financial institutions, should collaborate to facilitate market access and add value to agroforestry products, thereby creating income-generation opportunities for farmers.
Risk management	Review and update risk mitigation strategies and identify and manage any emerging risks.
Long-term planning	Initiate planning for the long-term sustainability of the agroforestry system beyond the project's duration.
Scaling up and replication	Share project results and lessons learned with other stakeholders to encourage replication and adoption of agroforestry systems in different contexts.
Documentation and reporting	Documentation and reporting can include data collection and compilation, case studies, and success stories for documentation.

Table 2: Management of agroforestry systems: Main activities. Source: Author's own elaboration, drawing on COWI, the Ecologic Institute and IEEP (2021) and McDonald et al. (2021).

While the core activities for existing systems may be similar to those for newly established systems, the focus shifts to fine-tuning and improving existing practices rather than setting up entirely new systems.

4.2.3 End of the project (year 5)

This subsection provides an overview of the end of project activities for the agroforestry project.

Project review

Review of the original project objectives and assessment of their achievement. A comprehensive evaluation of the project's achievements and performance, and its environmental, social and economic impacts should be carried out.

The MRV of environmental results

Assessment of the impact of agroforestry practices on various environmental factors (e.g., biodiversity, soil health, water quality, carbon sequestration, habitat connectivity for plant and animal species) through robust scientific processes. These processes should be carried out with relevant experts, local communities, and stakeholders to ensure a comprehensive and accurate assessment.

Monitoring

- **Biodiversity:** Monitor changes in plant and animal species diversity in the agroforestry system.
- **Soil health:** Conduct soil testing to assess changes in soil fertility, organic matter, and nutrient levels.
- **Water quality:** Monitor water quality in nearby water bodies.
- **Carbon sequestration:** Use established methods (e.g., remote sensing) to monitor carbon stored in soils and vegetation per hectare of agroforestry area.

During monitoring, the data collected will be analysed to quantify the changes and improvements resulting from the practices implemented. The final results will be compared with baseline data.

Reporting

- **Data compilation:** Collect and compile quantitative data from monitoring activities.
- **Photographic documentation:** Include visual documentation, such as photographs, to illustrate changes in the landscape throughout the project.
- **Case studies:** Develop case studies highlighting environmental, economic and social improvements or challenges encountered during the project.
- **Narrative report:** Prepare a report summarising key findings, challenges and lessons learned.

Verification

Monitoring results are submitted to a competent authority to verify environmental results such as carbon sequestration and biodiversity. The verification process involves an independent review of the monitoring data and the project documentation to ensure that the project has met the requirements of the chosen methodology. Verification typically involves the following activities:

- **External expert review:** External experts or consultants with expertise in agroforestry, ecology, or environmental science review project data and findings.
- **Peer review:** Facilitate a peer review process in which experts in the field provide constructive feedback on the project's achievements.
- **Stakeholder consultation:** Involve local communities, farmers, and other stakeholders in the verification process to ensure that different perspectives are considered.

Compliance with standards

- **Compliance with guidelines:** Ensure that the MRV processes are aligned with established guidelines and standards for agroforestry and environmental impact assessment.
- **Legal compliance:** Ensure compliance with all applicable regulations and standards.

The evaluation of the project

- **Economic assessment:** Assess the economic benefits to farmers, such as income generated and cost-benefit analysis.
- **Environmental impact assessment:** Assess the environmental results achieved on the farm.
- **Socio-economic and community outcomes:** Assess the socio-economic impacts of the project, including changes in agricultural productivity and livelihoods, and community impacts.
- **Knowledge transfer and adoption:** Evaluate the success of knowledge transfer and adoption of sustainable agroforestry practices by other farmers over the life of the project.
- **Market integration:** Evaluate the success of market linkages for agroforestry products and their contribution to farmers' incomes.

Evaluating the agroforestry project will help to understand its effectiveness and inform future initiatives for sustainable agricultural practices. It can be carried out by agricultural extension services or relevant entities specialising in sustainable agriculture, forestry, and environmental impacts.

Documentation

- **Comprehensive documentation:** Maintain comprehensive records of monitoring data, reports, and verification procedures.
- **Methodologies:** Document the methodologies used for monitoring and verification.
- **Challenges and lessons learned:** Identify challenges faced during the implementation of the agroforestry project and document lessons learned for future projects.
- **Reporting:** Prepare a concise final report summarising the evaluation results, including quantitative and qualitative data, and the MRV system used.
- **Financial closure:** Complete financial closure activities, including financial reports and all documentation required to comply with funding agreements.

Feedback for improvement

Gather feedback from project participants and stakeholders, including farmers, local communities, project partners, and funding entities, to understand their perspectives on the project's strengths, weaknesses, and impacts. Lessons learned can be used to improve future agroforestry projects.

Communication

- **Knowledge sharing and communication with stakeholders:** Communicate and share the project results, best practices and lessons learned with other farmers and relevant stakeholders, including local communities and funding entities.
- **Public awareness:** Communicate key results to the wider public through outreach activities, events, workshops, publications, case studies and the media.
- **Recommendations:** Provide recommendations for improving future agroforestry projects based on the evaluation results.

The end of project activities outlined will ensure comprehensive monitoring and evaluation of the environmental, social and economic impacts of agroforestry projects, and facilitate the dissemination of lessons learned to promote continuous improvement of sustainable agroforestry practices.

4.2.4 Subsequent years

After project completion, farmers should maintain and monitor the practices implemented to ensure the sustainability of their agroforestry practices with environmental, economic and social benefits.

Maintain the agroforestry practices

Continue to implement the agroforestry practices learned during the project and assess the health and growth of trees, crops and/or livestock over time.

Monitor environmental impacts to ensure sustainability

Continue to monitor and evaluate the environmental impact of agroforestry practices by assessing changes in carbon sequestration, biodiversity, soil health, and water quality. Ensuring environmental sustainability requires regular site visits, with MRV implementation and ongoing data collection.

Community engagement, networking and partnerships

Encourage community collaboration, knowledge sharing, and networking by maintaining connections with stakeholders and participating in networks that facilitate continuous learning and collaboration.

Knowledge sharing and educational programmes

Share the knowledge gained from the project with farmers and the wider community, and participate in educational programmes to enhance understanding and adoption of sustainable practices.

Financial planning

Ensure access to long-term financial support and advisory services and implement financial planning strategies to manage income from harvested agroforestry products.

Regulatory compliance

Continue to comply with relevant laws and regulations, and seek support and advice on compliance from relevant entities if necessary.

Participation in research and monitoring

Collaborate with researchers from different types of institutions conducting studies on agroforestry and share on-farm data and experiences to contribute to wider research efforts.

Adaptation and innovation

Keep abreast of new agroforestry techniques, technologies, and innovations, and adapt land management practices to changing conditions and new knowledge.

Documentation and reporting

Regularly document and report on farm activities, challenges, and achievements.

4.3 METHODOLOGICAL APPROACH

Developing a sustainable financing scheme for agroforestry that emphasises payments for ecosystem services requires careful consideration of the environmental benefits, the land management practices required to achieve them, and their associated costs. This includes recognising the wide range of ecosystem services provided by agroforestry systems, which vary according to the type of farming system, geographical location, climatic conditions and management techniques. A flexible approach to setting payment rates is needed for farmers to achieve environmental sustainability and economic viability. While payments must cover all costs incurred by farmers and reflect the true societal value of the ecosystem services provided, accurately determining these payment rates is a major challenge. In light of these considerations, this study proposes a methodological approach structured around six key steps to effectively design and implement a sustainable financing scheme for agroforestry. The study adopts a flexible approach to setting payment rates based on the costs of specific land management practices and an economic valuation of ecosystem services.

Application of ecosystem services in a result-based scheme: The Montado example

Securing the sustainable financing of agroforestry requires innovative methodological approaches to ensure the achievement of environmental, social and economic objectives. In the recent literature, Guimarães et al. (2023) propose a methodological approach for applying ecosystem services in a result-based scheme for the Montado. It includes three main sequential actions:

- **Defining environmental results:** Identifying and linking potential environmental results to the provision of ecosystem services.
- **Mapping land management practices:** Understanding and detailing the specific land management practices required to achieve these environmental results.
- **Calculation of costs:** Estimating the costs associated with implementing these practices.

The model compensates farmers for delivering environmental results linked to ecosystem services, such as a healthy soil ecosystem, a biodiverse pasture, and preserved landscape elements. Guimarães et al. (2023) show the importance of defining environmental results, mapping specific land management practices, and considering multiple factors to compensate for costs effectively. The study highlights the need for result-based schemes for ecosystem services that provide flexibility to farmers and allow them to use any land management practice, as the focus is on results.

Proposed methodological approach

Drawing on the sequential approach of Guimarães et al. (2023), this report outlines a methodological approach to support the sustainable financing of agroforestry. Under the proposed scheme, ex-ante and action-based payments are designed to compensate farmers for the costs of establishing and managing agroforestry systems. By directly addressing the initial financial barriers and compensating farmers for the costs of managing agroforestry systems, the cost-based approach to ex-ante and action-based payments can encourage greater uptake of agroforestry practices.

In contrast to the methodology described by Guimarães et al. (2023), where the economic valuation is based on the costs incurred by farmers to implement or change land management practices, our proposed approach for result-based payments relies on an economic valuation derived from a quantitative assessment of the ecosystem services provided by agroforestry systems. We believe that this approach is compelling because it provides a holistic perspective on the value of agroforestry systems, recognising their wider societal and environmental benefits beyond the costs incurred by farmers. By valuing the ecosystem services provided by agroforestry, farmers will be encouraged to adopt optimal land management practices for their farms that provide multiple ecosystem services.

This study proposes a methodological approach based on six distinct steps and provides a flexible framework that can be applied to different types of agroforestry systems:

1. **Identification of environmental results linked to the provision of ecosystem services**

This first step involves identifying and defining specific environmental results that are measurable, quantifiable and directly related to the provision of ecosystem services within the agroforestry system. These may include, for example, enhanced soil health and biodiversity or carbon sequestration.

2. **Mapping specific land management practices to achieve environmental results**

Once the environmental results have been identified, the specific land management practices required to achieve these results are identified. This involves identifying practices such as tree planting and soil management techniques. This mapping process should consider the compatibility of different practices with local ecological conditions and the potential synergies and trade-offs between them.

3. **Estimation of the costs associated with the implementation of land management practices**

The costs associated with implementing or changing land management practices are then estimated. These include direct costs associated with the establishment and management of agroforestry systems, and other indirect costs, such as opportunity costs and income foregone. The total cost estimate should consider the full life cycle of the agroforestry practices, including initial implementation, maintenance and any necessary adjustments over time.

4. **Development of measurable indicators to assess environmental results**

Measurable indicators are developed to assess the effectiveness of the land management practices implemented in achieving the desired environmental results. They should be quantifiable, verifiable, and scientifically sound in order to assess the environmental impact of agroforestry practices.

5. **Identification of financing mechanisms and sources**

Appropriate financing mechanisms and sources are identified to cover the costs of establishing and managing agroforestry systems and to reward farmers for the environmental results achieved.

6. **Setting of payment rates for environmental results based on an economic valuation of ecosystem services**

An economic valuation derived from a quantitative assessment of the ecosystem services provided by agroforestry systems will determine payment rates for environmental results. They should be fair transparent and reflect the true societal value of the ecosystem services.

The proposed methodology provides a basis for developing sustainable financing schemes for agroforestry, with a particular focus on newly established agroforestry systems. Although the steps outlined may need to be adapted slightly, the methodology can also be applied to existing agroforestry systems and guide the improvement of practices. However, it is important to recognise the challenges associated with its implementation in practice. These include consideration of different agricultural and environmental contexts and the complexity of monitoring and assigning economic value to agroforestry systems that provide a wide range of ecosystem services. In addition, the implementation of this approach depends on institutional support, financial resources and stakeholder collaboration. Overcoming these technical challenges and ensuring adequate financial resources and institutional support are essential steps to improve the scheme's applicability and encourage farmers to adopt sustainable land management practices that provide a range of ecosystem services.

5. FINANCING MECHANISMS, SOURCES AND PAYMENTS

Section 5 describes the potential public and private financing mechanisms and sources to cover the costs of establishing and managing agroforestry systems, rewarding farmers for environmental results, and providing advisory services to farmers. This report aims to provide a comprehensive guide for farmers wishing to establish and maintain sustainable agroforestry systems by highlighting the challenges and presenting the various potential financing mechanisms and policies available.

5.1 FINANCING THE UP-FRONT COSTS OF AN AGROFORESTRY PROJECT

Agroforestry projects can promote sustainable agricultural practices and environmental conservation and, therefore, play a key role in enhancing the resilience of farming systems. However, the successful establishment of agroforestry systems is often hindered by significant up-front costs, ranging from site assessment to infrastructure development. Recognising this financial barrier, it is imperative to identify the financing mechanisms and policies available to support agroforestry initiatives. This subsection identifies potential costs and a range of public and private financing mechanisms to cover them.

5.1.1 Costs associated with the establishment of agroforestry systems

Establishing an agroforestry system involves up-front costs for activities such as planning, drawing up the plan, preparing the land, purchasing planting material, and setting up the necessary infrastructure. To incentivise farmers and remove up-front financial barriers, a significant part of the payment should be made upon acceptance of the project plan. To be effective, the initial payment rate should cover all estimated costs associated with establishing an agroforestry system. An assessment of factors specific to the farmer's situation is required to accurately estimate costs and arrive at an overall budget. A combination of financial instruments and policies can support the financing of these costs.

Subsection 5.1.1 draws on studies such as COWI, the Ecologic Institute, IEEP (2021), and Guimarães et al. (2023), to provide an understanding of the cost components of establishing agroforestry systems.

Table 3 provides a list of potential costs associated with the establishment of agroforestry systems.

Site assessment: A thorough site assessment should consider soil quality, climate, topography, and water availability. This information will influence the choice of tree and crop species and may affect infrastructure requirements and associated costs.
Site preparation: Costs of clearing, grading, terracing, or other site preparation activities such as soil amendments. In some cases, there may also be labour costs and equipment rental.
Tree, crop and plant material: Refers to the cost of the tree and crop species that farmers intend to include in their agroforestry system. This may include the cost of purchasing seeds, seedlings, saplings or mature trees. The type, quantity, and quality of plants can also affect the total cost.
Purchase or lease of land: Cost of purchasing or leasing land suitable for agroforestry.
Tools and equipment: Cost of tools and equipment needed for planting, maintenance, and harvesting. This may include, for example, shovels, planting tools, maintenance machinery and irrigation equipment. This equipment can be purchased or rented.
Infrastructure costs: Identification of the infrastructure required for the agroforestry system and its estimated cost, such as fencing, windbreaks, or irrigation systems.

Water management costs: The costs associated with installing or modifying the irrigation system when irrigation is required. This may include pipes, pumps, and other necessary equipment.
Labour costs: Where applicable, labour costs for planting, weeding, and maintenance.
Education and training costs: The farmer may consider the need for education and training, including workshops, seminars, or hiring consultants. Investing in training programmes or consultants to properly implement agroforestry techniques can be a significant up-front cost.
Long-term planning and monitoring costs: Costs associated with developing a long-term management plan and implementing monitoring and evaluation systems.
Legal costs: Costs associated with obtaining permits and complying with existing regulations.
Insurance: Funds allocated to insure against crop and tree failure, weather-related risks or unforeseen events.
Contingency: Include a contingency fund to cover unforeseen circumstances or additional costs that may arise during the project. This could be a reserve fund for unexpected expenses or emergencies.
Monitoring and evaluation: Costs of monitoring progress and evaluating the performance of the agroforestry system.

Table 3: Potential costs associated with the establishment of agroforestry systems. Source: Author's own elaboration drawing on COWI, the Ecologic Institute, IEEP (2021) and Guimarães et al. (2023).

To be effective and remove up-front financial barriers, the initial payment rate should cover all the estimated costs of establishing the agroforestry system**.** Costs can vary widely depending on the scale of the project, the agroforestry system, the geographical location, and the specific requirements of the site. Careful planning and budgeting are therefore essential to ensure that all necessary costs are considered when establishing an agroforestry system. In addition, it is important to carry out a thorough project-specific analysis to identify any additional costs that may apply to the particular circumstances of the agroforestry system being implemented.

5.1.2 Potential sources of funding to cover the costs of setting up MRV systems

Various sources, including project developers, funders and external verification bodies can cover the costs associated with MRV systems in agroforestry projects.[9] The specific arrangements for funding MRV activities will depend on the type of agroforestry project, the entities involved, and the required certification standards or funding programmes. Setting and maintaining the MRV system involves conducting baseline measurements and data collection, collecting monitoring data over time, verifying results and producing regular reports. The developer of an agroforestry project can be an individual farmer, a group or association of farmers, an NGO, a government agency, or a private company. A "developer" in the context of an agroforestry project refers to the entity or individual responsible for initiating, planning, implementing, and managing the project. In some cases, farmers may contribute to the cost of MRV, especially for small-scale projects. They may make a direct financial contribution and participate in the data collection or allocate part of the income generated from agroforestry products to monitoring and verification activities.

[9] COWI, Ecologic Institute and IEEP (2021). Technical Guidance Handbook: Setting up and implementing result-based carbon farming mechanisms in the EU. Report to the European Commission, DG Climate Action, under Contract No. CLIMA/C.3/ETU/2018/007. COWI, Kongens Lyngby. Available at: https://www.ecologic.eu/18122

In summary, there are several possible ways to cover the costs of the MRV system:[10]

- **Project developer:** The project developer can cover the costs of designing, implementing, and maintaining the MRV system.
- **Third-party verification bodies:** External verification bodies can be involved in verifying the results and impacts of agroforestry projects. Project developers can hire the verification body and pay for the services provided.
- **Public funding:** Government support and public funding under the CAP for sustainable practices and environmental conservation can provide funding for agroforestry projects, including the implementation and maintenance of MRV systems.
- **Agri-food companies in the supply chain:** When agroforestry projects are part of supply chain sustainability programmes, agri-food companies can invest in robust MRV systems to ensure the positive environmental and social impacts of their supply chains.
- **Certification standards and carbon markets:** Agroforestry projects participating in certification schemes (e.g., Verified Carbon Standard) require MRV systems. The costs associated with MRV can be covered by the income generated from the sale of carbon credits.

Ensuring the financial sustainability of MRV systems is essential for successfully implementing any agroforestry project. The optimal financing arrangements for MRV activities may vary depending on the scale of the project and the requirements of certification standards or funding programmes.

5.1.3 Potential public financing mechanisms

After identifying the costs associated with establishing an agroforestry system, this subsection outlines potential (non-market) public and private financing mechanisms that can be used to cover these costs.

The CAP (2023-2027)

Under the CAP (2023-2027), Member States can design their support schemes by combining the different policy instruments. The CAP's green architecture provides different instruments to support climate and environmental objectives. These include, for example, enhanced conditionality and eco-schemes as direct payments under Pillar I and rural development measures under Pillar II.

The CAP can support the adoption of agroforestry systems through its pillars I and II.

Pillar I (Direct payments)

Eligibility conditions

Farmers must meet several eligibility conditions to receive income support:[11]

- Their farm must be located in the EU.
- The minimum requirements to receive income support must be met. Income support is not granted for less than € 100 to € 500 (depending on the EU country) and/or if the eligible area is less than 0.3 to 5 hectares.

[10] COWI, Ecologic Institute and IEEP (2021). Technical Guidance Handbook: Setting up and implementing result-based carbon farming mechanisms in the EU. Report to the European Commission, DG Climate Action, under Contract No. CLIMA/C.3/ETU/2018/007. COWI, Kongens Lyngby. Available at: https://www.ecologic.eu/18122

[11] European Commission (n.d.). Agriculture and rural development Income support explained. Available at: https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/income-support-explained_en

- They must carry out an agricultural activity (e.g., production, rearing or growing of agricultural products, maintaining land in good agricultural condition) on the agricultural area (e.g., encompassing arable land, permanent crops and grassland) at their disposal.
- They must meet the mandatory definition of "active farmer". The EU countries define the requirements, which relate to minimum levels of agricultural activity, lists of ineligible economic activities, pluri-activity/part-time farmers, and administrative burden reduction.

Conditionality

Receiving support from Pillars I is conditional on compliance with statutory management requirements (SMRs) and conditionality rules aimed at maintaining land in good agricultural and environmental conditions (GAECs).[12] The CAP (2023-2027) includes strengthened conditionality with "greener" requirements.

Under the previous CAP, farmers received green direct payments for carrying out three practices: Crop diversification, the maintenance of permanent grassland, and the dedication of land to ecological focus areas (EFAs.) These practices are now incorporated into new conditionality rules in the current CAP. These include, for example, GAECs on soil protection and quality and on biodiversity and landscape.

Income support schemes

Direct income support through eco-schemes can encourage agroforestry initiatives.

- **Eco-schemes:** Provide direct payments for adopting environmentally friendly practices such as agroforestry.[13] They can provide specific payments for establishing agroforestry systems, which can help finance the costs of land preparation, purchase of planting materials, and infrastructure development. While eco-schemes payments may not cover all up-front costs, they can provide initial financial support to start an agroforestry project.

Other CAP direct income support schemes can provide payments to farmers based on the area of eligible agricultural land they hold. These schemes aim to stabilise farmers' incomes and are not explicitly designed to finance specific on-farm activities. However, farmers could receive basic payments if they integrate agroforestry practices on their eligible land. Basic payments can, therefore, indirectly support the establishment of agroforestry systems.

Two direct income support schemes in the CAP (2023-2027) can indirectly cover part of the up-front costs associated with establishing an agroforestry system.

- **Basic income support for sustainability (BISS):** An annual payment is granted for each eligible hectare declared by the farmers.[14]
- **Complementary income support for young farmers (CISYF):** Provides additional support to young farmers setting up for the first time, provided they are eligible for basic income support. This support may take the form of income or, investment support, or start-up aid.[15]

[12] European Commission (n.d.). Agricultural and rural development Conditionality. Available at: https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/conditionality_en
[13] European Commission (n.d.). Agriculture and rural development Eco-schemes.
Available at: https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/eco-schemes_en
[14] European Commission (n.d.). Agriculture and rural development The basic income support for sustainability (BISS).
Available at: https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/biss_en
[15] European Commission (n.d.). Agriculture and rural development Young farmers.
Available at: https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/young-farmers_en

Table 4 provides a description of BISS and CISYF, including their features and applicability.

	Basic income support for sustainability	Complementary income support for young farmers
Type	Public	Public
Climate action	General	General
Mandatory/voluntary	Mandatory for Member States, voluntary for farmers	Voluntary for Member States and farmers
Funding	Pillar I (EU budget)	Pillar I (EU budget)
Payment basis	Per eligible hectare	Per eligible hectare
Support calculation	An annual payment is granted for each eligible hectare declared by the farmers	The support takes the form of an annual payment per eligible hectare or an annual lump sum
Commitment period	Annual	Annual
Minimum spending requirement	Income support is not granted for amounts of less than € 100 to € 500 (depending on the EU country) and/or if the eligible area is less than 0.3 to 5 ha	Member States must allocate at least 3% of their direct payments budget to support young farmers
Financial cover	Up-front costs (indirectly)	Up-front costs (indirectly)
Payment	Cash	Cash
MRV requirements	None	None

Table 4: Direct Income support schemes under CAP Pillar I. Source: Author's own elaboration based on European Commission (n.d.).

Eligibility for the BISS mechanism is a condition for receiving support under the direct payment schemes. A payment for small farmers, not exceeding EUR 1'250 per year, may be granted as a lump sum or on per hectare.[16] These payments are optional for farmers and replace all other forms of direct payments.

Pillar II (Rural development)

Pillar II (Rural development) reinforces the "first pillar" by strengthening the social, environmental and economic sustainability of rural areas. Within the rural development programmes (RDPs), agroforestry can be explicitly supported as a measure, and funds can be allocated for the establishment of agroforestry systems. The regulation on CAP strategic plans foresees eight types of interventions for rural development. Five interventions are particularly well suited to support agroforestry:[17]

- **Environmental, climate and other management commitments (Article 70):** Member States shall determine the annual payments to be made based on the additional costs incurred and income foregone resulting from the commitments made. Agri-environmental-climate measures (AECMs) promote environmentally friendly farming practices and can include support for agroforestry projects that contribute to biodiversity, soil health, and climate change mitigation. Financial support could cover some of the initial costs of agroforestry systems, such as purchasing planting materials and implementing infrastructure.

[16] European Commission (n.d.). Agriculture and rural development Payments for small farmers. Available at: https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/additional-schemes/payments-small-farmers_en

[17] EUR-Lex (2021). Regulation (EU) 2021/2115 of the European Parliament and of the Council of 2 December 2021 establishing rules on support for strategic plans to be drawn up by Member States under the common agricultural policy (CAP Strategic Plans) and financed by the European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD) and repealing Regulations (EU) No 1305/2013 and (EU) No 1307/2013. Available at: http://data.europa.eu/eli/reg/2021/2115/oj

- **Natural or other areas with natural constraints (Article 71):** Farmers practicing agroforestry in areas with natural constraints may receive income support (annual payment per hectare) to compensate for the disadvantages caused by these constraints.
- **Area-specific disadvantages resulting from certain mandatory requirements (Article 72):** Member States can make annual payments per hectare to farmers to compensate for area-specific disadvantages resulting from certain mandatory requirements. The payments are granted annually per hectare and compensate for all or part of the additional costs and income foregone resulting from the area-specific disadvantages in the area concerned.
  Investments (Articles 73 and 74): Member States may grant support for the establishment and regeneration of agroforestry systems with rates of support for investments up to 100%.
- **Setting-up of young farmers and new farmers and rural business start-ups (Article 75):**
- Member States may grant support for the setting-up of young and new farmers and for the start-up of rural businesses, including for new agroforestry projects.

Farmers can benefit from direct payments offered through eco-schemes under Pillar I and specific AECMs and investment measures under Pillar II of the CAP, which can provide more substantial financial support for the establishment of agroforestry systems. In addition, eligible farmers can receive direct payments per hectare of land under agroforestry through BISS and CISYF, as well as financial support for implementing agroforestry in areas with natural constraints or disadvantages resulting from certain mandatory requirements. Although these payments are not intended to support the establishment of agroforestry systems, they can indirectly cover part of these costs.

State aid

State aid is another public financing option for agroforestry, as it can complement or reinforce the CAP measures. The agricultural State aid guidelines help EU countries to correctly apply EU rules on state subsidies in agriculture, forestry and rural areas.

Most categories of agricultural State aid target key features related to agroforestry, although only a few explicitly mention agroforestry. Research and development in the agricultural and forestry sectors includes a state subsidy for establishing agroforestry system projects "Agroforestry systems (limited to € 7.5 million per agroforestry system establishment project)".[18]

Agroforestry is mentioned several times in the EU Guidelines for State aid in the agricultural and forestry sectors and in rural areas.[19] Some key examples are given below:

- 2.1.2. Aid for the establishment, regeneration or renovation of agroforestry systems

*o (509) "The Commission will consider aid for the establishment, regeneration or renovation of **agroforestry systems** compatible with the internal market under Article 107(3), point (c), of the Treaty if it complies with Part I, Chapter 3, of these Guidelines and with the conditions set out in this Section."*

*o (510) "The aid may be granted for establishing **agroforestry systems** as defined in point (33)(10)."*

*o (511) "The aid covers the costs of the establishment, regeneration or renovation of an **agroforestry system** and an annual premium per hectare may be granted to cover the costs of the maintenance, for a maximum period determined by the Member State."*

[18] EUR-Lex (2022). Commission Regulation (EU) 2022/2472 of 14 December 2022 declaring certain categories of aid in the agricultural and forestry sectors and in rural areas compatible with the internal market in application of Articles 107 and 108 of the Treaty on the Functioning of the European Union. Available at: http://data.europa.eu/eli/reg/2022/2472/oj

[19] EUR-Lex (2022). Communication from the Commission Guidelines for State aid in the agricultural and forestry sectors and in rural areas 2022/C 485/01.
Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52022XC1221%2801%29

*o (512) "Member States must determine the structure and composition of the **agroforestry system**, taking account of local pedo-climatic and environmental conditions, forestry species and the need to ensure sustainable agricultural use of the land."*

State aid for agroforestry systems is intended to cover the costs associated with establishing, regenerating, or renovating such systems. The following costs are eligible:[20]

- Article 42: Aid for agroforestry systems

- *a) the costs for planting trees, including the costs of the plantation material, the plantation, the storing and the treatments of seedlings with the necessary prevention and protection materials;*
- *b) the costs for converting existing forests or other wooded land, including the costs for felling trees, thinning and pruning and protection against grazing animals;*
- *c) other costs directly linked to the establishment, regeneration or renovation of an agroforestry system, such as costs for feasibility studies, establishment plan, soil examination, soil preparation and protection;*
- *d) the costs of silvopastoral, namely grazing system, watering and protective facilities;*
- *e) the costs of the necessary treatment connected to the establishment, regeneration or renovation of an agroforestry system, including watering and cutting;*
- *f) the costs for replanting during the first year after the establishment, regeneration or renovation of an agroforestry system.*

The annual premium per hectare granted under the aid covers the maintenance costs of the agroforestry system for a maximum period of 12 years from the date the aid is granted.

Table 5 describes the features and applicability of the "Aid for the establishment, regeneration or renovation of agroforestry systems".

	Aid for the establishment, regeneration or renovation of agroforestry systems
Type	Public
Climate action	General
Mandatory/voluntary	Voluntary for countries
Funding	State subsidies
Payment basis	Per eligible hectare
Support calculation	Initial payment for the costs of establishing an agroforestry system and an annual premium per hectare for the maintenance costs for a maximum period determined by the Member State
Commitment period	Annual or multiannual
Minimum spending requirement	None
Financial cover	Up-front and ongoing costs
Payment	Cash
MRV requirements	Vary between countries

Table 5: Features and applicability of the "Aid for the establishment, regeneration or renovation of agroforestry systems". Source: Author's own elaboration based on EUR-Lex (2022).

[20] EUR-Lex (2022). Commission Regulation (EU) 2022/2472 of 14 December 2022 declaring certain categories of aid in the agricultural and forestry sectors and in rural areas compatible with the internal market in application of Articles 107 and 108 of the Treaty on the Functioning of the European Union. Available at: http://data.europa.eu/eli/reg/2022/2472/oj

Other sources of public funding

Several other public funding sources can provide a range of income support for establishing agroforestry systems. These include, for example:

- **National or local governments** can provide grants and subsidies to promote sustainable agriculture and environmental conservation. This can include support for agroforestry projects, which can help offset some of the initial costs.
- **Research institutions and universities** may offer grants or partnerships for agroforestry research and pilot projects.

Farmers and landowners interested in accessing these funding sources should contact the relevant entities to find out about the eligibility criteria, application procedures, and support options that are available.

5.1.4 Potential private financing mechanisms

In addition to public financing mechanisms, several private sector entities can provide financial support to cover part of the up-front costs farmers face in an agroforestry project.[21]

- **Agri-food companies in the supply chain** can establish partnerships with farmers to support agroforestry initiatives. This can include financial support, technical assistance, and long-term commitments to purchase products from agroforestry systems. Agri-food companies can work with farmers to create financing mechanisms that support sustainable practices, including funding for agroforestry projects aligned with the company's sustainability goals.
- **Impact investors** are private individuals or organisations that invest in projects that deliver environmental and social benefits, while generating a financial return. They can fund agroforestry projects that align with their environmental and social objectives.
- **Private banks** can finance agroforestry projects through loans or other financial instruments, providing the capital needed to establish an agroforestry system. Their funding may be conditional on projects demonstrating financial viability and contributing to sustainability.
- **Some private foundations and NGOs** focus on sustainable agriculture, climate change, or biodiversity conservation and may offer grants or financial support for agroforestry initiatives.

5.1.5 Optimising finance: Combination of public and private funding for agroforestry

Covering all the costs associated with the establishment of an agroforestry system is a major challenge. Up-front costs include a range of costs, from site assessment to infrastructure development, and require careful planning and financial allocation. This subsection has identified the potential costs associated with agroforestry projects and existing financing mechanisms and policies. A wide range of funding sources has been examined, from public mechanisms such as the CAP and State aid, to private sector involvement through agri-food companies in the supply chain. Overall, the study shows the importance of combining public and private financing mechanisms to create a robust financial framework for agroforestry. By optimising these options, farmers can overcome the initial financial barriers to agroforestry adoption and pave the way for the sustainability of these practices.

[21] A more detailed description of private sources of funding can be found in COWI, the Ecologic Institute and IEEP (2021) and McDonald et al. (2021).

5.2 ADVISORY SERVICES

Advisory services are essential for the effective planning, implemention and management of agroforestry projects. According to Article 15 of the proposed regulation on CAP strategic plans, Member States should include farm advisory services in their CAP strategic plans, covering economic, environmental and social dimensions. These services should provide impartial advice and involve stakeholders, farm advisors and researchers, emphasising innovative practices such as agroforestry. These services can cover a wide range of activities, including training and capacity building, support to farmers for initial establishment, site selection and planning, tree species selection, planting techniques, soil management, pest and disease management, water management, monitoring and evaluation, community engagement, policy awareness and post-project support.

The following entities can provide advisory services to farmers, aiming to help them make informed decisions, adopt best practices, and overcome challenges related to agroforestry:

- **Agricultural extension services** provide technical advice and support to farmers (e.g., guidance on agroforestry practices, tree selection, planting techniques, and project management).
- **Agri-food companies** can provide advisory services to support agroforestry initiatives and projects in their supply chains.
- **Private consultants or companies** specialising in agriculture, forestry, agroforestry, or environmental services may be contracted by agroforestry projects to provide advisory services.
- **NGOs** working in agriculture, environment, and sustainable development often have programmes that provide advisory services to farmers and may allocate resources to support extension services. They can provide technical expertise and assistance, training sessions, and on-the-ground support for agroforestry initiatives.
- **Research institutions and universities** conduct studies on agroforestry practices. Farmers can benefit from collaborating with researchers who can provide evidence-based advice and share the latest scientific knowledge on agroforestry.
- **National or local government agricultural agencies** can provide funding for advisory services as part of their agricultural development programmes.

Several public policies can also support countries in providing advisory services to farmers:

- **The CAP** includes rural development measures related to knowledge exchange, training, capacity building, and advisory services. National authorities can allocate funds for advisory services as part of their strategic plans to support agroforestry projects. Under the regulation on CAP strategic plans, “Knowledge exchange and information” (Article 78) provides that Member States may grant support for advisory services, training and knowledge exchange in agriculture and forestry and for the development of rural businesses and communities.
- **State aid:** Under “the categories of aid for research and development in the agricultural and forestry sectors”, there is a state subsidy for the establishment of agroforestry system projects “Agroforestry systems (limited to € 7.5 million per agroforestry system establishment project)”. State Aid can therefore be used to fund research projects or pilot programmes aimed at developing and promoting agroforestry practices. This can support farmers by providing valuable knowledge, training, or resources to establish and maintain agroforestry systems.

Establishing advisory services requires technical expertise, local knowledge, community involvement and policy support. Farmers can access advisory services by working with multiple stakeholders and building partnerships that provide them with the knowledge and skills needed to effectively implement and manage their agroforestry projects. Successful agroforestry practitioners can also provide valuable advice and share their experiences, thus promoting knowledge sharing among farmers through peer-to-peer learning. Developing a network of qualified agroforestry advisors is therefore a high priority.

5.3 ACTION-BASED PAYMENTS

Succesful management of agroforestry systems requires accurate estimation and effective management of the ongoing costs associated with adopting or changing land management practices. This subsection examines the potential ongoing costs of agroforestry projects and explores potential public and private financing mechanisms and policies to support the maintenance of these systems.

5.3.1 Costs associated with the management of agroforestry systems

The management of agroforestry systems includes various activities such as tree maintenance, soil and land management, labour, monitoring and evaluation, training, insurance and administrative costs. Drawing on EUR-Lex (2022) and Guimarães et al. (2023), this subsection provides an understanding of the wide range of costs associated with the management of agroforestry systems.

Table 6 provides a list of potential costs associated with the management of agroforestry systems.

Tree maintenance: Regular maintenance such as pruning, mulching, watering, and tree protection. This may include labour costs and expenditure on tools or machinery needed for maintenance.
Soil management: Costs associated with soil testing, fertiliser, and amendments to maintain soil health and fertility.
Land preparation and management: Land preparation costs, including clearing, planting, and soil conservation measures.
Seedlings and planting materials: Costs of purchasing materials and planting tree seedlings.
Labour costs: Payment for hired farm workers involved in day-to-day management, planting, and maintenance tasks.
Water management: Expenses for irrigation systems, water access, or drainage management to ensure adequate water supply for trees and crops.
Monitoring and evaluation: Costs associated with evaluating project progress, measuring environmental impacts, and meeting monitoring requirements.
Training and education: Investment by farmers in participating in training or education programmes to ensure proper understanding and implementation of agroforestry techniques.
Insurance and contingency: Funds set aside for unforeseen events such as natural disasters, weather-related events, crop and tree failures, or market fluctuations.
Administrative costs: Costs for administrative tasks, permits, licences, and project management.
Certification or compliance: Costs associated with meeting certification standards or complying with environmental regulations, where applicable.
Opportunity costs: The potential income that could have been earned from other land uses, especially if the land is dedicated solely to agroforestry.

Table 6: Costs associated with the management of agroforestry systems. Source: Author's own elaboration, drawing on EUR-Lex (2022) and *Guimarães et al. (2023).*

5.3.2 Estimating ongoing costs and financial planning strategies

A proper estimation of these ongoing costs, efficient financial planning and access to multiple sources of funding are essential to effectively cover the ongoing costs of an agroforestry project. Several targeted strategies can be used to ensure that these ongoing costs are fully covered:

- Prepare a detailed budget outlining all expected expenditures over the project's five-year life, including categories such as labour, materials, maintenance, and contingency plans.
- Secure funding from various sources, such as the CAP, national grants and subsidies, and private sector partnerships, to reduce reliance on a single source and mitigate financial risks.
- Establish long-term agreements or contracts with private sector stakeholders such as agri-food companies in the supply chain to ensure a steady income stream for ongoing expenditure.
- Set aside a portion of the initial funding as a reserve specifically for the ongoing maintenance of the agroforestry system and unexpected costs that may arise during the project.
- Continually monitor the progress and financial situation of the project and adjust plans or seek additional funding if expenses exceed projections or unexpected costs arise.

By using a combination of these strategies, farmers can better ensure that all the ongoing costs of projects are sufficiently covered to enable the project to be implemented over a five-year period.

5.3.3 Potential public financing mechanisms

The CAP (2023-2027)

The CAP is the most appropriate policy for action-based payment mechanisms. Eco-schemes (Pillar I) and AECMs (Pillar II) are well suited for financing the ongoing costs of agroforestry projects by directly supporting sustainable land management practices through annual action-based payments.

Pillar I (Direct payments)

- **Eco-schemes** consist of payments per hectare granted to farmers who carry out practices that specifically contribute to climate and environmental objectives. The payment may either compensate for the additional costs and income foregone associated with a given practice or be an incentive payment on the top of the basic income support. Payments under eco-schemes are in principle granted annually and only on agricultural land eligible for direct payments. As CAP direct payments are made in advance, eco-schemes are generally considered action-based. This policy instrument can help to finance the ongoing costs of agroforestry projects by providing guaranteed action-based payments to farmers who introduce and maintain agroforestry systems for their presumed environmental benefits.

The European Commission has published a list of potential agricultural practices, including agroforestry, that can be financed through eco-schemes under the current CAP.

Eligibility: Farmers participating in eco-schemes that focus on agroforestry may be required to meet specific climate and environmental benefits criteria. This could include maintaining and implementing agroforestry systems that enhance biodiversity, soil health, and carbon sequestration.

Pillar II (Rural development)

- **AECMs** include measures to support environmentally friendly practices such as agroforestry. These policy measures can offer multi-annual guaranteed action-based payments to farmers

for introducing and maintaining agroforestry systems for their presumed environmental benefits. Payments are calculated based on the additional costs incurred and income foregone and are therefore suitable for funding the ongoing costs of agroforestry projects.

Eligibility: Farmers may need to demonstrate the integration of agroforestry in a way that makes a positive contribution to climate and environmental objectives.

Table 7 provides a description of eco-schemes and AECMs with their features and applicability.

	Eco-schemes	**AECMs**
Type	Public	Public
Climate action	Climate and environment	Climate and environment
Mandatory/voluntary	Mandatory for Member States, optional for farmers	Mandatory for Member States, optional for farmers
Funding	Pillar I (EU budget)	Pillar II (EU and Member States budgets)
Payment basis	Per eligible hectare	Per eligible hectare
Support calculation	Compensation for induced costs or income foregone or fixed top-up payment to decoupled payments	Compensation for induced costs or income foregone
Commitment period	Annual or multiannual	Multiannual (usually 5 years)
Minimum spending requirement	At least 25% of Pillar I budget	At least 35% of Rural Development funds to be allocated to measures to support climate, biodiversity, environment and animal welfare
Financial cover	Up-front and ongoing costs, potential for result-based payment	Up-front and ongoing costs, potential for result-based payment
Payment	Cash	Cash
MRV requirements	Low-medium	Low-medium

Table 7: Features and applicability of the eco-schemes and AECMs. Source: Author's own elaboration based on Guyomard et al. (2023) and European Commission (n.d.).

- **Research and innovation funding:** The CAP can provide funding for pilot projects with sustainability objectives, such as agroforestry, which can indirectly cover part of the farmers' ongoing costs associated with the land management practices implemented.
- **Agroforestry agreements or contracts:** The CAP can provide a range of practice-based land management contracts for specific carbon farming practices, such as agroforestry, which could help fund projects' ongoing costs.

Other sources of public funding

Other public funding sources such as State aid for agroforestry systems and research institutions and universities can potentially finance part of the ongoing costs of an agroforestry project.

- **State aid for agroforestry systems** is intended to cover the costs associated of establishing, regenerating, or renovating such systems. The annual premium per hectare is provided as part of the aid and covers the maintenance costs of the agroforestry system for a maximum period of 12 years from the date the aid is granted. It supports measures such as weeding, pruning, thinning and investment in protection.
- **Research institutions and universities** can offer grants or partnerships for agroforestry research or pilot projects, which can indirectly finance part of farmer's ongoing costs.

5.3.4 Potential private financing mechanisms

In addition to public financing instruments, private sector entities can also contribute to payments to farmers for implementing agroforestry practices for their presumed environmental benefits.[22]

- **Agri-food companies** can finance the ongoing costs of agroforestry projects in their supply chain by offering incentives such as long-term agreements or contracts with guaranteed payments to farmers.

Table 8 describes the features and applicability of the corporate supply chain.

	Corporate supply chain
Type	Private
Climate action	General
Mandatory/voluntary	Voluntary for agri-food companies and farmers
Funding	Determined by the agri-food company
Payment basis	Determined by the agri-food company
Support calculation	Generally, long-term contracts or agreements with guaranteed payments
Commitment period	Annual or multiannual
Minimum spending requirement	Determined by the agri-food company
Financial cover	Up-front and ongoing costs, potential for result-based payments
Payment	Cash
MRV requirements	Low-medium

Table 8: Features and applicability of the corporate supply chain. Source: Author's own elaboration based on COWI, the Ecologic Institute and IEEP (2021) and McDonald et al. (2021).

5.3.5 Securing funding for the costs associated with the management of agroforestry systems

A proper estimation of all ongoing costs of agroforestry projects is essential for the successful management of agroforestry systems. These ongoing costs can be financed through both public and private financing mechanisms. Public funding sources, particularly the eco-schemes (Pillar I) and AECMs (Pillar II) of the CAP, can provide guaranteed annual action-based payments to farmers adopting agroforestry practices. While these instruments can contribute financially to the maintenance of agroforestry systems, they may not always cover all ongoing costs of projects. As a result, a combination of different funding sources is often needed to ensure the effective management of agroforestry systems. Private sector involvement is essential, with agri-food companies able to offer farmers long-term agreements or contracts with guaranteed payments. By estimating ongoing costs and accessing multiple sources of funding from the public and private sectors, agroforestry projects can become economically viable for farmers and ensure the long-term provision of ecosystem services.

In addition to these public and private financing mechanisms, farmers can also generate income from various sources, including food production, timber and non-timber forest products. By integrating crops, trees, and/or livestock, agroforestry systems can produce diverse products that farmers can sell to local or wider markets. This diversified production not only improves food security but also provides an additional source of income to supplement action-based payments received under the scheme.

[22] McDonald, H., Frelih-Larsen, A., Lorant, A., Duin, L., Pyndt Andersen, S., Costa, G. and Bradley, H. (2021). Carbon farming - making agriculture fit for 2030. In Study for the committee on environment, public health and food safety (ENVI). Policy Department for Economic, Scientific and Quality of Life Policies, European Parliament.
Available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2021/695482/IPOL_STU(2021)695482_EN.pdf

5.4 RESULT-BASED PAYMENTS

Under the scheme, farmers receive an annual action-based payment for adopting agroforestry practices, with an additional result-based payment after five years if environmental benefits are demonstrated. From this perspective, the main challenge is to set fair and transparent payment rates for environmental results, considering the ecosystem services provided, project costs, market conditions and the overall impact on sustainability. This subsection proposes a novel approach to establishing result-based payments based on a flexible payment structure and the use of thresholds for the pre-determined indicators employed to evaluate the project. It introduces an economic valuation method based on the quantification of ecosystem services and describes alternative valuation methods. The subsection then identifies potential public and private financing mechanisms and sources for agroforestry, emphasising their current limitations and potential for integrating payments for ecosystem services. It also highlights how the public and private sectors can ensure continued financial support and advisory services to farmers beyond the agroforestry project. Finally, the next steps and expected future policy changes for the European agroforestry sector are discussed.

5.4.1 Proposed approach for setting payment rates for environmental results

The proposed approach for setting payment rates for environmental results linked to the provision of ecosystem services in an agroforestry project is described below. It outlines the iterative steps of a project leading to its successful implementation and the establishment of payments for environmental results. The scheme aims to make agroforestry systems an economically viable business model for farmers and to encourage them to adopt sustainable agroforestry practices that provide a range of ecosystem services by quantifying and assigning a tangible economic value to these services. This holistic approach requires the development of clear indicators, baseline data collection, measurable thresholds, a flexible payment structure and robust MRV systems to measure on-farm results.

Setting objective and transparent payment rates for ecosystem services requires a collaborative approach between farmers and a range of stakeholders, including funding entities, scientists working to develop measurable indicators and clear thresholds, experts specialising in ecosystem service valuation, and scheme administrators overseeing agroforestry projects. In close consultation with scientists, funding entities set payment rates based on the extent to which pre-determined indicator thresholds are met or exceeded. This collaborative approach can ensure that payment rates accurately reflect the true value of the ecosystem services provided by agroforestry practices and encourage farmers to adopt and maintain land management practices that provide multiple ecosystem services.

<u>Pre-project phase</u>

Identification of environmental objectives

The environmental objectives to be achieved by the agroforestry project are identified. These may include carbon sequestration, biodiversity enhancement, soil conservation, habitat diversity creation, and water quality improvement. This pre-project phase is the basis for aligning the project’s objectives with the compensation framework for farmers.

Development of measurable indicators

Measurable indicators are developed to monitor and evaluate the project's environmental results. These indicators should be reliable, quantifiable, verifiable, and scientifically sound to assess the environmental impact of agroforestry practices. The quantification of ecosystem services and the determination of payment levels for environmental results will be based on these indicators.

Setting clear and measurable thresholds

For each indicator, specific thresholds will be defined that represent the desired level of project performance. These thresholds must be measurable, realistic and based on scientific evidence.

Setting up a MRV system

The project's initial phase involves setting up a robust MRV system for the agroforestry project to accurately monitor, report, and verify the environmental results. It represents a key step in the economic valuation of ecosystem services and will inform fair payment structures based on the results achieved. This includes defining data collection methods and outlining reporting procedures.

Baseline measurement

Before the project starts, a baseline assessment is carried out to collect data on the area where agroforestry is to be implemented. This assessment serves as a reference point for measuring changes and determining the impacts as the project progresses to justify result-based payments.

Identification of appropriate land management practices to achieve the environmental results

The most appropriate land management practices required to achieve the environmental results are identified. This may include the selection of tree species and planting patterns. It is important to select agroforestry practices that have the potential to provide a range of ecosystem services. This requires a careful assessment of the local environmental conditions and available resources.

During project implementation

Project implementation and monitoring

The agroforestry project will be implemented according to the approved project plan. Continuous monitoring of the project using scientific methods is essential to observe activities and collect data regularly. This will include tracking various aspects such as tree planting, soil health, biodiversity, water use, carbon sequestration, and other socio-economic impacts.

Evaluation of the project

Progress against the pre-determined indicators will be evaluated regularly and the project plan will be adjusted as necessary. It is particularly important to assess the impact of agroforestry practices on local ecosystems and to make adjustments over time to optimise the provision of ecosystem services.

Ongoing monitoring and evaluation of the agroforestry practices will contribute to the effective achievement of the project objectives and will inform the compensation structure for the farmers.

After project completion

MRV of ecosystem services provided by agroforestry

Monitoring

A comprehensive monitoring of the project’s results against the established baseline will be carried out. The monitoring process can use various scientific methods, including direct measurement,

modelling or a combination of both. These approaches are subject to peer review and ensure transparent measurement of the environmental changes resulting from the implemented practices.

The monitoring phase measures and quantifies the environmental benefits of agroforestry systems. This may include quantifying carbon sequestration rates, biodiversity indices, soil fertility levels or water quality parameters, which are then subject to verification processes.

Reporting

Regular reporting is essential to document the project progress, challenges faced, achievements made, and any deviations from the original project plan. Reports should include quantitative data, qualitative assessments, and narratives describing the environmental and community impacts of the project.

Verification

The verification process should involve a third-party verification entity or accredited auditors to assess and verify the environmental results achieved. This requires using a robust MRV system to validate the changes in the specific indicators and the results obtained during the monitoring phase.

Overall, each stage of the MRV process plays a key role in ensuring that the agroforestry project develops as planned, delivers the intended benefits, and informs decision-making. In addition, MRV is essential for setting accurate and fair payment rates for environmental results, as it provides a clear link between the ecosystem services provided and the compensation paid to farmers.

Recognising, valuing and rewarding ecosystem services

Once the environmental results have been demonstrated, economic valuation methods can assign a tangible economic value to each ecosystem service provided by agroforestry systems, influencing farmers' payment structure.

The proposed valuation method is based on the quantification of ecosystem services, such as carbon sequestration rates, biodiversity indices, soil fertility levels or water quality parameters. The economic valuation of ecosystem services could also be based on market prices (e.g., carbon credits) or costs.

Payment structure

Payment structure based on performance

Farmers who demonstrate environmental results through MRV will receive result-based payments according to the pre-defined payment structure. As the culmination of all previous steps, result-based payments directly reflect the project's success in achieving its pre-defined objectives.

The proposed payment structure considers the time required for agroforestry practices to deliver measurable environmental results and rewards farmers based on their ecosystem services. The performance-based payment structure offers higher payments to farmers who implement agroforestry practices that deliver significant climate and environmental benefits.

This report proposes a result-based payment structure that links financial incentives or rewards to achieving pre-determined thresholds for each indicator. Meeting or exceeding the thresholds triggers basic payments to the participants involved in the agroforestry project.

The payment mechanism is structured as follows:

- **Result-based payments:** Structure payments to farmers based on the environmental benefits achieved through agroforestry practices. Payments should be directly linked to measured and verified improvements beyond the established baselines or thresholds.
- **Scaled incentives:** By offering higher payments for significantly exceeding pre-determined thresholds in the agroforestry project, farmers are encouraged to strive for performance and contribute to achieving significant environmental and sustainability objectives.

Example

The payment increments are designed according to the degree to which the threshold is met or exceeded. Each percentage point or unit above the threshold will result in an incremental increase in the payment. Farmers will receive higher payments for performance that goes beyond the initial target.

For example, exceeding the threshold by 20% will result in a higher payment than exceeding it by 10%.

- **Rewarding farmers for ecosystem services:** Recognising the ecosystem services of agroforestry practices and rewarding farmers for providing them will be important in scaling up agroforestry. The financing scheme will provide additional payments to farmers who demonstrate significant co-benefits in addition to carbon sequestration.
- **Recognising exceptional performance:** Farmers could receive additional payments for achieving significant environmental enhancements beyond baseline levels. Recognising and rewarding exceptional performance will encourage farmers to adopt land management practices that deliver significant long-term environmental benefits.

No or partial achievement of environmental results

- **Environmental results are not achieved:** If the environmental results of an agroforestry project do not meet the established thresholds, the payment decision may depend on the project objectives, the terms of the agreement between farmers and funding entities, and the context (e.g., specific environmental conditions or feasibility of achieving the objectives).

The payment structure can be designed to accommodate this scenario through two approaches:

  - **Partial payments based on progress**: Make a partial payment that reflects the degree of progress made towards meeting the established thresholds. This recognises the efforts farmers have made to achieve environmental results, even if they have not fully achieved the intended targets. It encourages continuous improvement and recognises partial success.
  - **No payment if thresholds are not met:** No payment is made if the environmental results do not meet the established thresholds. This approach acts as a stronger incentive, signalling the importance of achieving the intended environmental results. It can motivate participants to work harder and take corrective actions during the project to achieve the targets set.

Flexibility and adaptability

Flexibility and adaptability are needed to respond to unforeseen challenges or opportunities. This could include adjusting thresholds if they prove to be unrealistic or modifying payment structures to reflect changing or new circumstances. A flexible payment structure can accommodate different agroforestry systems, farm sizes, and agricultural contexts. The payment structure should also be adapted based on scientific updates, evolving environmental conditions, or policy changes.

Comprehensive documentation

Project development, successes, challenges, results and the MRV process should be fully documented for knowledge sharing, replication, and future project planning. Comprehensive documentation is essential to justify and communicate the basis for result-based payments.

Long-term commitment

Payments to farmers should be made over a longer period to ensure continued commitment to maintaining and improving agroforestry practices beyond the end of the project. This can be achieved through long-term agreements or contracts with public and private sector entities that continuously encourage farmers to improve the ecosystem services provided by their agroforestry practices.

Transparency and accountability

Transparency and accountability mechanisms should be in place to monitor, evaluate, verify, and validate the environmental results achieved on the farm. Criteria for payments linked to the achievement of environmental results should be clearly defined and communicated.

Summary

The proposed approach to setting payment rates for environmental results first identifies the agroforestry project's environmental objectives, such as carbon sequestration and biodiversity enhancement. Measurable indicators with clear thresholds are then developed to assess project performance. A robust MRV system is established to assess environmental benefits against baseline measurements from the initial data collection, which serve as a reference point for measuring changes. Throughout project implementation, ongoing monitoring and evaluation will inform adaptive measures to optimise the performance of the agroforestry system in terms of the provision of ecosystem services. At the end of the project, MRV will ensure accurate measurement of the ecosystem services provided by the agroforestry system, which is an essential step in the economic valuation of ecosystem services, and will inform fair payment structures based on the results achieved. Performance-based payments can encourage long-term commitment from farmers to maintain their land management practices and ensure transparency in environmental impact assessment.

This approach integrates clear indicators, measurable thresholds, a flexible payment structure recognising co-benefits and exceeding targets, a robust MRV to measure on-farm results, and an economic valuation of ecosystem services. It can create the necessary conditions for farmers to adopt agroforestry systems that improve their economic situation and provide ecosystem services.

5.4.2 Economic valuation based on the quantification of ecosystem services

The proposed economic valuation method is based on the quantification of ecosystem services, such as carbon sequestration rates, biodiversity indices, soil fertility levels or water quality parameters. Scientific methods and accurate data are required to measure the quantity and quality of the ecosystem services provided by agroforestry systems. Establishing thresholds for indicators allows for the identification of specific targets or desired levels of ecosystem service provision. These thresholds should be based on ecological standards, scientific evidence and legal requirements.

The performance of the agroforestry system in meeting its environmental objectives can be assessed by comparing measured biophysical metrics with pre-determined thresholds. For example, a threshold could be set based on the desired amount of carbon stored in soils and vegetation per hectare of agroforestry area. Biodiversity indices could have thresholds indicating the minimum level of species

diversity required to maintain a healthy ecosystem. Soil health indicators could include thresholds for nutrient levels or soil organic matter content. In this way, payments for ecosystem services directly link economic valuation to the achievement of specific results on the farm. When biophysical assessments indicate that agroforestry systems have met or exceeded pre-determined thresholds for ecosystem services, farmers receive payments commensurate with their performance, encouraging the adoption of sustainable land management practices. Farmers are motivated to manage their agroforestry systems to provide ecosystem services because higher payments are linked to meeting or exceeding environmental targets. Under this payment structure, farmers receive basic payments for meeting the pre-determined thresholds, with scaled incentives offering higher payments for significantly exceeding these thresholds. For example, if the measured parameter exceeds the threshold by 20%, the economic valuation of the ecosystem service would be higher than if it exceeded the threshold by 10%. Farmers are rewarded for providing ecosystem services beyond carbon sequestration, and exceptional performance above baseline levels can lead to additional payments.

The economic valuation methods outlined in the payment structure apply to climate, biodiversity, soil health and water quality indicators. These indicators represent different ecosystem services provided by agroforestry systems. Farmers can receive one payment for each indicator if they meet or exceed pre-determined thresholds for environmental results. For example, if an agroforestry practice exceeds the thresholds for carbon sequestration, the level of species diversity and soil nutrient levels, the farmer would be eligible for a separate payment for each ecosystem service. This approach can encourage farmers to adopt sustainable practices that enhance multiple ecosystem services by recognising the multifunctionality of agroforestry systems. The payment structure encourages holistic land management practices that contribute to overall environmental sustainability by rewarding farmers for meeting or exceeding thresholds for different indicators. This approach also helps to avoid double counting of payments by ensuring that each payment is specifically linked to the achievement of a pre-determined threshold for each indicator, reflecting a different ecosystem service.

In summary, quantifying ecosystem services and using pre-determined thresholds provide a transparent and objective basis for determining the level of payment rates for the environmental results linked to the provision of a wide range of ecosystem services provided by agroforestry systems. This scientific approach allows farmers to understand the specific environmental criteria they need to meet to qualify for payments for environmental results, which can promote clarity and fairness in the scheme. Finally, as scientific knowledge and environmental targets continuously evolve, indicators and thresholds can be adjusted over time to reflect new standards or targets, ensuring continued incentives for sustainable agroforestry practices and improvements in the provision of ecosystem services.

5.4.3 Alternative economic valuation approaches

Market-based valuation

Some ecosystem services have a market value, and their economic valuation can be based on market prices. For example, carbon credits traded on voluntary markets can provide a market-based valuation of carbon sequestration. The quantified carbon sequestered is converted into tradable units, such as carbon credits, representing the verified environmental result attributable to the agroforestry project. By selling carbon credits to buyers on the voluntary market, farmers or project owners receive a result-based payment proportional to the quantity and quality of the carbon sequestered. Some agreements may include long-term commitments or periodic payments as an incentive to maintain or improve the agroforestry practices implemented during the project. Regarding marketable products, non-timber forest products such as fruits, nuts and medicinal plants harvested from agroforestry systems can also be valued based on their market prices. However, the lack of price stability and the inability of market prices to reflect a wide range of ecosystem services are major limitations of this valuation method.

Costs-based valuation

The economic valuation of the ecosystem services can be based on the calculation of direct and indirect costs incurred by farmers in implementing or changing their land management practices. This approach provides valuable insights into the financial implications of adopting environmentally friendly practices or moving towards sustainable land management systems. By delving into the specifics of these costs, such as operational costs, opportunity costs, income foregone, transaction costs and investment requirements, farmers, policymakers and agroforestry stakeholders can understand the economic considerations involved in promoting sustainable agroforestry practices. A detailed explanation of the cost-based economic valuation approach can be found in Guimarães et al. (2023).

However, an economic valuation based solely on costs often fails to capture the wider societal and environmental benefits of agroforestry practices. By focusing primarily on the direct and indirect costs incurred by farmers , this approach may undervalue the multiple and diverse benefits of agroforestry systems, including their positive impacts on soil health, biodiversity conservation, carbon sequestration and water quality. Thus, while cost-based economic valuation provides valuable insights into financial aspects, it may not fully recognise the holistic value of agroforestry systems, potentially leading to an incomplete understanding of their overall benefits to society and the environment.

5.4.4 Payments for environmental results: Potential public and private financing mechanisms

A sustainable financing scheme for agroforestry needs to consider combining different sources of funding to cover the costs of establishing and managing agroforestry systems, and to remunerate farmers for environmental results. In exploring public financing for payments for environmental results, it is important to consider the potential role of CAP instruments, particularly eco-schemes and AECMs.

Potential CAP instruments

While public instruments such as the CAP can cover a wide range of up-front and ongoing costs of agroforestry through ex-ante and action-based payments, they are not currently explicitly designed to link payments to specific environmental results. To provide direct incentives to farmers, it seems necessary to integrate payments for environmental results into the CAP, such as in eco-schemes under Pillar I and AECMs under Pillar II. These instruments have the potential to be extended to reward farmers for the climate and environmental results they achieve. Integrating payments for environmental results into these CAP instruments can encourage farmers to focus on delivering specific ecosystem services, such as improved biodiversity, soil health, water quality or carbon sequestration. EU countries can promote result-based payment schemes to encourage farmers to achieve significant environmental improvements at a larger scale and in a measurable way.

Other potential public financing instruments

- **Government or public funds:** Public authorities can make payments at the local or national level through direct grants and subsidies for environmental results in agroforestry projects.

Potential private financing instruments for payments for environmental results

In terms of private finance, there are several financing mechanisms and sources, including agri-food companies in the supply chain and the voluntary carbon market. They can play a key role in recognising and rewarding farmers for achieving environmental results.

- **Agri-food companies in the supply chain** with sustainability objectives can play an important role in recognising and rewarding farmers for achieving climate change mitigation and biodiversity co-benefits through their agroforestry practices. They can negotiate long-term

contracts with farmers to compensate them for the ecosystem services they provide. However, financial incentives are not always explicitly linked to the environmental results.

- **Voluntary carbon market:** The sale of carbon credits resulting from carbon sequestration through agroforestry practices can generate payments to farmers. Voluntary carbon markets allow entities to purchase credits or offsets to compensate for their environmental impact, while providing farmers with an income directly linked to the measurable on-farm results.

Table 9 describes the features of the voluntary carbon markets.

	Voluntary carbon market
Type	Private
Climate action	Climate change mitigation
Mandatory/voluntary	Voluntary for farmers
Funding	Predominantly private funding (e.g., private companies, individuals)
Payment basis	Carbon/offset credits
Support calculation	Farmers sell carbon credits for carbon emission reductions/removals achieved (credits equivalent to one metric tonne of carbon dioxide equivalent). Prices may be determined by markets, set through negotiation or fixed in advance
Commitment period	Not specified
Minimum spending requirement	None
Financial cover	Result-based payments
Payment	Freely tradeable offset credits
MRV requirements	High

Table 9: Features of voluntary carbon markets. Source: Author's own elaboration based on COWI, the Ecologic Institute and IEEP (2021) and McDonald et al. (2021).

While voluntary carbon markets are a potential financing mechanism for environmental results, they are insufficient to promote payments for a wide range of ecosystem services.

5.4.5 Ensuring long-term financial support and advisory services for agroforestry

The continued provision of payments and advisory services from both the public and private sectors is essential to ensure the commitment of farmers to maintain the practices implemented during the agroforestry project and to ensure the permanence of the environmental benefits provided.

Action- and result-based payments support farmers who implement and maintain agroforestry systems. Through the eco-schemes and AECMs of the CAP, farmers can receive payments for their efforts, providing a stable income stream that allows them to maintain their sustainable land management practices. Action-based payments compensate farmers for their ongoing efforts, while results-based payments reward them for the environmental results they achieve. By integrating both types of payments into long-term agreements or contracts facilitated by the CAP or private sector entities such as agri-food companies in the supply chain, farmers would receive the support they need to continue implementing their agroforestry practices and improve the provision of ecosystem services.

In addition to financial incentives, advisory services play a key role in sustaining agroforestry practices beyond the project period. By including funding for these services in the national CAP strategic plans and agricultural development programmes, EU countries can ensure the continued provision of advisory services to farmers. Promoting partnerships between farmers, research institutions, NGOs

and private sector actors can also create a collaborative environment conducive to knowledge sharing and advisory support for agroforestry initiatives at local, national and regional levels.

In summary, the establishment of long-term agreements or contracts with public and private entities, offering advisory services and a combination of action-based and result-based payments, is essential to ensure farmers' commitment to continue their agroforestry practices beyond the project period, thereby promoting the environmental sustainability and resilience of agricultural landscapes.

5.4.6 Policy recommendations and expected future changes

This subsection discusses the policy recommendations and expected changes for the European agroforestry sector. Agroforestry can be financed through public financing mechanisms, such as the CAP, private initiatives linked to voluntary carbon markets, the corporate supply chain, or through a combination of these options. A combination of financing mechanisms and sources can diversify the financial support available for agroforestry projects, cover the costs of establishing and managing agroforestry systems, and reward farmers for results.

The CAP instruments can cover farmers' initial and ongoing costs by providing ex-ante and action-based payments for implementing land management practices. However, they are not explicitly designed to link payments to specific environmental results. In addition, the current State aid framework for agriculture and forestry does not include provisions for result-based payments. Voluntary carbon markets allow farmers to be rewarded for measurable carbon sequestration. However, these markets involve price uncertainty and are insufficient to promote payments for a wide range of ecosystem services in agroforestry. An alternative source of private funding can come from the supply chain. Agri-food companies with sustainability objectives can offer long-term agreements or contracts to farmers to reward them for the ecosystem services they provide. However, their financial incentives are generally not explicitly linked to specific environmental results.

In light of these considerations, public sector support is essential to ensure that agroforestry practices are successfully implemented. Integrating payments for environmental results into the CAP, particularly within eco-schemes and AECMs, is essential to build a more effective and targeted approach to support the adoption and maintenance of agroforestry systems with payments for ecosystem services while providing incentives for tangible environmental benefits. In addition, the inclusion of support for result-based approaches in the Guidelines for State aid in the agricultural and forestry sectors could support the development of agroforestry by providing additional financial opportunities for farmers. The development of the EU certificate framework for carbon removals and the possible future integration of agriculture and forestry into the EU Emissions Trading Systems (EU ETS) would be an important step forward in the development of result-based payments for carbon removals from the agriculture, forestry, and agroforestry sectors. This will require strong support and acceptance from the institutions involved in the system and sufficiently robust MRV systems for carbon removals. By attributing a value to nature, the development of a voluntary market for biodiversity credits can also provide an additional source of funding for farmers adopting agroforestry practices that safeguard biodiversity. The biodiversity market would operate similarly to the carbon market, allowing farmers to receive result-based payments for demonstrated biodiversity benefits.

However, it is important to recognise that financing mechanisms and sources can vary considerably from country to country, depending on regional, national and local policies, government support for environmental objectives, market opportunities for payments for ecosystem services, and private sector commitment to sustainable agriculture and environmental conservation. Therefore, multi-stakeholder cooperation is essential to ensure the success and sustainability of any financing scheme for agroforestry. In the coming years, a collaborative approach to agroforestry financing and integrating environmental results into financing mechanisms will be key strategies for promoting sustainable agroforestry practices and ensuring long-term environmental sustainability across Europe.

5.5 Overview of financing mechanisms and sources for agroforestry

This report examined public and private financing mechanisms for agroforestry, emphasising the need to combine different sources of funding to cover the costs of establishing and managing agroforestry systems, rewarding farmers for environmental results, and providing advisory services to farmers.

Table 10 provides an overview of the potential financing mechanisms and sources by payment type.

Payment type	Financing mechanisms/sources
Financing the up-front costs of an agroforestry project (Year: 0) *Farmers receive an initial payment to compensate for planning and initial investment costs*	<u>Potential public financing mechanisms</u> ○ CAP Pillar I: Eco-schemes and other direct income support schemes such as basic income support for sustainability (BISS) and complementary income support for young farmers (CISYF) ○ CAP Pillar II: Agri-environmental-climate measures (Article 70), Natural or other areas with natural constraints (Article 71), Area-specific disadvantages resulting from certain mandatory requirements (Article 72), Investments (Articles 73 and 74) and Setting-up of young farmers and new farmers and rural business start-up (Article 75) ○ State aid for the establishment, regeneration or renovation of agroforestry systems ○ Other: Grants and subsidies from national or local governments, research institutions and universities <u>Potential private financing mechanisms</u> ○ Agri-food companies in the supply chain, impact investors, private banks, some private foundations and NGOs
Advisory services (Years: 1-5) *Farmers receive advice and technical support from a reliable source*	<u>Entities providing advisory services</u> ○ Agricultural extension services, agri-food companies, private consultants or companies, NGOs, research institutions and universities, national or local government agricultural agencies <u>Policies providing advisory services</u> ○ CAP Pillar II (rural development measures), State aid for the establishment, regeneration or renovation of agroforestry systems
Action-based payments (Years: 1-5) *Farmers receive an annual action-based payment to cover ongoing costs*	<u>Potential public financing mechanisms</u> ○ CAP Pillar I: Eco-schemes ○ CAP Pillar II: Agri-environmental-climate measures (AECMs) ○ Other: State aid for the establishment, regeneration or renovation of agroforestry systems, research institutions and universities <u>Potential private financing mechanisms</u> ○ Agri-food companies in the supply chain
Result-based payments (Year: 5) *Farmers receive an additional payment based on results*	<u>Potential public financing mechanisms (to be developed)</u> ○ CAP Pillar I: Eco-schemes ○ CAP Pillar II: Agri-environmental-climate measures (AECMs) ○ Other: Government or public funds <u>Potential private financing mechanisms (to be developed)</u> ○ Agri-food companies in the supply chain, voluntary carbon markets

Table 10: Financing mechanisms and sources by payment type. Source: Author's own elaboration.

6. CONCLUSIONS

This report outlines a sustainable financing scheme for agroforestry, emphasising payments for ecosystem services. With the growing ambition of the European Green Deal to address the current challenges related to climate change, environmental degradation and food security, policy initiatives and sustainable practices are needed to transform the EU into a more resource-efficient economy. As a multifunctional land use, agroforestry could be at the centre of this transition due to its environmental, economic and social benefits. To promote the uptake of agroforestry in Europe, it is essential to develop innovative financial instruments and policies based on payments for ecosystem services, which recognise the co-benefits of agroforestry and reward farmers for providing them.

Section 3 describes the framework for a sustainable financing scheme for agroforestry. The scheme aims to incentivise the adoption and maintenance of agroforestry systems through a hybrid approach combining action-based and result-based payments, tailored to local conditions and farmers' needs. However, the development of such a scheme faces challenges ranging from technical complexity to financial constraints and farmer engagement. To address these challenges, the design of the scheme is guided by key principles such as agroforestry project preparation, objective setting and eligibility, baseline and additionality, permanence, governance, risk mitigation, insurance for farmers, gender and social inclusion, robust MRV systems, and flexible financing mechanisms. It also prioritises farmer and stakeholder engagement, advisory services, recognition of agroforestry co-benefits, and the development of measurable indicators for co-benefits. This framework lays the foundation for a sustainable financing scheme for agroforestry by outlining its key elements and design principles.

Section 4 outlines a sustainable financing scheme for agroforestry that integrates ex-ante payments, action-based payments, result-based payments, and advisory services. It also details the prototype of an agroforestry project and its different phases. The scheme aims to overcome financial and knowledge barriers and ultimately encourage the adoption and maintenance of agroforestry systems. In the pre-project phase, the farmer, with the help of an advisor, prepares an agroforestry project plan, which serves as a detailed roadmap for establishing, managing, financing and evaluating the project. The first year (year 1) focuses on laying the foundation for sustainable land use practices and establishing agroforestry systems. This may include conducting site assessments, collecting baseline data, setting a robust MRV system, capacity building, pilot planting, securing funding, establishing partnerships, and maintaining communication with stakeholders. As the project progresses into the subsequent years (years 2-4), activities shift towards managing agroforestry systems. This phase may include scaling up tree planting, community engagement, regular monitoring and evaluation, adaptive management, system optimisation, financial analysis, stakeholder engagement, market linkages, long-term planning, risk management, documentation and reporting. End-of-project activities (Year 5) may include project review, conducting environmental impact assessments, monitoring and verifying environmental results, documenting and reporting findings, and ensuring compliance with standards. After project completion, farmers should continue to maintain the practices implemented and monitor environmental impacts to ensure the long-term sustainability of their agroforestry systems.

Building on this framework, this study proposes a methodological approach structured around six key steps to design and implement a sustainable financing scheme for agroforestry: 1) Identification of environmental results linked to the provision of ecosystem services, 2) Mapping specific land management practices to achieve these environmental results, 3) Estimation of the costs associated with implementing these practices, 4) Development of measurable indicators to assess environmental results, 5) Identification of financing mechanisms and sources, and 6) Setting payment rates for environmental results based on an economic valuation of the ecosystem services.

Section 5 examines potential public and private financing mechanisms for agroforestry, emphasising the need to combine different sources of funding to cover the costs of establishing and managing agroforestry systems, rewarding farmers for environmental results, and providing advisory services to farmers. The study proposes a flexible approach to setting payment rates based on the costs of implementing specific land management practices and an economic valuation of ecosystem services. Establishing agroforestry systems involves a range of up-front costs, from site assessment to infrastructure development, and requires careful planning and financial allocation. By combining

payments from pillars I and II of the CAP, farmers can benefit from direct payments offered through eco-schemes and specific AECMs and investment measures, which can provide more substantial financial support for the establishment of agroforestry systems. In addition, eligible farmers can receive direct payments per hectare of land under agroforestry through BISS and CISYF. There are other direct payments for introducing agroforestry in natural areas with natural constraints or with disadvantages resulting from certain mandatory requirements. Although these payments are not designed to support the establishment of agroforestry systems, they may indirectly cover part of these costs. Other public instruments, such as State aid for agroforestry and private sector involvement through agri-food companies, can also support the establishment of agroforestry systems.

Advisory services are essential for the effective planning, implemention and management of agroforestry projects. These services can cover a wide range of activities, including training and capacity building, assisting farmers with initial establishment, site selection and planning, tree species selection, planting techniques, soil management, pest and disease management, water management, monitoring and evaluation, community engagement, policy awareness and post-project support. Various entities (e.g., agricultural extension services, agri-food companies in the supply chain, private companies and consultants, NGOs, research institutions and universities, and national or local government agricultural agencies) can help farmers make informed decisions. Public policies, such as the CAP rural development measures and State aid for agroforestry, can help countries provide advisory services to farmers. Developing a network of qualified advisors is a high priority and requires technical expertise, local knowledge, community involvement and policy support.

The scheme aims to encourage farmers to adopt and maintain agroforestry practices that enhance environmental sustainability by rewarding them for implementing environmentally friendly practices. The CAP instruments, such as eco-schemes and AECMs, can finance the ongoing costs of agroforestry projects by providing farmers with a guaranteed annual action-based payment for adopting sustainable land management practices for their presumed environmental benefits. State aid for agroforestry can also cover the maintenance costs of agroforestry systems. In addition to public financing instruments, private sector entities such as environmentally committed agri-food companies in the supply chain can contribute to payments to farmers for adopting agroforestry practices.

By quantifying and assigning a tangible socio-economic value to ecosystem services, the scheme aims to incentivise farmers to adopt agroforestry practices that provide a wide range of ecosystem services. This holistic approach requires the development of measurable indicators with clear thresholds, baseline measurement and data collection, a flexible payment structure that recognises co-benefits and exceeding targets, and a robust MRV system to measure on-farm results. While public instruments such as the CAP can cover a wide range of agroforestry costs through action-based payments, they are not explicitly designed to link payments to specific environmental results. As for the private sector mechanisms, voluntary carbon markets involve price uncertainty and are insufficient to promote payments for a wide range of ecosystem services in agroforestry. In addition, financial incentives from agri-food companies in the supply chain are generally not explicitly linked to specific environmental results. In light of these considerations, public sector support is essential to ensure that agroforestry practices are successfully implemented. The integration of payments for environmental results into the CAP, in particular within eco-schemes and AECMs, is essential to develop a more effective and targeted approach to support the adoption and maintenance of agroforestry with payments for ecosystem services, while providing incentives for tangible environmental benefits.

In summary, the proposed scheme prioritises farmer involvement, flexibility, adaptability and innovation in land management practices, aiming to achieve long-term agricultural and financial sustainability for farmers and environmental sustainability at both national and EU level. The practical application of the scheme in the living labs as part of the ReForest project will ensure real-world case studies and thorough testing of the scheme to tailor it to the needs and local conditions of agroforestry practitioners. The proposed scheme serves as a first step that will require further scientific research to develop accurate indicators, integrate co-benefits, and improve data collection and monitoring systems for the performance of agroforestry systems in terms of the provision of ecosystem services. Finally, multi-stakeholder cooperation and policy development at the EU level, particularly within the CAP, is essential to effectively integrate payments for ecosystem services into existing policies.

APPENDIX 1: REFERENCES AND RELATED DOCUMENTS

ID	Reference or Related Document	Source or Link/Location
1	COWI, Ecologic Institute and IEEP (2021). Technical Guidance Handbook: Setting up and implementing result-based carbon farming mechanisms in the EU. Report to the European Commission, DG Climate Action, under Contract No. CLIMA/C.3/ETU/2018/007. COWI, Kongens Lyngby.	https://www.ecologic.eu/18122
2	den Herder, M., Moreno, G., Mosquera-Losada, R. M., Palma, J. H. N., Sidiropoulou, A., Santiago Freijanes, J. J., Crous-Duran, J., Paulo, J. A., Tomé, M., Pantera, A., Papanastasis, V. P., Mantzanas, K., Pachana, P., Papadopoulos, A., Plieninger, T. and Burgess, P. J. (2017). Current extent and stratification of agroforestry in the European Union. *Agriculture, Ecosystems & Environment, 241*, 121-132.	https://doi.org/10.1016/j.agee.2017.03.005
3	Donham, J., Venn, R., Schmutz, U. and Migliorini, P. (2022). Global inventory of current policy contexts, instruments and operational means for the support of mixed farming and agroforestry systems. Deliverable D6.1 for AGROMIX (862993).	https://agromixproject.eu/project/
4	EUR-Lex (2021). Regulation (EU) 2021/2115 of the European Parliament and of the Council of 2 December 2021 establishing rules on support for strategic plans to be drawn up by Member States under the common agricultural policy (CAP Strategic Plans) and financed by the European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD) and repealing Regulations (EU) No 1305/2013 and (EU) No 1307/2013.	http://data.europa.eu/eli/reg/2021/2115/oj
5	EUR-Lex (2022). Communication from the Commission Guidelines for State aid in the agricultural and forestry sectors and in rural areas 2022/C 485/01.	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52022XC1221%2801%29
6	European Commission (n.d.). Agricultural and rural development Conditionality.	https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/conditionality_en

7	European Commission (n.d.). Agriculture and rural development Eco-schemes.	https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/eco-schemes_en
8	European Commission (n.d.). Agriculture and rural development Income support explained.	https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/income-support-explained_en
9	European Commission (n.d.). Agriculture and rural development Payments for small farmers.	https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/additional-schemes/payments-small-farmers_en
10	European Commission (n.d.). Agriculture and rural development The basic income support for sustainability (BISS)	https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/biss_en
11	European Commission (n.d.). Agriculture and rural development Young farmers.	https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/young-farmers_en
12	Feliciano, D., Ledo, A., Hillier, J. and Nayak, D.R. (2018). Which agroforestry options give the greatest soil and above ground carbon benefits in different world regions?. *Agriculture, Ecosystems and Environment*, *254*, 117-129.	https://doi.org/10.1016/j.agee.2017.11.032
13	Food and Agricultural Organisation of the United Nations (2015). Agroforestry.	https://www.fao.org/forestry-fao/agroforestry/80338/en/
14	García de Jalón, S., Graves, A., Palma, J. H. N., Williams, A., Upson, M. and Burgess, P. J. (2017). Modelling and valuing the environmental impacts of arable, forestry and agroforestry systems: A case study. *Agroforestry Systems*, *92,*1059-1073.	https://doi.org/10.1007/s10457-017-0128-z
15	Guimarães, M.H., Pinto-Correia, T., de Belém Costa Freitas, M., Ferraz-de-Oliveira, I., Sales-Baptista, E., da Veiga, J.F.F., Tiago Marques, J., Pinto-Cruz, C., Godinho, C. and Belo, A.D.F. (2023). Farming for nature in the Montado: The application of ecosystem services in a results-based model. *Ecosystem services*, *61*, 1-11.	https://doi.org/10.1016/j.ecoser.2023.101524
16	Guyomard, H., Détang-Dessendre, C., Dupraz, P., Delaby, L., Huyghe, C., Peyraud, J.-L., Reboud, X., and Sirami, C. (2023). How the Green Architecture of the 2023-2027 Common Agricultural Policy could have been greener. *Ambio*, *52*(12), 1327-1338.	https://doi.org/10.1007/s13280-023-01861-0
17	Hajdukovic, I. (2023). Mapping report on agroforestry sector finance and	http://dx.doi.org/10.2139/ssrn.4562798

	policy 1. Deliverable D5.1 of ReForest (grant agreement 101060635).	
18	Hajdukovic, I. (forthcoming). Mapping report on agroforestry sector finance and policy 2. Deliverable D5.2 of ReForest (grant agreement 101060635).	https://czuvpraze.sharepoint.com/teams/fld-t-reforest/Sdilene%20dokumenty/Forms/AllItems.aspx
19	Jacobs, S. R., Webber, H., Niether, W., Grahmann, K., Lüttschwager, D., Schwartz, C., Breuer, L. and Bellingrath-Kimura, S. D. (2022). Modification of the microclimate and water balance through the integration of trees into temperate cropping systems. *Agricultural and Forest Meteorology*, *323*, 109065.	https://doi.org/10.1016/j.agrformet.2022.109065
20	Jose, S. (2009). Agroforestry for ecosystem services and environmental benefits: An overview. *Agroforestry Systems*, *76*, 1-10.	https://doi.org/10.1007/s10457-009-9229-7
21	Kay, S., Graves, A., Palma, J. H. N., Moreno, G., Roces-Díaz, J. V., Aviron, S., Chouvardas, D., Crous-Duran, J., Ferreiro-Domínguez, N., García de Jalón, S., Măcicăşan, V., Mosquera-Losada, M. R., Pantera, A., Santiago-Freijanes, J. J., Szerencsits, E., Torralba, M., Burgess, P. J. and Herzog, F. (2019). Agroforestry is paying off - Economic evaluation of ecosystem services in European landscapes with and without agroforestry systems. *Ecosystem Services, 36*, 100896.	https://doi.org/10.1016/j.ecoser.2019.100896
22	McDonald, H., Frelih-Larsen, A., Lorant, A., Duin, L., Pyndt Andersen, S., Costa, G. and Bradley, H. (2021). Carbon farming - making agriculture fit for 2030. In Study for the committee on environment, public health and food safety (ENVI). Policy Department for Economic, Scientific and Quality of Life Policies, European Parliament.	https://www.europarl.europa.eu/RegData/etudes/STUD/2021/695482/IPOL_STU(2021)695482_EN.pdf
23	Scheid, A., McDonald, H., Bognar, J. and Tremblay, L. (2023). Carbon farming co-benefits: Approaches to enhance and safeguard biodiversity. Ecologic Institute, Institute for European Environmental Policy.	https://www.ecologic.eu/19040