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Economic Performance, Valuation and the Business Case for Agroforestry

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1. MOTIVATION/CHALLENGE

Agroforestry (AF) combines crops and trees in production systems that generate both market outputs and ecological functions. It can deliver fruit, timber, biomass, and annual crops while improving soil structure, nutrient cycling, water retention, and carbon storage. These overlooked ecosystem services (ES) are not merely side benefits but core factors that influence input costs, yield stability, and long-term productivity. As such, they should be explicitly reflected in farm business planning and financial assessment.

In practice, farm performance is still largely measured by annual output and short-term financial indicators. Economic comparisons often focus on gross margins and marketable production, while many ecosystem services regulating functions remain outside conventional market transactions and farm accounts. When regulating ecosystem services — such as soil fertility improvement, water regulation, erosion control, and microclimate regulation — are not accounted for, AF appears less competitive than it may be over the full life cycle of the system. The result is a systematic undervaluation of agroforestry. Existing markets, accounting frameworks, and policy instruments continue to reward short-term production more effectively than resilience, natural capital accumulation, and long-term system performance.

There is also a time/maturity challenge. Establishing AF requires capital, labour, and management changes. In the early years, farmers face higher costs and limited additional revenue, which affects cash flow and risk perception. Without policy mechanisms that address this transition phase, adoption decisions will still be driven by economies of scale and short-term financial pressure rather than by long-term and holistic economic performance.

This policy discussion paper[15] examines how AF economic performance and ecosystem service valuation can be better integrated into EU policy frameworks. It draws on findings from the ReForest project and complementary external literature to identify financial, institutional, and methodological constraints that limit the economic uptake of AF, and to clarify the conditions required for AF to function as a viable farm strategy in the post-2027 CAP context.

2. REFOREST EVIDENCE

Deliverable 3.1 from UCPH provides a quantification and valuation analysis of ES from AF systems compared to monoculture fields across Living Labs. The report shows that AF can improve overall farm revenues relative to monoculture and explains this through two main mechanisms. First, it shows that tree belts make more efficient use of available resources and broaden the range of harvestable products without necessarily creating a crop yield gap. Second, it explores how the presence of trees improves soil properties, thereby enhancing fertility and reducing the need for external

[15] As part of the ReForest Policy Discussion series, this paper aims to support dialogue with panellists, gather targeted input, and help refine priorities for the final Policy Briefs to be released in June.

inputs. Results further suggest that the value of regulating ecosystem services may be more than three times higher than that of marketable provisioning services[16].

Beyond average revenue effects, the report argues that higher levels of diversification increase both product revenues and the capacity to reduce input costs. It notes that diversified production structures can compensate for price fluctuations in individual products and buffer risks associated with extreme weather events. Improved soil conditions are identified as a key factor in reducing yield loss under climate stress, reinforcing the role of AF as a risk-management strategy.

At the same time, the study highlights that economic outcomes also depend on system maturity. Young trees generate limited marketable ES, and the positive effects of AF strengthen over time as ecological functions develop. As a result, many of the most significant benefits of AF take the form of valuable but non-marketed ecosystem services that are not reflected in market prices. This temporal and valuation gap underscores the importance of policy support, including subsidy schemes, to help farmers overcome establishment costs and income foregone during the transition period.

It is also important to note that Deliverable 3.1 focuses primarily on benefit valuation and does not dedicate to considering negative externalities (e.g. pollution, soil degradation, biodiversity loss, pressures on water resources, and broader socio-cultural impacts such as landscape aesthetics, cultural heritage, traditional land-use practices, and recreational values). The report acknowledges that higher labour requirements, investment costs, knowledge requirements, and the lack of tailored machinery can act as barriers to adoption. These cost-side elements require further analysis and are expected to be addressed in upcoming Deliverable 3.3. A complete economic assessment must therefore consider both the quantified ecosystem service benefits and the structural costs associated with system conversion.

3. LITERATURE REVIEW / EXTERNAL SOURCES

The literature reviewed in D5.3 confirms that conclusions about agroforestry's economic performance depend strongly on the valuation framework applied. Studies that rely on comparisons of annual crop yields tend to show limited or mixed financial benefits. Studies that extend the time horizon and integrate non-market ecosystem services reach different conclusions.

Alcon et al. (2024) analyse diversified farming systems across European pedoclimatic regions using short-term gross margin analysis and medium- to long-term cost–benefit approaches. When environmental and socio-cultural benefits are monetised and added to market returns, most diversification scenarios outperform their monocrop reference systems in both short-term margins and medium- to long-term economic benefits. This shows that the choice of time horizon and the valuation of non-market ecosystem services are decisive for assessing the overall economic performance of diversified farming.

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Kay et al. (2019) assess agroforestry at European scale and quantify its carbon sequestration potential. While the study focuses primarily on mitigation effects, its economic relevance lies in demonstrating that agroforestry generates measurable regulating services with potential monetary value. The capacity to reduce cumulative environmental pressures while contributing to climate objectives provides an empirical basis for linking land-use decisions with carbon accounting frameworks.

The *AGFORWARD* research programme adds comparative evidence on agroforestry systems across Europe, showing that AF can enhance regulating ecosystem services, while effects on yields and farm income are more variable and context-dependent. Performance is strongly influenced by site characteristics, system design, management practices, and market access, which supports the view that economic outcomes are not uniform and that profitability hinges on locally adapted configurations.

Thiesmeier and Zander (2023), through a scoping review of temperate agroforestry systems, conclude that AF often performs economically between conventional agriculture and forestry when assessed with conventional financial indicators. In many cases, AF shows lower private financial returns than annual cropping but higher returns than pure forestry, with outcomes highly sensitive to product prices, discount rates, and the presence of policy support or payments for ecosystem services. These findings reinforce that measured economic performance depends on which components are valued, which ES are included, and whether diversification and risk reduction are reflected in the assessment framework.

4. CAP POST-2027 IMPLICATIONS

The proposed CAP for 2028–2034 gives Member States more flexibility in how they design and allocate support. This may help adapt measures to local conditions, but it also increases differences in how economic performance is assessed and rewarded. Similar agroforestry systems could receive very different levels of support depending on national choices.

For AF, the key issue is how ecosystem services are valued in practice. If environmental payments shift toward incentive-based schemes rather than strict cost compensation, payment levels must be linked to clear, measurable outcomes. Without transparent criteria, support risks reflect political priorities more than system performance.

Changes in income support also affect incentives. Member States have room to adjust payment levels within defined limits. This influences baseline income conditions and can either strengthen or weaken the economic case for long-term systems such as agroforestry. Where environmental incentives are modest compared to area-based payments, transition signals remain weak. Where incentives reflect measurable benefits, diversified systems are better recognised.

The new planning structure also means that agricultural measures compete more directly with other national priorities. In this context, AF must demonstrate its economic contribution in practical terms: income stability, input savings, and reduced exposure to climate risks.

Many resilience benefits generated by agroforestry are expressed through avoided costs rather than additional revenues. Improved water retention, reduced soil erosion, lower exposure to droughts and floods, and greater production stability during climate shocks can generate significant economic value. However, these benefits rarely appear in farm accounts, market prices or payment systems because they reflect losses that did not occur rather than revenues that were directly earned.

As climate risks intensify across Europe, improving the assessment of avoided losses may become increasingly important for both public policy and private investment decisions. Recent developments in sustainable finance and corporate reporting may also influence how agroforestry value is assessed. Frameworks such as the EU Taxonomy, the Corporate Sustainability Reporting Directive (CSRD), and nature-related disclosure approaches are increasing attention on natural capital, environmental dependencies and ecosystem impacts. These developments may create new opportunities to recognise forms of value that have traditionally remained outside conventional farm accounting and investment appraisal, including soil health, biodiversity, water regulation, carbon storage and climate resilience.

All that said, three gaps remain central:

- **Quantified ecosystem services are not yet consistently translated into payment levels.**

Many studies and pilot projects now generate robust estimates of carbon sequestration, erosion control, nutrient retention, and biodiversity benefits in AF systems, but these values rarely feed directly into CAP payment calculations. Payment levels are still mostly based on “costs incurred and income foregone” at regional averages rather than on the marginal value of services delivered, which weakens the link between performance and reward. In other words, two farms delivering similar ecosystem benefits can receive very different support, and high-performing agroforestry systems may be paid as if they were only meeting minimum practice requirements.

- **Higher Labour, investment, and machinery costs need to be fully reflected in support design.**

AF establishment involves significant upfront planting costs, additional labour for management, possible loss of short-term cropping area, and often the need for adapted or more complex machinery fleets. Current CAP instruments only partially address these structural costs, typically through generic investment support or area-based payments that do not reflect system complexity. Where payments are calibrated mainly on average income foregone, they may undercompensate farms that take on higher transition risks or management burdens, making AF less attractive than simpler practices that better fit existing machinery and labour organisation.

- **Resilience benefits (such as reduced vulnerability to drought or price shocks) are rarely captured in standard performance indicators.**

Diversified AF systems can stabilise yields over time, reduce dependence on volatile input and output markets, and lower exposure to extreme weather events, yet these effects are not systematically measured or rewarded. In the absence of such resilience metrics, policy comparisons favour systems with high short-term returns and visible output and understate the economic value of AF as a risk-management and climate-adaptation strategy.

The post-2027 framework offers tools that could address these gaps, including transition payments and more flexible environmental actions. Their impact will depend on whether valuation methods are clear, consistent, and linked to measurable results over time.

5. Key Questions for the Post-2027 CAP

How can ecosystem service valuation be translated into payment design in a way that is transparent, proportionate, and operational?

Field-based assessments show that regulating services such as soil fertility, water retention, and carbon sequestration have measurable economic effects at farm level. What criteria should determine how these measurable effects influence payment levels, and how can this be done without creating disproportionate monitoring costs?

How should cost structures be integrated into valuation frameworks? Agroforestry adoption involves labour adjustments, planting investments, machinery adaptation, and management changes. Are current support instruments sufficiently aligned with these structural costs, or do they rely too heavily on benefit-side estimates?

How can resilience be reflected in performance assessment? Diversified systems reduce exposure to price volatility and climate risks, yet most indicators remain centred on annual output. What proxies could capture income stability, input efficiency, and risk reduction in measurable economic terms?

What degree of methodological consistency is needed across Member States? Greater flexibility allows adaptation to local conditions, but it may also lead to uneven economic recognition of similar systems. Should common valuation principles be defined to ensure comparability while preserving national discretion?

How can natural capital accounting frameworks, including the EU Taxonomy, CSRD and nature-related disclosure approaches, help recognise agroforestry value beyond conventional farm accounts?
How can avoided losses, such as reduced drought impacts, erosion costs, flood exposure and yield volatility, be incorporated into economic assessment?

Should resilience be treated as an economic output in its own right, rather than only as an indirect co-benefit?

How should transition support address the timing gap between upfront investment and delayed returns? Agroforestry generates increasing value over time, while establishment costs are immediate. What mechanisms can bridge this gap without distorting long-term incentives?

6. Appendix 1: References and Related Documents

ID	Reference or Related Document	Source or Link/Location
1	Alam, M., Olivier, A., Paquette, A. et al. A general framework for the quantification and valuation of ecosystem services of tree-based intercropping systems. Agroforest Syst 88, 679–691 (2014).	https://doi.org/10.1007/s10457-014-9681-x
2	Alcon, F., et al. (2024). Economic performance of crop diversification systems across European pedoclimatic regions: A social gross margin and cost–benefit analysis approach.	https://doi.org/10.1016/j.scitotenv.2023.169272
3	García-Rubio, V., et al. (2024). Valuing multifunctional agroforestry systems: Beyond traditional market-based assessments	
4	Hagemann, N., et al. (2025). Result-based agri-environmental schemes in Europe: Design features, uptake challenges, and transferability.	
5	Haile, K. K., Tirivayi, N., Tesfaye, W., & Nyikal, R. A. (2019). Farmers' willingness to accept payments for climate-smart agroforestry practices: Evidence from a discrete choice experiment in Ethiopia. Ecological Economics, 166, 106403.	https://doi.org/10.1016/j.ecolecon.2019.106403
6	Kay, S., et al. (2019). Agroforestry creates carbon sinks whilst enhancing the environment in agricultural landscapes in Europe. Land Use Policy, 83, 581–593.	https://doi.org/10.1016/j.landusepol.2019.02.025
7	Mayr, J., et al. (2025). Payments for ecosystem services in agroforestry transitions: Opportunities and limitations for scaling in Europe and beyond.	
8	Tavernier, J., et al. (2024). Stakeholder perceptions of economic incentives for agroforestry in Flanders.	https://doi.org/10.1016/j.agsy.2018.01.004
9	Thiesmeier, L., & Zander, P. (2023). Economic performance of temperate agroforestry systems in Europe and North America: A scoping review. Agroforestry Systems, 97, 1–20.	https://doi.org/10.1016/j.forpol.2023.102939
10	Torralba, M., Fagerholm, N., Burgess, P. J., Moreno, G., & Plieninger, T. (2016). Do European agroforestry systems enhance biodiversity and ecosystem services? A meta-analysis. Agriculture, Ecosystems & Environment, 230, 150–161.	https://doi.org/10.1016/j.agee.2016.06.002