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Incentivising Agroforestry in Germany: An Analysis of Eco-schemes and Investment measures in the Common Agricultural Policy

Master-thesis submitted in partial fulfilment of the requirements for the degree of Master of Science Environmental Governance

by

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List of Abbreviations

AFOLU	Agriculture, Forestry and Other land-use
AFS	Agroforestry Systems
ANK	Aktionsprogramm Natürlicher Klimaschutz
BA	Bavaria
BW	Baden-Wuerttemberg
CAP	Common Agricultural Policy (DE: GAP)
CDR	Carbon Dioxide Removal
Ch.	Chapter
CO_2	Carbon Dioxide
CRCF	EU Regulation on Carbon Removals and Carbon Farming
CSP	Country Specific Plan
DeFAF	Deutscher Fachverband für Agroforst
EC	European Commission
EC3	Eco-scheme 3
e.g.	*exempli gratia*; for example
EU	European Union
EURAF	European Agroforestry Federation
GAK	Gemeinschaftsaufgabe ‘Verbesserung der Agrarstruktur und des Küstenschutzes’
GAP	Gemeinsame Agrarpolitik (EN: CAP)
GHG	Greenhouse Gas Emission
ha	hectare
i.e.	*id est*; that is to say
IM	Investment Measure for Agroforestry (I84, KULAP; StMELF 2023)
LULUCF	land-use, land-use change and forestry
MLR	Ministerium für Ernährung, Ländlichen Raum und Verbraucherschutz Baden-Württemberg (MLR)
MRV	Monitoring, reporting and verification
Mt	Mega tonne
SSD	Self-sustaining societal dynamic
SWOT	Strengths, Weaknesses, Opportunities and Threats

Abstract

Land use practices play a crucial role in addressing climate change by emitting and sequestering significant greenhouse gases (GHGs). Agroforestry systems (AFS), integrating trees with crops and livestock, offer multifunctional benefits and represent a promising land-use based approach to meet EU's climate objectives. Despite their potential, transitioning AFS from a niche practice to the established agricultural system in Germany is hindered by economic, socio-political and regulatory challenges. This thesis assesses the role of policy measures, particularly Eco-scheme 3 (EC3) and Investment Measures (IM), in facilitating this transition within Germany under the Common Agricultural Policy (CAP). It explores the concept of a self-sustaining societal dynamic (SSD) in AFS adoption, operationalised within a SWOT analysis. Qualitative data is collected from policy and legal documents, literature, and semi-structured interviews, and analysed via a qualitative content analysis. The findings reveal that the complementary provision of EC3 and IM is crucial for the adoption of the policy measures and the uptake of AFS. Addressing restrictive eligibility requirements, ensuring design flexibility and planning security for farmers, and optimising funding is necessary to improve adoption rates. To create an SSD towards AFS, coherent policy and regulatory frameworks are needed that align processes and financial incentives to climate and environmental outcomes, foster collaboration among stakeholders, and involve participatory governance. Along with policy changes, this study recommends enhancing societal learning, and strengthening strategic alliances to elicit societal advocacy and drive collective action for AFS among diverse actor groups. Future research should focus on the synergies with other CAP elements and risks associated with carbon farming schemes, conduct a comprehensive mapping of relevant actors and examine approaches to pluralise actor landscapes. Further, the conceptualisation of the SSD should be refined with regards to agricultural transition studies.

1. Introduction

Agriculture, forestry, and other land-use (AFOLU) is reported by the IPCC (2023a) to play a substantial role as a net emitter of greenhouse gas (GHG) emissions (with high confidence). These emissions account for approximately 23% of the overall anthropogenic GHG emissions. Simultaneously, AFOLU acts as a carbon sink that counteracts net emissions, resulting in positive net removals equivalent to 29% of total CO_2 emissions. However, projections of the source/sink balance of land are uncertain due to complex anthropogenic and natural drivers (IPCC, 2023a).

Within the land-use, land-use change, and forestry (LULUCF) regulation (EC 2018/841), the European Commission has established a new target of removing net CO_2 by 310 Mt CO_2eq by 2030 (European Commission, 2022).

The IPCC (2022a) recognises carbon dioxide removal (CDR) as an essential method to compensate for inevitable emissions to achieve net-zero targets. Subsequently, the European Commission (2022a) regards carbon farming as a land management method for CDR that naturally removes carbon on land by engaging in activities that enable carbon storage in living biomass, dead organic matter, and soils and/or reduce the release of carbon into the atmosphere. In fact, removals through natural carbon sinks have been an integral part of the climate strategy for the LULUCF sector. In the past decade, however, the EU has experienced a decline in LULUCF carbon removals (European Parliamentary Research Service [EPRS], 2021), and this trend is expected to continue unless the regulation undergoes revision (EPRS, 2023). In that regard, transitioning land-use systems in a sustainable way to achieve these CDR targets appears to be a pivotal task in the fight against climate change in the AFOLU sector.

As one nature-based solution for CDR, agroforestry systems (AFS) are experiencing a comeback in the EU policy landscape (Hajdukovic, 2023). Agroforestry is a traditional farming practice that combines trees and other woody perennials with crops and/or animals in diverse combinations, offering a wide range of possibilities (Lampkin et al., 2020). The European Agroforestry Association (EURAF, 2023) concludes from calculating the carbon sequestration potential of AFS that AFS-

promoting schemes are likely the most favourable option to achieve the LULUCF targets through the effective and multifunctional combination of forestry and agriculture. Beyond its contribution to climate change mitigation and adaptation, AFS provide multiple socio-cultural, economic, and environmental benefits such as increasing biodiversity, improving water and nutrient cycling, controlling soil erosion, and providing high-value agricultural products that diversify farmers' income streams (Mosquera-Losada et al., 2017; Laporta et al., 2021; McDonald et al., 2021; Smith et al., 2022).

Despite the benefits, it appears that AFS are not gaining momentum, spreading, or achieving the necessary pace to meet the climate neutrality goals by the middle of the century. In the EU, AFS face several technical, economic, and socio-political challenges that hinder the implementation and maintenance of these niche-like land-use systems (Mosquera-Losada et al., 2023; Thiesmeier & Zander, 2023). In particular, the relatively high investment costs for the establishment of AFS can be considered fixed capital for farmers that only recoups over the long-term. Additionally, there is overregulation and a lack of financial valuation through markets, subsidies, and funding of the multiple co-benefits created by AFS. These aspects often result in the frequently weak economic viability of establishing, maintaining, and expanding AFS over long time horizons (Thiesmeier & Zander, 2023). Economic viability, however, is a crucial component for permanent carbon dioxide removal through AFS (Tsonkova & Böhm, 2020). Consequently, scaling AFS as an economically viable agricultural practice requires incentivisation via diverse political approaches.

As an analytical framework to understand dynamics and levels of land-use transitions, the multi-level perspective structures socio-technical transitions into three dynamic and fluid levels: niches, regimes and landscapes (Geels, 2004). Characterised by a *low degree of institutionalisation* and representing alternative practices to the more *coherent* regime (cf. Frank et al., 2024), such as conventional agriculture, AFS are conceptualised to happen on the niche-level. For niches to create path-breaking dynamics, i.e.,for upscaling AFS, they need to integrate into the structure of the regime level (Elsner et al., 2024). For a successful land-use transition, effective incentivisation for AFS through relevant policy measures is not reached by mere acceptance of key actors. Rather policy measures and their wider context need to encourage the uptake of AFS based on an active endorsement of

involved actors, namely encompassing a self-sustaining dynamic as conceptualised by Aykut et al. (2019).

Different policy options are available to foster AFS under EU regulation. Many policy measures relevant for AFS are part of the EU's Common Agricultural Policy (CAP), which is among the most fundamental and long-standing policy structures for the agricultural sector in the EU (Hajdukovic, 2023). For instance, the 'enhanced conditionality' of the CAP encompasses obligations by setting mandatory minimum requirements to receive direct payments or area- and animal-based payments (EC, 2023a). Going beyond the 'enhanced conditionality', specifically two voluntary options of the CAP's so-called 'green architecture', appear interesting for upscaling AFS: On the one hand, the *eco-schemes* of pillar Ⅰ are a novel feature of the CAP (2023–27), which comprise direct area-based, annual payments for measures fostering biodiversity, soil, water, and climate protection (EC, 2023a). The European Member States are free to decide how many and which specific eco-schemes to offer. Eco-schemes are fully funded by the EU (Lampkin et al., 2020). On the other hand, *investment measures* (IM) as part of the Rural Development Programme of pillar Ⅱ aim to address environmental and climate issues on a multi-annual basis by, for example, offering investment funding for establishing AFS. The choice of specific interventions to offer is subject to regional authorities. These investment measures require national and regional co-financing (Lampkin et al., 2020).

The complementary approaches to financial incentivisation of the two policy measures principally address the two major financial barriers to AFS adoption: the relatively high initial investment costs for establishing AFS, including slow recouping (Thiesmeier & Zander, 2023), and the lack of incentives to maintain AFS (Mosquera-Losada et al., 2023). The former barrier can be addressed by investment measures, and the latter by eco-schemes.

In this regard, Germany constitutes an interesting case since it is among the few European Member States to offer such an eco-scheme (EC3; DE: Öko-Regelung 3) directly related to the maintenance of AFS within its CAP-Strategic Plan. This focus on the maintenance of AFS via EC3 is justified by the assumption that the federal states will complementarily incorporate necessary investment funding for AFS implementation in pillar Ⅱ (BMEL, 2023a; CAP-Strategic Plan 2023, p. 182).

However, many federal states in Germany did not include the proposed Investment measure for the establishment of AFS (FÖ4, L., BMEL, 2023a; BMEL, 2023b). Baden-Wuerttemberg (BW) represents an exemplary case of a federal state that refrains from adopting the AFS-related Investment measure of pillar Ⅱ (MLR, 2023a). Meanwhile, Bavaria (BA) stands out as one of the few states (as well as Mecklenburg-Vorpommern, Lower Saxony, and Saxony) to support the establishment of AFS through area- and investment-based measures in the Bavarian implementation plan, the 'Bayerisches Kulturlandschaftsprogramm' (KULAP) (StMELF, 2023).

1.1. Research Problem

Insights from the first year of German CAP legislation, 2023, indicate an overall low representation of the AFS-related schemes in regional implementation plans and a low adoption rate of respective measures by farmers (Dahm, 2023; Deutscher Fachverband für Agroforst [DeFAF], 2022a). With regard to EC3, a press release from the Federal Ministry of Food and Agriculture (BMEL, 2023c) highlights a significant gap between planned hectares applied for, and actual applications within the first year of the funding period: Although it was planned for a total of 25.000 ha of AFS to be funded by EC3, only 51 ha were funded in 2023. Regarding the initial target of the German CAP-Strategic Plan (2021) to plant 625.000 ha of AFS till 2027, and the EU target to significantly increase LULUCF removals (EU 2023/839), this constitutes a major discrepancy. Further multifaceted criticism is expressed by the German Agroforestry Association (DeFAF, 2022a; DeFAF et al., 2023c), the WWF, EEB, and BirdLife International (2021), and other national and European associations (EURAF, 2023; BUND, 2021), judging the budget, articulation, and ambition of the policy measures.

For one thing, the CAP (2023–27) claims to be well equipped with the 'green architecture' to reach its climate mitigation targets[1] (BMEL, 2023a). Subordinate to these aims of transitioning towards sustainable forms of agriculture, the CAP principally involves complementary policy measures that can foster AFS.

[1] Dedicating 50% of the budget into environmental- climate and biodiversity protection (BMEL 2023a).

Nevertheless, the above-mentioned discrepancy between planned and actual scales of adoption, as well as public political discourses, both indicate several socio-political challenges and barriers that still need to be overcome for AFS to diffuse and succeed at a significant rate.

1.2. Research Gap

While global research interest in agroforestry has increased (Golicz et al., 2022), the social science perspective evaluating the drivers of AFS implementation is lacking in the literature (Lui et al., 2019). The state of art in research covers several analyses of CAP policies and policy recommendations to increase the uptake of AFS on the EU level (cf. Mosquera et al., 2017; Pe'er et al., 2020; Lampkin et al., 2020; Mosquera et al., 2023, Krishna et al., 2023, Donham et al., 2022), and examines the effectiveness of CAP-Strategic Plans in reaching EU targets (Münch et al., 2023). Laporta et al. (2021) and Thiesmeier and Zander (2023) investigate the requirements for and the design of financial incentives for AFS adoption. They similarly advocate for valuing AFS through payments for ecosystem services or carbon pricing mechanisms. Particularly regarding the development of financial instruments that internalise the CDR potential of AFS in Germany, Hübner et al. (2022) examine the potential, assessment, and recommendations for action of CO_2-certification of AFS. With regards to political climate targets, they emphasise the urgent need for specific guidelines on climate certificates in order for AFS projects to realise their potential to transition agricultural systems.

Additionally, shortcomings and requirements to adapt the AFS-associated policy measures of the CAP are highlighted by several policy briefs and position papers (e.g., DeFAF, 2023b, DeFAF et al., 2023c, BUND, 2021; Böhm et al., 2024b). Yet, no comprehensive scientific research examining factors that favour or hinder the uptake of the specific EC3 and IM has been conducted. Moreover, the interaction of these selected policies has also not been analysed by comparing the two regional contexts of BW and BA.

Few research papers focus on the perspective and role of key actors in the context of upscaling AFS: Litschel et al. (2023) analyse the benefits, barriers, and potentials of

AFS implementation as perceived by key actors[2] in Northeastern Germany. Similarly, Deutsch and Otter (2023) investigate the acceptability of AFS, in particular the expectation of economic advantages by different agricultural stakeholders. Additionally, Massfeller et al. (2022) explicitly examine farmers' acceptance of results-based agri-environmental schemes in Germany. Previous research shows that specifically, the perspectives of farmers towards AFS are underrepresented (García de Jalón et al., 2018; Litschel et al., 2023). In this study, the comprehension of key actors' perspectives is considered central to understanding multifaceted strengths, weaknesses, opportunities, and threats in the adoption of the respective AFS-relevant policy measures. This further helps to identify potential reforms for successful policy adoption.

With that in mind, it seems particularly significant to assess the potential of the policy measures of EC3 and IM to generate a self-sustaining dynamic among its societal actors to achieve a relevant, wide-scale uptake of AFS. This concept broadens the social perspective in transition studies beyond the concept of social acceptance (e.g., Wüstenhagen et al., 2007). It rather encompasses social factors that influence an active endorsement and advocacy among key actors (Aykut et al., 2019) regarding the implications of the policy measures. The determination of land-use practices includes many decisive elements, such as political regulations and frameworks, relevant authorities, enterprises and cooperatives, and markets. Therefore, a holistic advocacy of different societal groups, ranging from consumers, actors in the value-chain, policymakers, administrators, farmers, and other practitioners, is required to sustain a long-term path and resist external threats.

Conceptually, transition studies and acceptance studies have frequently focused on renewable energy transitions (Geels, 2014; Dermont et al., 2017; Wolsink, 2018; Wolsink, 2020; Batel & Rudolph, 2021; Kluskens et al., 2024). This conceptual framework of transition studies was further applied in the context of agricultural transitions (Mylan et al., 2015; Darnhofer, 2015; Elsner et al., 2024). Embedded in the conceptual framework of socio-technical transition, this study, for the first time, applied the conceptual lens of self-sustaining societal dynamics to analyse the

[2] Key actors in the study of Litschel et al. (2023) include AFS-implementing farmers, lobby and interest groups, political actors (e.g., DeFAF) and research and nature conservation.

performance and context of agricultural policy measures. To my knowledge, the SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis has not yet been applied to operationalise the concept of a self-sustaining societal dynamic in the context of policy measures.

1.3. Research Questions

From the contextualisation of the problem, the following research questions with more specific sub-questions are derived:

Research Question 1: How far can the Eco-scheme 3 and Investment measure trigger a self-sustaining societal dynamic for promoting AFS?

SRQ1: What are the strengths, weaknesses, opportunities, and threats of the Eco-scheme and Investment measure in the Common Agricultural Policy (2023–2027)?

SRQ2: What role does the complementarity of the two intertwined policy measures play in regionally promoting AFS?

Research Question 2:

What reforms are necessary, according to identified SWOT factors, for the Eco-scheme 3 and Investment measure to trigger a self-sustaining societal dynamic?

1.4. Research Objective

This research aims to provide an SWOT analysis of the two complementary funding schemes in support of AFS adoption and maintenance: 1.) the eco-schemes as direct payment (pillar Ⅰ) mechanisms to reward the climate effectiveness and co-benefits of maintaining AFS; 2.) the regional investment funding (pillar Ⅱ) for establishing AFS. The SWOT analysis provides a useful framework to organise and structure the analysis of determinants of AFS policy adoption, in particular assessing both policy measures regarding their ability to trigger a self-sustaining societal dynamic.

The case study comparison on the regional level provides insights into the role of complementary policy measures for financially incentivising AFS: The absence of investment measures of CAP pillar Ⅱ in BW as compared to their availability in BA serves as an evaluation of the complementary character of financial support needed for establishing and maintaining AFS. Concluding from the insights of this exploratory case-specific SWOT analysis, recommendations are proposed for creating a policy environment that can facilitate a self-sustaining social dynamic regarding AFS adoption. Ultimately, this is aimed at fulfilling AFS adoption targets on the national level and the LULUCF target on the EU level.

First, a literature review illuminates the role of AFS generally in the context of CDR and, in specific, the position of AFS in the German policy environment. In this light, the two federal states of BW and BA, with different extents of policy support, are characterised and evaluated, which serves as a case study analysis of the institutional interplay within the legislative levels of the CAP. The conceptualisation of the self-sustaining societal dynamic is elaborated within the frame of socio-technical transition research and contrasted to the concept of social acceptance. The groundwork for the legal comparison of the policy measures in the two case study regions is laid. In the course of the SWOT analysis, data is collected through reviewing policy and legal documents, as well as scientific and grey literature. Further, empirical qualitative data is collected by conducting semi-structured interviews with different key actors in the two policy measures. Within the SWOT framework, the collected data is analysed with regards to the concept of a self-sustaining societal dynamic. The qualitative content analysis is concluded by presenting results, which include discussing their meaning for triggering a self-sustaining social dynamic and associated recommendations for enhanced AFS adoption. This is contextualised within the broader scope of the AFS policy landscape and land-use based CDR discourses.

2. Literature Review

2.1. Potential of Land-use Based CDR in the Climate Crisis

The IPCC (2022a) defines carbon dioxide removal (CDR) as deliberate anthropogenic practices, technologies, and approaches that remove CO_2 from the atmosphere and permanently store it in geological, terrestrial, or ocean reservoirs, or in products.

The IPCC (2022a) differentiates CDR methods[3] according to the following categories: based on their role in the carbon cycle, that is the removal process (land-based biological; ocean-based biological; geochemical; chemical), on the timescale of storage (ranging from decades to longer than a thousand years), technological maturity, potential mitigation, costs, co-benefits, adverse side-effects, and governance requirements. The existing variety of CDR methods provides a diverse set of implementation options. Implementation strategies for CDR methods need to consider these differences and potential conflicts, for instance, effectively addressing various sustainability and feasibility limitations. These limitations encompass political inclinations and societal acceptance (IPCC, 2022a).

The IPCC (2022a) reports with high confidence that CDR constitutes a central element in climate scenarios, which likely limits global warming below 2°C by 2100. There is significant research exploring the financial and economic feasibility and the mitigation potential of different CDR methods (Honegger et al., 2022). Further, the ethics of CDR are being examined in a growing body of literature (Honegger et al., 2022). The imperative nature of CDR as an unconventional mitigation approach that needs to be applied to a substantial extent to reach global climate targets by now is broadly recognised in climate research (Geden & Schenuit, 2020).

Still, policy development for CDR is slow (Geden & Schenuit, 2020; Tamme & Beck, 2021; Smith et al., 2023) and the political discourse about the composition and

[3] Here, the terminology of the IPCC's 6th Assessment Report is used. "Methods" refers to concrete approaches leading to CDR. It is not intended to refer to specific methodologies for, for instance, assessing the baseline emissions and monitoring activity emissions as frequently used in the climate policy community (cf. Honegger 2022).

implementation of CDR methods is highly controversial (Honegger et al., 2022; Honegger, 2023; Tamme & Beck, 2021; Hansen & Geden, 2023). Different reasonings prevail against CDR, which, for instance, criticise the risk of compromising mitigation efforts and even legitimise the fossil fuel industry by allocating direct funds towards CDR methods perceived as uncertain (Honegger, 2023). In the context of environmental integrity, the formal integration and application of standardised and reliable approaches in measurement, reporting, and verification (MRV) of carbon flows is frequently highlighted as a major operational challenge due to high costs and context-specific mitigation potential, risks, and co-benefits (Smith et al., 2023). Robust MRV is required, amongst other things, to account for the permanence and additionality of removed carbon dioxide and prevent leakage risks (Hübner et al., 2022).

Despite existing challenges associated with various CDR methods, Tamme and Beck (2021, p. 6) set out three reasons why it is necessary to approach CDR in the near future: 1.) Surpassing climate targets is becoming more likely, highlighting the need to quickly compensate for exceeded carbon budgets. 2.) Historically, commercialising technologies takes decades, but acceleration requires appropriate policies, which also need years to implement. 3.) The EU's increased climate ambition underscores the importance of CDR methods for addressing inevitable emissions and achieving long-term net-negative emissions. For CDR approaches to be successful, Honegger (2023) emphasises that the policy selection and design of appropriate, ethical, and effective CDR approaches must be context-sensitive, which raises fundamental questions of governance at their core.

Specifically, land-use based CDR (incl. afforestation, reforestation, and agroforestry) assumes an ambivalent role due to the complex and context-dependent interplay of effectiveness, fairness, environmental integrity, and sustainability dimensions that determine the positive or negative character of the outcome (Honegger et al., 2022).

While agriculture accounts for the second largest share of mitigation potential in AFOLU (IPCC, 2022b), the risk of non-permanency of respective carbon removals constitutes major hurdles for the environmental integrity of CDR and policymaking (EPRS, 2021, Geden & Schenuit, 2020; Honnegger, 2022). Additionally, specifically in densely populated regions, competing types of land-use, such as food production

or habitats for animals and plant species, can represent a severe conflict of interests (Hansen & Geden, 2023; Smith et al., 2023). These aspects influence the public acceptance, efficiency and effectiveness, and fairness implications of land-use based methods (Hansen & Geden 2023; CDRterra, 2023). In contrast to other isolated CDR technologies, land-use based CDR therefore requires multi-stakeholder collaboration and a profound comprehension of ecological, social, financial, and political structures to avoid negative repercussions that impair the methods' sustainability (Honegger et al., 2022).

Net removals through land-use based methods are being recorded within the LULUCF sector (LULUCF regulation, EU 2018/841). Representing the main source of carbon removals, LULUCF is essential for climate mitigation (EPRS, 2023). However, the latest recording of 2019 demonstrates a decrease of LULUCF removals by 20% compared to 2005 (EPRS, 2021). In recent years, the EU has started to acknowledge the necessity of CDR methods (EPRS, 2023; Smith et al., 2023). The enhanced removal target of the LULUCF regulation (EU 2023/839) is hoped to grant structural support and incentives for carbon farming practices to promote the carbon sinks' capacities (Smith et al., 2023, EPRS, 2023).

2.2. Agroforestry as a Carbon Farming Method

2.2.1. Carbon Sequestration Potentials of Agroforestry

The open potential for implementing AFS in the EU contrasts with its actual area coverage. In the EU, agroforestry covers approximately 8.8% of the EU's agricultural area and 3.6 % of the total land area (den Herder et al., 2017). There is an estimated untapped potential of 90 million ha of arable land and 50 million ha of pasture land in the EU to be used as AFS (Aertsens, De Nocker, & Gobin, 2013).

In EU Regulation 1305/2013, AFS are defined as "land-use systems in which trees are grown in combination with agriculture on the same land. The minimum and maximum number of trees per hectare shall be determined by the Member States, taking account of local pedo-climatic and environmental conditions, forestry species, and the need to ensure sustainable agricultural use of the land." Other institutions or projects (e.g., FAO, ICRAF, AGFORWARD) adhere to different definitions. For

instance, the European Agroforestry Association complements the EU definition in Article 4 of the EURAF Constitution (2012) by clarifying three major categories of AFS combinations: “Agroforestry practices include all forms of association of trees and crops (silvoarable systems) and/or animals (silvopastoral systems), on a parcel of agricultural land, whether in the interior of the parcel or on its edges (hedges)." Five basic spatial agroforestry practices can be identified: silvopastoral, silvoarable, forest farming, riparian buffer strips, and home gardens/ kitchen gardens (Mosquera-Losada et al., 2018b).

The various definitions similarly point out that AFS are more complex than monoculture systems when it comes to structure, function, and economy (Nair, 1993). The above-mentioned complexity and variability of AFS pose challenges for its role as a robust carbon farming method. The carbon sequestration potential can differ considerably between 0.03-27 tonne of CO_2eq per hectare and year (McDonald et al., 2021), depending on the specific ecosystem, plant and tree species, growth rate, previous land-use, and management of the implemented AFS (McDonald et al., 2021; Tsonkova & Böhm, 2020; IPCC, 2022b).

Particularly, AFS can contribute to climate change mitigation by increasing the carbon storage in above-ground biomass and in the soil (Aertens et al., 0213), while simultaneously no to low nitrogen needs to be added (Scheffler et al., 2023). In some scenarios, it has the potential to raise both the quantity and resilience of soil carbon in deeper soil layers compared to monocrops or herbaceous vegetation (Mosquera-Losada et al., 2016). The increased resilience of AFS helps avoid emissions (e.g., preventing forest fires through silvopastures) and the effects of catastrophic events (Mosquera-Losada et al., 2023), which further implies prospects for enhanced climate adaptation. In EU landscapes, Mosquera-Losada et al. (2016) identified silvoarable and silvopastoral systems as the most effective AFS practices for carbon sequestration. The EURAF (2024) highlights that European AFS often have a considerably higher sequestration potential than crop/grass monocultures and similar levels of sequestration compared to forests. The overall EU mitigation potential is estimated to be 8–235 Mt CO_2eq per year (McDonald et al., 2021). Countries with high shares of arable land and grassland possess a specifically high potential to adapt farming systems according to AFS approaches. The calculations of Aertens et al. (2013) surpass these estimates by a technical sequestration potential of 1.4 billion

tonnes of CO_2eq per year in the EU-27. The study by Kay et al. (2019b) calculates a carbon sequestration potential equal to 1.4 and 43.4% of the European agricultural GHG emissions when transferring conventional farmland with the highest numbers of accumulated pressures (making up approximately 8.9% of agricultural land) into AFS. As expressed by the EURAF (2024), this wide range of estimates demonstrates the challenge of condensing similar data from various studies that utilise different methodologies. These challenges add further complexity to the uncertainty of additionality and the permanence of carbon dioxide removed through land-use based methods, as elaborated in 2.1.

In addition to the challenges of establishing a robust MRV, financial investments in CDR methods are needed to reach a significant scale. The United Nations Environment Programme(UNEP, 2022) estimates US$ 2,600–3,600 billion of cumulative investment sums needed to be allocated to AFS globally between 2022 and 2050 in order to reach 1.5 and 2°C scenarios. This high number of investments reflects the necessity of financially encouraging AFS uptake for CDR.

2.2.2. Co-Benefits of Agroforestry

Beyond its carbon sequestration potential, the multifunctionality of AFS is an essential characteristic that makes it an advantageous land-use type for social, economic, environmental, and ecological reasons. There is a broad recognition that a conclusive assessment of AFS-related co-benefits requires an individual approach to identify site-specific trade-offs and synergies (Smith et al., 2022; Elabkidze et al., 2021; IPCC, 2022b).

AFS can provide several environmental benefits, differing significantly by geography and scale (Nabuurs et al., 2022). Smith et al. (2022) conclude from five case studies of AFS in northern, eastern, and southern Europe that AFS features high land equivalent ratios, resulting in increased efficient land-use compared to monocultures, and lower fossil fuel use than average agricultural systems. On a larger scale, the efficient multifunctional land-use of AFS can increase food and wood production while globally reducing pressures on scarce productive surfaces (Aertsens, De Nocker, & Gobin, 2013). Mosquera-Losada et al. (2016) explain this efficient land-use through the enhanced resource use of solar radiation, water, and nutrients at the plot

level. Consequently, the wooden parts can be energetically utilised, thereby replacing fossil fuels. Moreover, combining woody components with crops and/or grass enhances a greater diversity of plants that are adapted to various microclimate conditions. This consequential increase in biodiversity can also be promoted by combining woody vegetation with animals due to trampling and fertilising the soil; the benefits generally improve when different species are selected (Mosquera-Losada et al., 2016). On a landscape level, AFS are identified to improve regulation services such as soil conservation (García de Jalón et al., 2018), nutrient retention, climate regulation, higher functional biodiversity based on pollination, and greater habitat diversity (Kay et al., 2018). Further environmental benefits of AFS are improved nutrient cycling (Nair, 1992) and lower levels of pesticides, which can both improve water quality (Rois-Díaz, 2022). In terms of climate change adaptation, the capacity of AFS to adapt results from improved soil structure, an improved microclimate (Aertsens, De Nocker, & Gobin, 2013), particularly reduced temperature variations due to shadowing and windbreak, and increased resilience to catastrophic events (Mosquera-Losada et al., 2023).

Regarding the social benefits of AFS, it can be associated with increased opportunities for on-farm employment, enhanced well being of the workforce, and engagement with local communities (Smith et al., 2022). Higher revenues from AFS are linked with an increased demand for labour, while the diversity of the revenues can strengthen farmers' resilience to compensate for crop shortfalls and market volatility or to handle catastrophic events (Mosquera-Losada et al., 2016). Thus, diversified income streams can reduce the economic risks of cultivating AFS (Sollen-Norrlin et al., 2020; Rois-Díaz 2022). In many regional contexts, AFS have a significant cultural value associated with landscape aesthetics (García de Jalón et al., 2018), recreation (Burgess & Rosati, 2018), and family tradition (Rois-Díaz, 2022; Elbakidze et al., 2021; Smith et al., 2022). AFS are considered social settings that facilitate social interaction and knowledge exchange (Rois-Díaz et al., 2018). Elbakidze et al. (2021) highlight the significant qualities of human-environment interaction attributed to AFS in supporting identity and improving quality of life

2.2.3. Risks and Challenges of AFS

Notwithstanding the above-mentioned significant co-benefits of AFS, this multifunctional land-use system faces economic, administrative, and legal risks and challenges. The environmental and social benefits generated by AFS are reported to potentially come at higher financial costs given that these, often, public benefits are not sufficiently accounted for by markets and policy frameworks (Sollen-Norrlin et al., 2020; Mosquera-Losada et al., 2018a; Kay et al., 2019a; Thiesmeier & Zander, 2023). The analysis of the cost-sensitivity of farmers by Rois-Díaz (2022) reveals other alternatives are preferred to AFS when farmers place a high importance on costs. Albeit other hindering parameters impeding AFS uptake, this indicates the particular importance economic barriers play in AFS adoption. Financial viability can be a challenge for farmers regarding the phases of establishment and the long-term maintenance of AFS. Establishing AFS is time-consuming (Rois-Díaz et al., 2018) and constitutes major economic challenges for farmers due to high initial investment costs and protracted periods of returning cash flow (European Innovation Partnership for Agricultural productivity and Sustainability [EIP-AGRI], 2017; Thiesmaier & Zander, 2023). Though AFS can be more profitable in the long run, the establishment of woody components implies high upfront costs that take time to pay off since income flows depend on the maturity of components for their harvest (Abdul-Salam et al., 2022; Smith et al., 2022). Additionally, despite potential economic advantages through diversification (Thiesmeier & Zander, 2023), managing and maintaining such diverse systems frequently represents a challenge for farmers, especially when considering labour costs (Smith et al., 2022). Farmers are confronted with high management costs and increased labour associated with a high complexity of work that demands specific knowledge and technical skills (García de Jalón et al., 2018; Rois-Díaz et al., 2018; EIP-AGRI, 2017). This implies the need for a systemic approach since aiming for a symbiosis in AFS requires considering a wide range of variables and understanding complex interactions (García de Jalón et al., 2018; EIP-AGRI, 2017).

Further barriers to developing AFS are administrative burdens (García de Jalón et al., 2018) and legal uncertainties, such as, for instance, in Germany due to incoherences in regulatory law and subsidy law (DeFAF et al., 2023c): Since the introduction of GAPDZV in 2023, AFS underlies legal certainty when in accordance with the

GAPDZV requirements of Sect. 3 and Sect. 4. (to be specified in 2.3); still, interventions with the German nature conservation law (BNatSchG) are possible, which can prohibit the removal or irreversibility of wooden elements due to a classification as a protected status. Moreover, commercialising AFS products is hampered due to a lack of established markets and specific value chains, labels, consumer awareness, and willingness to pay price premiums (EIP-AGRI, 2017; Rois-Díaz et al., 2018).

Several research papers and reports emphasise the need to incentivise and financially compensate farmers for the added value generated by AFS (Mosquera-Losada et al., 2018a; EIP-AGR, 2017; Thiesmaier & Zander, 2023; Giannitopoulos et al., 2020; Kay et al., 2019a; Kay et al., 2019b; Hajdukovic, 2023). Considering three European case studies, Giannitopoulos et al. (2020) compare the economic benefits of AFS, arable cropping, and tree-only systems and examine the environmental externality values required for AFS to achieve financial parity with conventional arable cropping. Similarly, Kay et al. (2019a) find that the economic valuation of ecosystem services associated with AFS contributes to the relative economic viability of AFS for farmers. Pricing carbon at 30 €/tonne would make AFS more profitable for farmers compared to non-agroforestry land-use systems (Kay et al., 2019a). Thiesmaier and Zander (2023) suggest valuing carbon sequestration in combination with the co-benefits of AFS as an attractive approach to increasing the profitability of AFS and making it competitive. However, challenges for coherent and robust MRV approaches impede the financial internalisation of AFS co-benefits in the subsidy law (Golizc et al., 2020).

2.3. Agroforestry-specific Policy Measures within the CAP

Several EU policy instruments were developed within the last decade that are relevant to agroforestry, namely Natura 2000, the European Biodiversity Strategy to 2020, the EU Forestry Strategy 2030, or the European Strategy for Sustainable Development (cf. Sollen-Norrlin et al., 2020, Hajdukovic, 2023, Mosquera-Losada et al., 2016). Among them, the CAP provides a relevant EU policy framework to support AFS. With approximately one-third of the European Union’s overall budget in 2021–2027, the CAP receives a major proportion of financial support (EC, 2023b). The

socio-ecological and climate mitigation potential of AFS can contribute to fulfilling several CAP targets, while (structural) financial barriers of AFS could be overcome by such a financial framework (Mosquera-Losada et al., 2023). Ironically, this relevance for AFS is amplified considering the CAP's adverse historical impact of reducing trees in European landscapes by promoting productivity through favouring large-scale annual monocropping systems (Golicz et al., 2020). The CAP is criticised for predominantly distributing funds on an area basis, which distortedly privileges large-scale farmers (BUND, 2023; Pe'er et al., 2020). The priority goal of productivity came at the expense of detrimental environmental effects on ecosystem services and biodiversity (Santos et al., 2023; Willard, 2023). Schemes were criticised for being tied to "low requirements and broad exemptions in the compulsory instruments, unambitious design of voluntary schemes, overpayment for ineffective environmental measures, and imbalanced investment in the environment compared to other objectives" (Pe'er et al., 2022, p. 2).

Based on several structural and intervention-specific changes, the new CAP legislation (2023–2027) claims to be fairer, more social, greener, simpler, and more coherent (Münch et al., 2023). It aims at reversing biodiversity loss and reducing the environmental impacts of farming (Pe'er et al., 2022). A major innovative approach comprises green architecture: It aims at more ambitious environmental levels by means of the enhanced conditionality to receive direct payments and the new, voluntary eco-schemes (pillar Ⅰ) and agri-environmental-climate measures (AECM) (pillar Ⅱ) (BMEL, 2023a). The political discourse is increasingly moving towards demands for an overarching rationale to allocate CAP funding according to the principle 'public money for public goods' (Krishna et al., 2023; Pe'er et al., 2020; Thiesmeier & Zander, 2023). Such claims would favour the consideration of AFS in CAP policymaking due to the above-mentioned co-benefits of AFS that serve the common good.

The scope and requirements under which AFS is funded fundamentally depend on how AFS is legally defined in the CAP legislation, regulated by the CSP. In the German regulation of direct payments (GAPDZV), AFS are defined as follows: Agroforestry systems can be cultivated on arable land, on permanent cropland, or on permanent grassland. They are part of the agricultural area (cf. Sect. 4(1) of

GAPDZV), and their cultivation is defined as agricultural activity (cf. Sect. 3(1) sentence 1 of GAPDZV). Possibilities to organise AFS are restricted to two options:

- Agroforestry systems organised in strips must have at least two wooden strips; the wooded strips may not cover more than 40 % of the total agroforestry area,
- If woody plants are scattered over the area, their number must be must be between 50 and 200 per hectare,
- In all agroforestry systems, only tree and shrub species that are not on the negative list (Annex 1 of the GAPDZV) may be planted.

In addition to the fulfilment of these criteria, the legally compliant recognition of an agroforestry system also requires that cultivated agroforestry trees are grown "with the primary aim of extracting raw materials or producing food" (Sect. 4(2) of GAPDZV). This must be verified in the course of agricultural application by means of a so-called utilisation concept (DE: ‘Nutzungskonzept’), which must be approved by a responsible authority. Funding recipients are ‘active farmers’ as defined in Art. 4, Sect. 5 (EU 2021/2115), who fulfil a minimum level of agricultural activity based on criteria such as income, employment on the farm, business purpose, and registration of agricultural activities in national or regional registers.

Despite other policy elements of the CAP fostering the adoption of elements of AFS, in this paper the most relevant two policy measures within the CAP (2023–2027) are focused on: the Eco-scheme 3 (EC3) (‘Öko-Regelung 3’, Art. 31, CAP-Strategic Plan 2021) and Investment measures (IM) (Art. 73, CAP-Strategic Plan, 2021). While single funding instruments generally have inherent limitations, the CAP foresees the option of combining several instruments. Regarding the promotion of AFS, concurrently examining these intertwined financial support programmes of eco-schemes and investment measures approximates a more holistic and sufficient economic support structure for farmers (Thiesmeier & Zander, 2023). The different characteristics of both measures in terms of payment levels, time horizon of cash flow, and financial purpose indicate their financial support being structured side by side in a complementary way (Scheffler et al., 2023).

2.3.1. Eco-scheme for Maintaining Agroforestry Systems

Eco-schemes represent a new component of the CAP 'green architecture' linked to the first pillar (Article 31). Eco-schemes are exclusively available to farmers and are intended to support new or existing sustainable farming practices and systems that go beyond conditionality requirements (Donham et al., 2022). The instrument implies annual direct payments per hectare and is fully financed by the EU through the European agricultural guarantee fund (EAGF) (EC, 2023a; Lampkin et al., 2020). While farmers can apply voluntarily on an annual basis, participation in eco-schemes is compulsory for Member States (Münch et al., 2023), with generally 25% of the direct payments budget needed to be allocated to the eco-schemes[4]. Member States possess great flexibility to customise the precise arrangement and funding allocation between individual eco-schemes to their national needs (EC, 2023a). Notwithstanding the broad thematic variety of eco-schemes, their strong interrelationship with conditionality and AECM pre-sets a narrow scope for their design to ensure coherence between CAP instruments (Pe'er et al., 2022; Latacz-Lohmann et al., 2022).

Out of a total of 158 eco-schemes in the approved Country Specific Plans, the German CAP-Strategic Plan defines a set of seven eco-schemes (CAP-Strategic Plan, 2023). Germany is among three Member States (WWF et al., 2021) that define one eco-scheme particularly relevant to support AFS: "Maintaining agroforestry management on arable land and permanent grassland" (DE: Ökoregelung 3; DZ-0403). Eco-scheme 3 (EC3) is a new object of funding without any equivalent to other previous measures in the CAP. It takes the approach of a compensation payment[5] under Art. 31, Sect. 7(b). In 2023, the unit amount of the direct payment amounted to 60 € per eligible hectare and was increased in 2024 to 200 € per eligible hectare (BMEL, 2024a). The direct payment of EC3 is exclusively available for strip-shaped areas of the AFS, excluding AFS with scattered wooden components. Eligibility is tied to further specific requirements illustrated in Table 1. These, among others, define the eligible proportion of wooden strips, their width (min/max), and the distance between strips and the edge of the area (min/max) (CAP-Strategic Plan, 2023).

[4] Exceptions prevail and allow for lower budget allocation when MS allocate more than 30% of their rural development budget based on environmental and climate criteria (EC 2023a).
[5] Encompassing income forgone, additional costs incurred also covering transaction costs.

These requirements do not correspond with the definitions of AFS in Sect. 4 of GAPDZV of AFS, as described in 2.3.

Table 1: Specific requirements for the eligibility of the area of wooden strips on arable land and permanent grassland according to EC3 (CAP-Strategic Plan, 2023)

The proportion of wooden strips in an eligible arable or permanent grassland area	2 - 35 %
The wooden strips must be planted with trees and shrubs throughout as far as possible.	
The minimum number of wooden strips	2
The width of the individual wooden strips	3 - 25 metres
The greatest distance between two wooden strips and between a wooded strip and the edge of the area	100 metres
The smallest distance between two wooden strips and between a wooded strip and the edge of the area	> 20 metres

Böhm et al. (2024a) and DeFAF et al. (2023c) demand that the AFS definition of GAPDZV serve as a provisional definition for AFS funding since it is the most practical legal definition that provides the greatest flexibility in the planning and design of AFS. Moreover, the combination of EC3 with other eco-schemes is prohibited. Namely, prohibited combinations of EC3 concern eco-scheme 1, defining the provision of areas for the improvement of biodiversity and conservation of habitats, (e.g., flower areas and strips), and eco-scheme 2, which funds the cultivation of diverse arable crops with at least five main crop species, including the cultivation of legumes with a minimum share of 10% (CAP-Strategic Plan, 2023). Organic farmers are additionally restricted from receiving EC3-payments, not to mention that they can combine them with the respective funding premiums for organic farming (DeFAF et al., 2023c).

EC3 is explicitly identified to contribute to the specific CAP target of climate protection, adaptation, and mitigation (SO4), and ranks the need for securing and improving carbon sequestration (D.2) with 'very high priority' (CAP-Strategic Plan, 2021; ILSF et al., 2022). Despite this distinct benefit of maintaining AFS for climate mitigation among all offered eco-schemes (DeFAF, 2023a; WWF et al., 2021), EC3 has by far the lowest financial share (0.76%, 2023) within the overall eco-schemes

budget (Münch et al., 2023). Accordingly, in the first legislative year 2023, EC3 was applied for by 67 farmers and eventually funded 51 ha of AFS stips, even though it had been planned to fund 25.000 ha of AFS (BMEL, 2023c). Less than 5 ha of AFS were funded via EC3 in BW and BA (BMEL, 2024b). In March 2024, the budget for EC3 was agreed to be reduced by 75% from 37.5 Mio. € to 9.5 Mio. € in CAP CSP 4.0 (DeFAF, 2024c). Accordingly, the target area for AFS as of 2023 is reduced from reaching an accumulated sum of 625.000 ha to 65.000 ha till the end of the legislative period (CAP-Strategic Plan, 2021; CAP-Strategic Plan, 2023).

2.3.2. Investment Measures for Agroforestry Systems

The European Agricultural Fund for Rural Development (EAFRD, DE: EFRE/ELER) is the main support instrument in implementing the common EU priority areas for the development of rural areas in pillar Ⅱ. Member States are provided a wider scope of action to define interventions for investment funding, which are regulated under Article 73 (Münch et al., 2023). In contrast to the funding structure of eco-schemes, investment measures of pillar Ⅱ require national and regional co-funding in addition to EAFRD funding, and are planned and implemented by the federal states under their sole responsibility (BMEL, 2023). In the German CSP, the investment funding for establishment AFS is intended under the Investment measure "individual productive investments in agricultural businesses" ('Einzelbetriebliche produktive Investitionen in landwirtschaftlichen Unternehmen', EL-0403) (CAP-Strategic Plan, 2023; p. 456). It comprises "the establishment, purchase, or modernisation of immovable property, including equipment, technology, agroforestry systems" (p. 1477) with the aim of "competitive, sustainable, environmentally friendly, animal-friendly, multifunctional agriculture" (p. 199).

The proposition of this Investment measure at the federal level emphasises the intended possibility of complementing the annual direct payments through eco-schemes. Art. 73 Sect. 4(c) of EU Regulation 2021/2115 gives the possibility to fund 100% of investments for the establishment and regeneration of AFS (DEFAF et al., 2023c). At the same time, national co-funding through the German Law of the Joint Task for 'Improvement of the agricultural structure and coastal protection'[6] (BMEL

[6] In short GAK [Gemeinschaftsaufgabe 'Verbesserung der Agrarstruktur und des Küstenschutzes']

2023b*)* is also possible and intended (cf. CAP-Strategic Plan 2023, p. 230). Yet, the majority of German federal states did not follow these intentions (DeFAF 2023a and 2023c), which contradict the German CAP-Strategic Plan (cf. DeFAF et al., 2023c). This is repeatedly criticised and reversely recommended by policy consultancies, research institutes, and AFS associations (DeFAF et al., 2023c; ILSF et al., 2022). As emphasised by DeFAF et al. (2023c), these decisions of the federal states significantly undermine the achievement of reaching a national coverage of 625.000 ha of AFS (downgraded to 65.000 ha in 2024).

2.3.2.1. Investment Measures in Baden-Wuerttemberg

Investment measures for funding AFS establishments, as described above, are not a provided measure in pillar Ⅱ of the regional plan of BW.

Still, it is to be mentioned that BW offers a consultancy module (DE: 'Beratungsmodul', module 222) that implies financial support of 80% of eligible costs for independent consultancy for agroforestry[7] (MLR, 2023b). At least, this module for consultancy can alleviate some barriers and reservations of farmers towards AFS, as it subsidises consultations regarding planning, establishing, and maintaining AFS, its economic viability, evaluation of AFS in terms of biodiversity, climate resilience and protection, and marketing options (MLR, 2023b). This aims to assist in reducing some knowledge-related hurdles for farmers to initially implement agroforestry.

Moreover, measures for the agri-environment, climate, and animal welfare (FAKT II) can be supportive of AFS elements, for instance, the cultivation of meadow orchards[8] ('Streuobst-Maßnahme' C1, MLR, 2023c) or voluntary measures for water protection and erosion control (Measure F, MLR, 2023d).

2.3.2.2. Investment Measures in Bavaria

BA stands out as one of four German federal states with a funding programme under pillar Ⅱ that covers 65% of eligible investments into AFS implementation (StMELF,

[7] Up tp 1,500 EUR (MLR, 2023b)

[8] Eligible are areas with a max. of 200 fruit trees/ha. Payments amount to 5€/tree for a max. of 100 trees/ha. For specific requirements see MLR (2023c)

2023). With support amounts of 1.566-5.271 € per hectare of wooden strips depending on the type of planting and its usage (see Table 2), the AFS-specific Investment measure of BA's 'Cultural Landscape Programme', in short, KULAP ('Kulturlandschaftsprogramm'; Measure I84), can serve as a blueprint for other federal states. Yet, as criticised by various AFS advocates (DeFAF et al., 2023c; Böhm et al., 2024b), this Investment measure for AFS requires that AFS is designed and implemented in compliance with the preconditions for EC3 (StMELF, 2023). It equally demands a formal utilisation concept and an additional investment concept as a funding requirement (StMELF, 2023). Therefore, it similarly excludes the promotion of AFS with scattered wooden components and exclusively focuses on funding the implementation of wooden stips. In addition, eligible expenditures exclude farmers' own labour contributions, among others (StMELF 2023). Albeit its favourable attributes in BA, the Investment measure experiences weak utilisation, similarly to eco-schemes, with less than five recipients (STMELF, 2024).

Table 2: Eligibility specification of Investment Measure in BA (I84).

Eligible criteria	Amount of the grant
per hectare of wooded strip, when planting trees for short rotation	Up to 1,566 €
per hectare of wooded strip, when planting shrubs	Up to 4,138 €
per hectare of wooded strip, when planting tree species that are used in food or stem/timber production or for both purposes, including shrubs for understory.	Up to 5,271 €
*a minimum amount of grant of 2,500 € needs to be reached. The grant is capped to a maximum of 50,000 €. This maximum can be reached once per recipient within five years.	

3. Conceptual Approach

3.1. Research Philosophy

Ontologically, this research assumes a mixed perspective of interpretivism and postmodernism. Reality is regarded as complex and socially constructed through culture, language, and power relations. Therefore, multiple meanings, interpretations, and realities exist, with some being dominated by others (Furlong & Marsh, 2010).

As an epistemological perspective, this research takes an interpretivist standpoint, focusing on the perspectives of key actors in AFS adoption and associated, selected policy measures (cf. Furlong & Marsh, 2010). Their narratives, stories, perceptions, and interpretations give rise to meaning and knowledge within the socio-political and cultural context of actor groups in BW and BA.

Concluding from these perspectives, I am aware of the fact that my research results are biassed by my interpretation of the research problem, and the findings represent only the few constructed social realities of its subjects, gathered and consulted in the process of data collection.

This research axiologically assumes a value-bound stance. Researchers are regarded as part of what is researched. They behave and make decisions in a subjective and reflexive manner, their interpretations being central to the contribution to research (Saunders, Lewis, & Thornhill, 2019).

The methodological perspective is a blend between interpretivism and pragmatism, which means all necessary approaches should be used to understand research problems. Accordingly, a small sample, in-depth qualitative case study of several interpretations of reality concerning the selected policy measures appears to be among the useful methods to explore the societal dynamics of the policy measures and their wider context (Saunders, Lewis, & Thornhill, 2019).

3.2. Socio-political Dynamics within Socio-technical Transitions

Before introducing the concept of the self-sustaining societal dynamic (SSD), this chapter gives an outline of the theoretical framework of socio-technical transitions, where the unit of analysis can be embedded. Relevant adaptations of the concept of social acceptance, associated with transition studies, are described that demonstrate shortcomings as well as similarities compared to the concept of SSD. Lastly, conceptualising and understanding an SSD will not only bring more conceptual nuance and clarity into this new conceptual realm, but it is also crucial to identify leverage points for social actors to influence the pathway of AFS.

Geels (2004) provides an analytical approach that addresses crucial elements that determine socio-technical transitions. Accordingly, socio-technical systems are defined as an interplay of elements of production, diffusion, and use of technology that are fundamental for societal functions and simultaneously the outcome of human activity. These *socio-technical systems* are to be analytically differentiated from *actors* and *rules/ institutions* which allows for exploring the dynamic interaction of these dimensions (Geels, 2004).

The established concept of the multi-level perspective describes socio-technical transitions as nonlinear processes that develop at stages of change at three analytical levels, ranging from technological niche innovations, over socio-technical regimes to exogenous socio-technical landscapes (Geels, 2004; adapted by Geels, 2019). These conceptual levels can be considered dynamic and fluid instead of clearly delineated (Smith & Stirling, 2010). Niches are characterised as alternative configurations that are little institutionalised (Fuenfschilling & Truffer, 2014), and where learning and deviation from the rules of the regime are possible (Geels, 2004). The degree of structuration is the lowest for niches as compared to the regime and landscape level. On the contrary, socio-technical landscapes provide the strongest 'structuration of activities', thus being most stable, and representing the wider exogenous environment. While actors can influence and shape the structure of existing regimes, even though they are unfrugal, the landscape level reaches beyond their scope of agency (Geels, 2004). In specific, as conceptualised by Frank et al.

(2024), regimes destabilise when the degree of “coherence between institutional and technological concepts in an organisational field” (p. 4) decreases. Finally, transitions materialise when dynamics across these three levels intertwine and enhance each other (Geels, 2014). Particularly interesting to this study’s focus on political measures and their contextual factors is the explicit conceptual extension of this analytical transition approach by components of politics and power by Geels (2014), which are elaborated in 3.2.2.

The above-elaborated conceptualisation is applied to this study’s focus on agricultural systems. Dominant conventional and industrial agricultural systems are considered ‘socio-technical regimes’, which consist of interconnected and mutually reinforcing relations between economic interests, political groups, infrastructures, technologies, markets, and practices (Smith & Stirling, 2010; cf. Darnhofer, 2021; Elsner et al., 2024). Here, incumbent actors, such as conventional farmers and corporate retailers, are opposed to structural change. These determine a dynamically stable system that is semi-institutionalised (Frank et al., 2024).

AFS, on the other hand, can be considered to be primarily organised at the niche level. Based on how niches are understood and conceptualised in research on agri-food systems in the examination of Elsner et al. (2024), the characteristics of niches are linked to AFS in the following ways: Firstly, the *organisational form* of AFS identifies as predominantly self-organised, since there is only a small, familiar network of institutional actors (e.g., DeFAF). This also corresponds with the rather small *size* of a niche. Furthermore, *collaboration and networking activities* are regarded as relevant practices for AFS to overcome political and socio-economic hurdles (cf. Elsner et al., 2024). In addition, the term AFS comprises various traditional farming practices (Nair 1992), like long-standing orchard meadows in Germany. This aligns with the niche concept since niches encompass combinations of pre-existing actions, while novelty often consists of (alternative) social issues neglected by the regime (cf. Elsner et al., 2024). Currently, AFS has a relatively weak political, institutional, and socio-cultural presence and establishment in agricultural landscapes (DeFAF, 2022b) and faces incoherent legal frameworks (e.g., interference with regulatory and subsidiary law). Despite this, AFS has recently gained political recognition in the EU, driven by international debates on carbon farming, biodiversity loss, and climate change adaptation, to name a few. This

gradual recognition indicates that AFS is still in the niche stage but is increasingly being acknowledged on the political agenda, highlighting its importance and the challenges it faces at the regime level.

Agricultural systems are inevitably dependent on and interact with systemic environmental variables, which are neglected in the conceptualisation of socio-technical systems. The socio-ecological system framework (Ostrom, 2009; Rounsevell et al., 2012; Partelow, 2018) can provide relevant insights into the coupling of human-environment systems and therefore can complement the conceptualisation of socio-technical systems. Though, specific dynamics of human-environment interactions are not considered a focal point of this analysis, Therefore, this study refrains from elaborating on possible integrations of both conceptual systems, and merely uses it as a theoretical background. As argued by Ostrom (2009) and analysed by Partelow (2018), the framework of socio-ecological systems can be adapted and applied to diverse cases, which can serve as a starting point for potential future research.

Zooming in from the concept of socio-technical systems, this paper's level of analysis concentrates on the socio-political dimensions of AFS-specific policy measures. While the analysed policy measures are embedded in the EU-level policy framework of the CAP, the policy specifications, introduction, and implementation take place on a national and regional scale. Analytically, these policy measures can be considered formal *rules* that shape processes happening at the niche and regime levels and interact with multiple *actors* between these systemic levels. Additionally, normative and cognitive rules are involved, which are formed by perceptions and expectations of social and organisational networks, belief systems and values, internalised thought structures, and acquired knowledge, skills, and competencies (Geels, 2004).

3.2.1. Social Acceptance

The social-political perspectives studied in the context of socio-technical transition processes are frequently based on concepts of acceptance (Wüstenhagen et al., 2007; Bartel & Rudolph, 2021; Dermont et al., 2017; Wolsink, 2018; Kluskens et al., 2024). A renowned conceptualisation of acceptance from Wüstenhagen et al. (2007) focuses on *social acceptance* in the particular context of renewable energy

innovation and comprises the three interrelated dimensions of *socio-political, community,* and *market acceptance*.

Wolsink (2018) regards the level of *socio-political acceptance* as providing conditions that are supportive of social innovation at the other two levels, i.e., market and community acceptance. By, for example, defining market conditions, political regulations, and empowering community actors, the socio-political layer substantially shapes the institutional framework and therefore represents the foundation of social acceptance (Wolsink, 2020). The dynamic process of *community acceptance,* as further elaborated by Kluskens et al. (2024), refers to diverse responses to a specific object of acceptance (e.g., a policy measure) by multiple interactive local groups (e.g., stakeholders, residents, authorities). Thirdly, *market acceptance* relates to the diffusion of a particular innovation and its adoption by the market (Wüstenhagen et al., 2007).

Different academic approaches review criticism by adapting and/or extending the concept of social acceptance. For instance, Dermont et al. (2017) apply a policymaking perspective to social acceptance, by specifying the components of the *object of interest, the relevant actors, and their roles*. These are identified as influencing the process of political decision-making. Social acceptance is conceptualised as being influential for policy success or failure; Dermont et al. (2017), nonetheless, refrain from making any definitive presumed claim regarding the indispensability, adequacy, requirement, or even desirability of social acceptance as a condition for the successful introduction of policies.

Furthermore, Batel and Rudolph (2021) criticise that the conceptualisation of social acceptance fails to critically analyse the possibility of attaining fairer and more sustainable societies. They refer to the prevailing socio-economic and political systems that are based on the extraction, utilisation, and exploitation of fossil fuels for economic development. Instead, they demand an approach that is “more sensitive to the socio-economic and political dimensions [...] and their spatial, community, and psycho-social associations and consequences” (p. 7).

Wüstenhagen et al. (2007) acknowledge the need for ‘active’ participants and their ‘active acceptance’ towards the innovation process as a crucial determinant for policy

effectiveness. Still, *support* as opposed to *non-agency* (Batel et al., 2013), to be understood as active endorsement, is not an integral part of the conceptualisation of social acceptance. In fact, acceptance has been operationalised by framing it as silent, passive reception without any pronounced opposition (Batel et al., 2013; Dermont et al., 2017). This study, however, assumes the active support of diverse actors as a crucial aspect of transitioning towards more sustainable agricultural land-use practices.

Albeit the elaborated conceptual shortcomings and inconsistencies, the above-mentioned adaptations of the concept of social acceptance provide constructive reflections that can ground and consolidate further conceptual deliberations of an SSD. In particular, the dimensions of socio-political and community acceptance appear relevant for this analysis:

2. Socio-political acceptance can illuminate aspects that shape socio-political and institutional factors and limitations that are influential on policy measures, their adoption, and their external environment (e.g., trust in political decisions and processes).
3. Community acceptance covers the dynamics and perspectives of local groups towards the two specific policy measures in both case study regions.

They conceptually allow for considering factors that hinder or enhance the interplay of multiple social and political actors on various levels towards the adoption of specific policy measures.

While applications and adaptations of the concept of social acceptance usually take place in the context of energy transitions, some elaborations are required for the purpose of this paper's conceptual focus. Firstly, agricultural systems face significant challenges from environmental degradation and climate change. In addition, they are complex, dynamic, and multi-actor socio-ecological systems (cf. Elsner et al., 2024). Similar to energy transitions, agricultural systems require sustainability transitions in order to develop socially just, economically viable, and environmentally sound processes and outcomes.

Contrary to the specific context of this study, I argue that the successful adoption of policy measures to facilitate implementing and maintaining AFS on a larger scale

over long time horizons differs from the dynamics between actors and the responsibilities of key actors crucial in the field of energy transitions. The focus is less on achieving acceptance from opposing actors, such as neighbour associations that counter (energy) transition practices. Rather, the distinguishing characteristic for transitioning agricultural land-use towards AFS consists less in social acceptance but instead in the necessity of an active endorsement. Within EU-, national and regional political and regulatory frameworks, it is fundamentally about various key actor groups that need to actively support and commit to the endeavour of upscaling AFS. The following social groups are identified:

1. Above all, (individual) farmers need to be convinced and engaged to commit to such a long-term type of agricultural land-use management as AFS.
2. Policymakers on the EU, national, and regional levels that comprehend and approve AFS-associated policy measures.
3. Regional and local authorities that consult and accompany the application and implementation processes of the policy measures.
4. Professional institutions and organisations, extension services, and consultancies that share knowledge and skills, set best practice examples and flagship projects, and provide resources for AFS planning, implementation, and maintenance.
5. Market participants along the value chain that ascribe value to AFS products.

Therefore, this study's conceptual framework builds on valuable insights from the social acceptance debate while also recognising the need to further consider dynamic multi-actor advocacy and endorsement of AFS, which can be mediated through supportive policy measures.

3.2.2. Self-sustaining Societal Dynamic

Given its conceptual richness, this study's lens utilises conceptualisations of social acceptance as a foundation (Wüstenhagen et al., 2007; Wolsink, 2018; Wolsink, 2020; Batel & Rudolph, 2021; Kluskens et al., 2024) and seeks to consider further factors that reach beyond acceptance by involving the self-sustaining societal dynamic (SSD). In that sense, the conceptual considerations of Aykut et al. (2019) resonate with this study's analytical stance. Aykut et al. (2019) endorse transition

studies to broaden their perspective of societal dynamics, and specifically the participatory character of transitions, that reaches beyond mere acceptance. Likewise, Pohlmann et al. (2021) stress that social factors relevant for socio-technical transitions are not sufficiently recognised by questions of acceptance. In fact, this paper's conceptual perspective encompasses an active endorsement and advocacy of change processes by societal actors (Aykut et al., 2019).

Originally developed in the context of energy transitions, this initial conceptualisation of the SSD by Aykut et al. (2019) is applied to the field of agricultural systems in sustainability transition, as elaborated in 3.2.1. The applicability of this conceptualisation with regard to land-use transitions is tested by examining the challenges and potentials of policy measures and their context to trigger an SSD for transitioning towards AFS. Policy instruments regarding carbon farming methods, such as AFS, inevitably inter-depend on societal agents and societal dynamics for effective implementation. As argued by Lascoumes and Le Galès (2007), public policy instruments represent technical and social mediums that interact with societal dynamics influenced by the power-laden relationship between the 'governing' and the 'governed'. Indeed, potential positive and negative feedback loops from political instruments influence societal transformative processes. This implies that, beyond economic viability and acceptance, multifaceted socio-political interplays need to be taken into account in the selection and design of policy instruments (Aykut et al., 2019). Consequently, Aykut et al. (2019) consider eliciting an SSD as a valuable scale for successful socio-political transitions.

Given the initial approach to the concept of the SSD by Aykut et al. (2019), the following working definition is assumed for the purpose of this study: SSD is understood as a multifaceted concept that refers to self-perpetuating processes within a society that drive and maintain transformative changes. It involves active participation, societal learning, transformative power structures, and advocacy from various societal actors, including individuals, organisations, institutions, and authorities. These aspects are sustained through feedback loops between technical, ecological, and social elements. SSDs primarily operate at the regime and niche levels: Dynamics involve reconfiguring existing systems (regime) and fostering alternatives (niche strategies) through applying the above mentioned practices that collectively drive transformative changes. For the SSD to ultimately break through,

influences from the landscape level are argued to be favourable, at least in the mid- to long-term, for instance by creating a window of opportunity for an SSD to gain momentum (cf. Elsner et al., 2024).

Aykut et al. (2019) identify three dimensions of an SSD that are pivotal to complex societal transformations:

1. socio-political conflicts where *conflicting interests* compete for dominance, power, and control;
2. *socio-technical learning process* that can only be partially orchestrated;
3. a process of profound social change that derives its transformative potential from the *active participation of society* and *democratic decision-making*.

These dimensions are applied to assessing whether the policy measures might contribute to eliciting an SSD for AFS adoption, as illustrated in Figure 1.

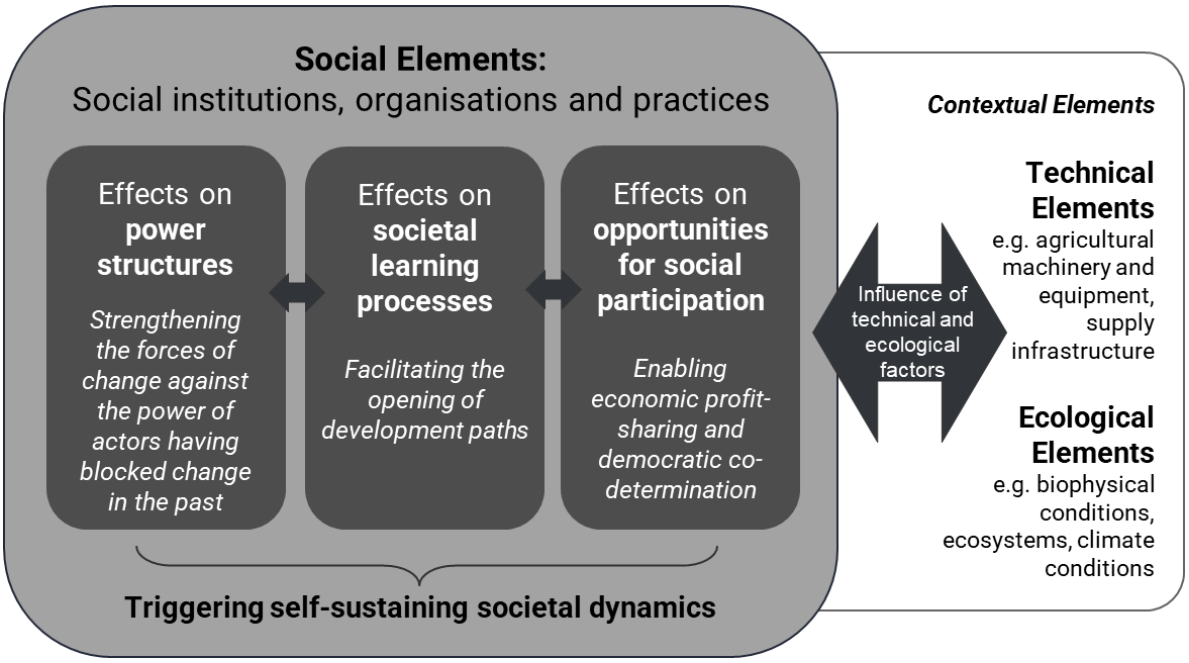

Figure 1: Conceptual elements and dimensions elicit a self-sustaining societal dynamic (after Aykut et al., 2019)

For social elements, Aykut et al. (2019) define social institutions, organisations, and practices as determinants of such complex societal transformation projects. Particularly in this study's context, these societal elements comprise political regulations and frameworks, regulatory authorities, enterprises, and markets.

In this study, **technical elements** comprise the material infrastructure, such as agricultural machinery and equipment, in interaction with supplier structures, such as tree nurseries. In addition to technical elements, it is argued that ecological elements need to be considered in the conceptualisation of an SSD in the context of AFS. Agroforestry, by itself, can be regarded as a complex process of human-nature interaction. As expressed by Ostrom (2009), “all humanly used resources are embedded in complex, social-ecological systems” (p. 419). Thus, the **ecological elements** are inductively complemented as they represent a foundation for the social realm. Ecosystem services, for instance, that are crucial for implementing and maintaining AFS, are entangled in and affected by developments in socio-technical regimes (Smith & Stirling, 2010). Consequently, Figure 1 illustrates technical and ecological elements as the wider contextual dimensions that are interconnected with social elements to elicit an SSD.

To ground the conceptualisation of Aykut et al. (2019) in relevant thematically and conceptually overlapping work, the following connections towards the three dimensions are established.

First, the influence of technical, ecological, and social elements on **power structures** constitutes an essential dimension of an SSD. This refers to socio-political conflicts where **conflicting interests** compete for dominance, power, and control (Aykut et al., 2019). Likewise to the emphasis on power structures by Aykut et al. (2019), Geels (2014) includes political economy into conceptualisations of regimes: To enrich the established framework of socio-technical transitions from a multi-level perspective (MLP), Geels (2014) considers factors of politics and power. Regime level alliances between incumbent regime actors (e.g., incumbent firms and policymakers) are regarded as using different forms of power to resist changes in regards to low-carbon transitions (Geels, 2014) or, in the context of agriculture, to carbon farming transitions with co-benefits. Additionally, Polmann et al. (2021) underline the consideration of complex, entrenched societal power structures. In specific, strategically building heterogeneous alliances is identified to disrupt and surmount coalitions of political-economic interest groups, and entrenched conventional ideologies. As an inevitable prerequisite to this, the plurality, presence, and validity of social realities, values, and interests are crucial to be socially acknowledged (Pohlmann et al., 2021). This

represents conceptual inter-linkages to the other two dimensions of social participation and societal learning processes.

The second dimension of an SSD includes **effects on socio-technical learning processes**. Opportunities for such societal learning processes are particularly relevant to triggering an SSD because education, capacity building, and knowledge exchange can facilitate the opening of new development paths.

Carmen et al. (2022) regard learning as a social factor that arises from social interconnections, i.e., a “shared understanding of concepts, clarified assumptions, more positive emotions, new connections, more aligned identities, and emerging solidarity around shared challenges and goals” (p. 267). Provided that purpose, identity, and values correspond among social actors, learning is understood as a key factor in improving the quality of social relations and reinforcing the regenerative societal dynamics of shaping change processes collaboratively (Carmen et al., 2022). As a form of social interaction, Aykut et al. (2019) particularly perceive engagement with controversies as a necessary condition to facilitate societal learning processes. Establishing small-scale platforms for experimentation and negotiation is essential to publicly deliberate and debate the benefits and impacts of various technical choices in a practical context. Moreover, Aykut et al. (2019) state that open and reflexive processes that foster social learning mechanisms enable reciprocal adjustment of technical and social elements, such as markets, practices, and institutions, and ensure that unfavourable developments can be rectified in time.

Thirdly, the dimension of **effects on opportunities for social participation** includes economic profit-sharing and democratic decision-making. Strengthening opportunities for social participation has transformative potential based on the following aspects: First, in the context of social acceptance, Cuppen and Pesch (2021) highlight the relevance of social participation by reflecting on the notion of social conflict. Social conflict can be understood as a societal assessment that can enhance and provide feedback to the learning processes of actors, as it reveals a wide range of topics, ideas, and values that actors evaluate as relevant for decision-making. Second, social conflicts further have the potential to represent a dynamic process that involves socio-political interaction among multiple actors, which can shed light on their behaviour, expectations, and imaginations (Cuppen & Pesch, 2021).

Additionally, Pohlmann et al. (2021) emphasise the need to actively involve disadvantaged social groups that are initially not interested in the area of transition by reacting to their interests to achieve that wide-ranging societal groups actively support policy programmes, etc. Beyond political participation, Aykut et al. (2019) highlight the necessary economic involvement of a pluralist society for an SSD in the sense that actors receive a fair financial share.

Building on these conceptualisations, this study examines how far the respective policy measures and their environment are associated with the above-mentioned social dimensions and can create an SSD for the uptake of AFS.

3.3. SWOT Framework

The SWOT framework is used for operationalising the concept of the SSD and assessing its four dimensions that characterise the two policy measures and their context. To develop a comprehensive understanding, determinants of the performance of policy measures to effectively promote AFS are assessed. In that respect, the identification of the strengths, weaknesses, opportunities, and threats of the policy measures within its socio-political context seems suitable.

The acronym SWOT refers to strengths, weaknesses, opportunities, and threats that make up the foundation of the method named SWOT analysis (Houben et al., 1999). Originally developed as a tool for effective strategic planning for businesses, organisations, or projects, the SWOT analysis was analogously applied and adapted to various other contexts (Chan et al., 2016; Knierim and Nowicki 2010). In the context of policy programming, SWOT analysis has been used in scientific literature to identify pivotal determinants that enable the development of a policy strategy to achieve its goals (Woźniak & Sokołowska-Woźniak, 2017; Mukwada & Manatsa, 2017; Mainali et al., 2011). For instance, the SWOT analysis has been employed to: i). elucidate factors that determine the relevance and utility of public programmes (Woźniak & Sokołowska-Woźniak, 2017); ii.) assess the effectiveness and appropriateness of Protected Areas policy frameworks (Mukwada & Manatsa, 2017), and iii.) analyse and identify the key elements involved in the implementation of water reuse schemes (Mainali et al., 2011). It is argued that beyond business units, every project, policy programme, and development plan has its strengths, weaknesses,

opportunities, and threats, whereas a respective assessment illuminates the derivation of leverage points for an improved implementation strategy (Mainali et al., 2011).

In this particular case of evaluating the two CAP policy measures, the SWOT framework provides an operationalisation of the SSD, as illustrated in Figure 2. Strengths can be regarded as internal attributes of the selected policy measures that trigger an SSD and enable the upscaling of AFS adoption, whereas weaknesses are seen as internal features that impair the fulfilment of this target. Opportunities and threats are external features of the specific policy measures, including potential decisions within the CAP-Strategic Plan (2023–27) and its implementation plans (DE: *Länderebene*). The external environment further includes aspects that go beyond the realm of policy measures and can be of a wider political, socio-cultural, economic, or technical nature. Here, potential future developments are taken into account. The SWOT analysis offers valuable insights into transforming threats into opportunities and balancing weaknesses with strengths. This serves as a basis for formulating recommendations to reform the policy measures in such a way that they can trigger an SSD among societal actors.

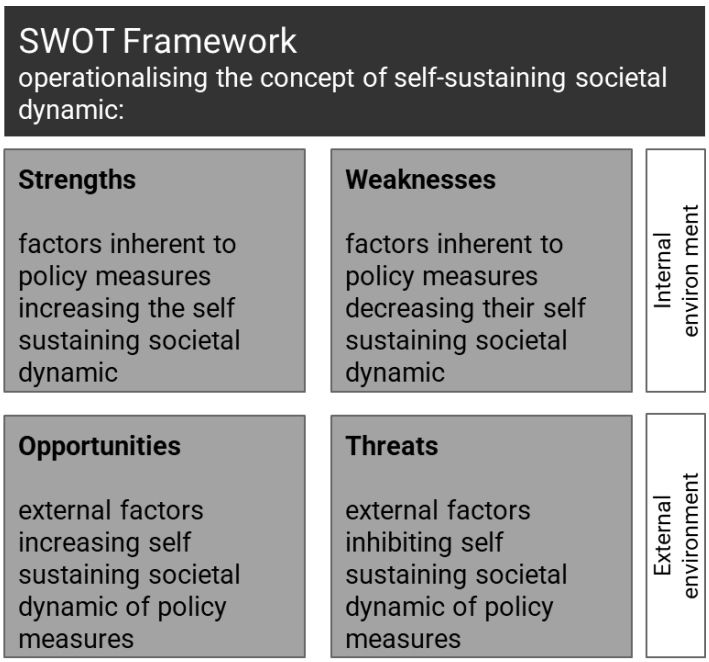

Figure 2: SWOT Framework operationalising the concept of self-sustaining societal dynamics (own elaboration)

4. Methodology and Methods

Based on a systematic literature review, the previous chapters presented the current state of knowledge and the chosen conceptual approach. The research process is illustrated in Figure 3. In the following, the methods on which this thesis is based are presented, and the decision in favour of the empirical approach is explained. First, the comparative method of law and respective case study selection are described. Second, the data collection via primary and secondary literature, and semi-structured qualitative interviews is elaborated. Subsequently, the development of the interview guidelines, the sample selection of the interviewees, and the conduct of the interviews are described. Finally, relevant data from literature and transcribed interviews is evaluated using a qualitative content analysis.

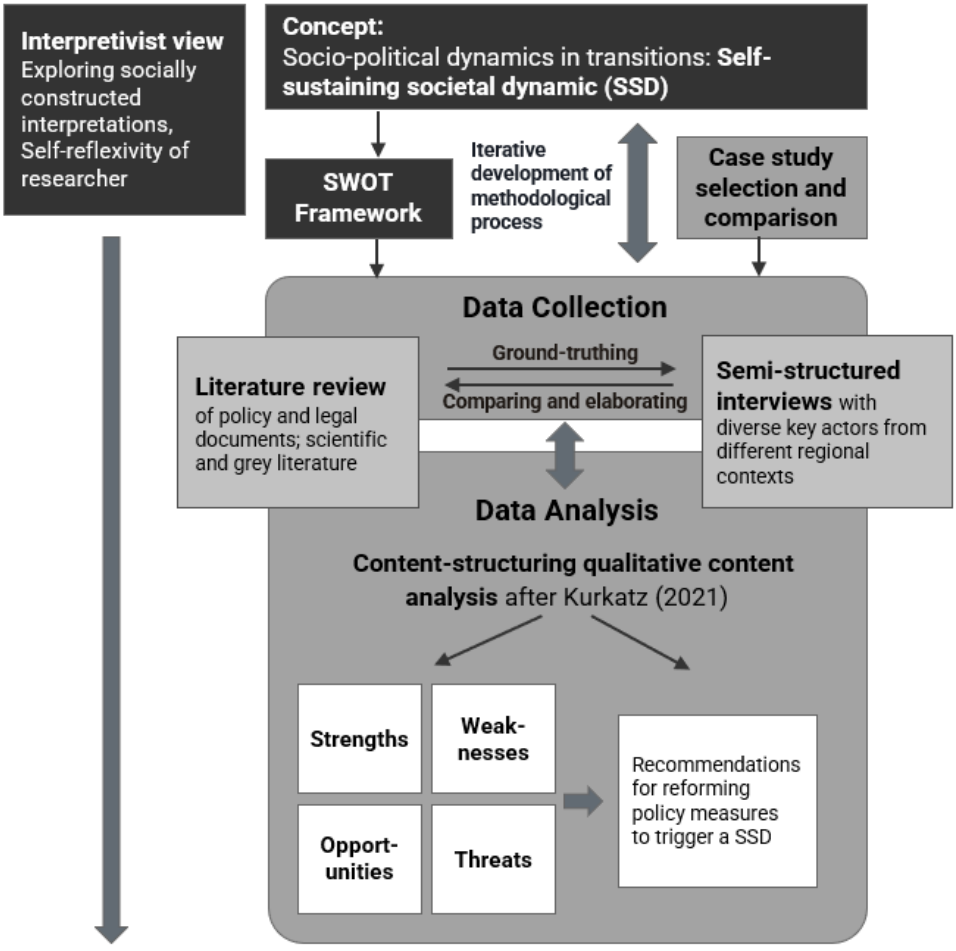

Figure 3: Structure of research methodology

4.1. Legal Micro-Level Comparison

In this study, a legal comparison after Reitz (1998) is conducted on the micro-level to analyse the measures within subsidy law in the two case study regions of BA and BW. The two specific policy measures embedded in the EU-level policy framework of the CAP and implemented in subsidy law at the level of federal states, represent the research unit, the *tertium comparationis*. The national regulatory objective to attain a certain coverage target for AFS is unified for all federal states (CAP-Strategic Plan, 2023), while German federalism allows flexible arrangements of how to implement the CSP and reach this unified target. The federal regulatory freedom and competition for incentive schemes with potential functional equivalence provide an essential analytical point of departure. It enables an empirical comparison of differences and similarities of (policy) instruments utilised in different federal states serving similar functionality (cf. Reitz, 1998). This analytical lens is particularly relevant for the IM, for which federal states have respective sovereignty in deciding whether and how to implement this measure suggested by the CAP (EU 2021/2115) and the German CSP. In contrast, the arrangement of EC3 is decided at the national level and is therefore similar for all federal states. Interesting in this specific case is the functional interplay and potentially even an interdependency between these two measures, given their complementary purpose of subsidy.

A common explanatory constraint shared by case studies and qualitative comparative analyses, in contrast to quantitative models, is their fundamental heuristic nature. This characteristic renders them unable to offer validity for generalisation. Instead, a comparative case study approach enhances the heuristic value of individual cases by providing a comprehensive exploration of differing circumstances. Consequently, this approach enhances the reliability of the conclusions derived from these cases (Knight, 2001).

Bartlett and Vavrus (2017) similarly consider a comparative case study approach as a heuristic that facilitates a “process of discovery or problem-solving” (p. 6). Given the limited scope of this study, the comparison concentrates on a horizontal logic: it examines various influencing (spatial and relational) factors that determine how the

selected political measures unfold in the two comparable federal states (Bartlett and Vavrus, 2017).

The following dimensions are identified in Table 3, which reveal both differences and similarities in the agricultural, financial, and fiscal policy structures of the states.

Table 3: Agro-economic structure in Bavaria and Baden-Wuerttemberg (data from Statistisches Bundesamt, 2021 and BMEL, 2023e)

Agricultural Structure	Bavaria	Baden-Wuerttemberg
Amount of agricultural farms	84,756	39,085
Average agricultural farm size [ha]	36,7	36,0
average labour force/ ha	3.0	3.1
Profit gains incl. labour costs [€]	42,049	35,031
Registered AFS Area [ha]	239	90

With approximately double the total territorial area, BAhas slightly more than double the amount of agricultural farms compared to BW (Statistisches Bundesamt, 2021). They show significant similarities regarding the average agricultural farm size and average labour force per hectare (BMEL, 2023e). These measures are relevant for a meaningful comparison since they imply farmers in both states have similar financial structures.

Still, statistically, Bavarian agricultural enterprises gain 20% more profit, including labour costs, than those in BW (BMEL, 2023e). While areas of arable land and grassland are similar in both federal states proportionally to the overall agricultural area, BW is covered by more permanent crops by approx. factor 5 considering absolute numbers (by factor 10 considering proportional differences in area size) (MLR, 2020b). In 2021, 239 ha of AFS were registered in BA, whereas BW reported 90 ha of AFS (DeFAF, 2022b). Nationally, BAhas the most registered AFS, while BW ranks fourth. The proportion of silvo-pastoral systems constitutes more than half of AFS in BA, while in BW, a majority is covered by silvo-arable AFS (DeFAF, 2022b).

The differences in planned funding budgets of the two federal states within the legislative period from 2023–2027 for direct payments of pillar Ⅰ are illustrated in Figure 4, and for Investment measures of pillar Ⅱ in Figure 5 (BMEL, 2023f).

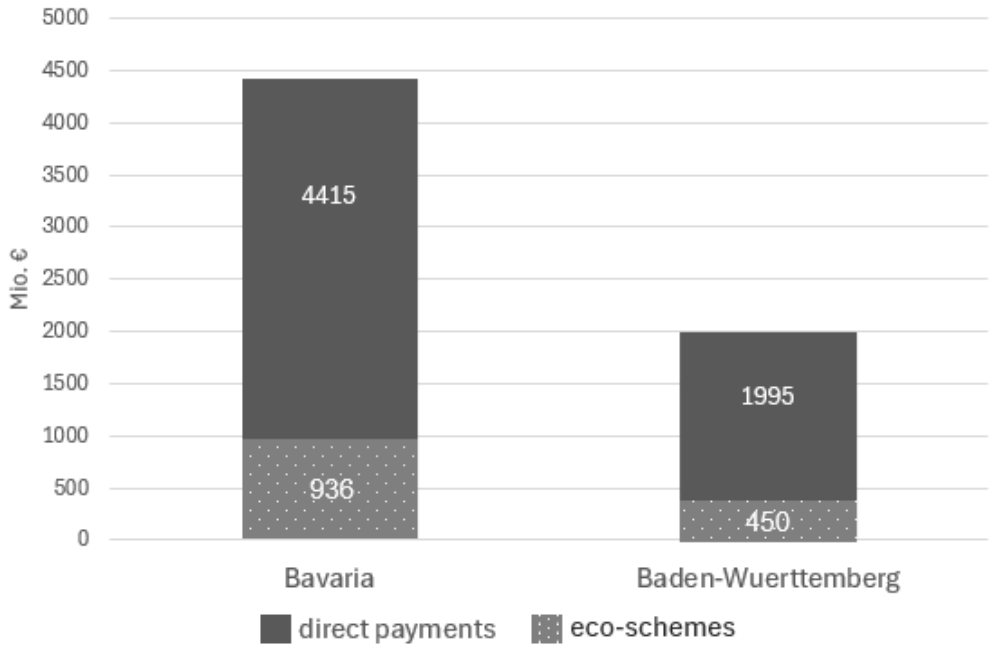

Figure 4: Comparison of Funding Amounts for Direct Payments in BA and BW (2023–2027)

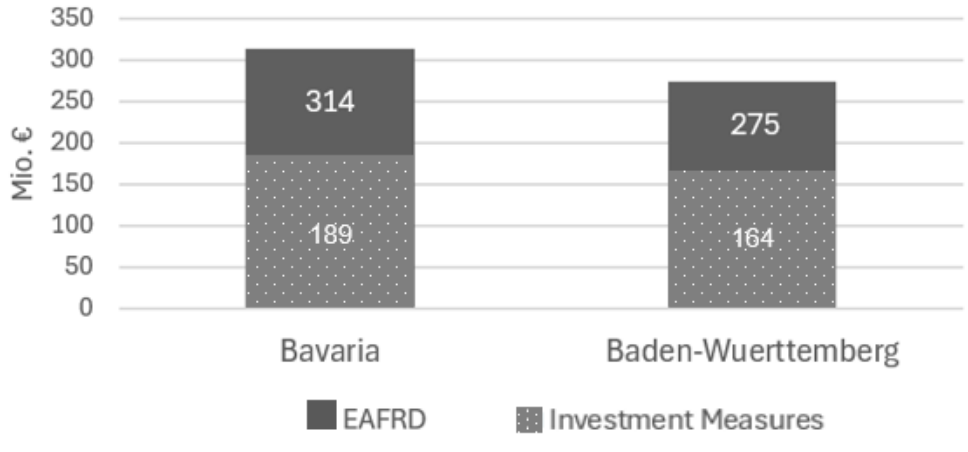

Figure 5: Comparison of Funding Amounts for EAFRD in BA and BW (2023–2027)

The data shows that EU funding for direct payments foresees an approximately 220% higher budget for BA, compared to the one from BW. Among direct payments, eco-schemes in BA similarly receive funding amounts that are double the amount of BaWü. Specifically for the AFS-related eco-scheme, 3.7 Mio. € are available in BA as opposed to BW's budget of 4 Mio. € (BMEL, 2023f). Regarding the EAFRD funding of

pillar Ⅱ, BA plans to spend only 14.5% more for investment measures than BaWü, which is very little considering the larger agricultural area and number of agricultural businesses. Likewise, the budget to be spent for “individual productive investments in agricultural businesses” (EL-0403) is distributed in the federal states equal to the proportion of the overall investment budget.

Even though differences in the agricultural structures and in public funding exist, similarities between the two Southern German federal states prevail, especially in a national comparison. Regarding the funding frame of the federal states, there are several differences, which, however, makes a comparison of these states with similar agricultural structures insightful. Thus, the comparability of these two southern German states is given.

The comparable case study strategy is found particularly suitable for exploring the level of complementarity of the selected policy measures within the two partly differing external contexts and associated SWOT dimensions regarding policy adoption.

In accordance with Kohlbacher (2006), exploratory case study analysis seeks to understand complex social phenomena, as it allows to grasp the comprehensive and significant attributes of actual occurrences. This case study approach aims to investigate the case of policy performance in the two federal states. Thus, this case study selection provides insights into the relevance of complementary support measures for economically incentivising AFS. The absence of investment measures in BaWü as compared to their availability in BA serves as an evaluation of the complementary character of economic support needed for establishing and maintaining AFS.

4.2. Data Collection

This study is based on a circular approach to qualitative research developed by Flick (2009) and Glaser and Strauss (1967). It involves the triangulation of an iterative, two-fold data collection: Relevant literature is reviewed, including primary literature, i.e., policy and legal documents, and secondary literature, i.e., scientific and grey literature. Additionally, the development of semi-structured interviews is elucidated.

The circularity of the process encourages constant reflection on the research process and its interdependent steps (Flick 2009).

4.2.1. Literature Review: Policy and Legal Documents

The consulted primary literature in the form of policy documents and legal documents is displayed in Tables 4–6. They are structured according to the policy level, ranging from the EU-level to the national and federal state level.

Table 4: Legal and Policy Documents on the EU-level

Full Reference	**In-text Citation**
European Commission. Directorate-General for Climate Action; COWI; Ecologic Institute; IEEP (2021): Setting up and implementing result-based carbon farming mechanisms in the EU: technical guidance handbook	EC 2021
European Commission (2022): Questions and Answers on EU Certification of Carbon Removals	EC 2022
European Commission (2023a): Approved 28 CAP-Strategic Plans (2023–2027). Summary Overview for 27 Member States.	EC 2023a
European Commission (2023b): Mid-term revision of the multiannual financial framework 2021–2027.	EC 2023b
European Commission. Directorate-General for Climate Action (2024). Carbon Removals and Carbon Farming. Energy, Climate change, Environment.	EC 2024
EU Regulation (1305/2013) on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC)	EU 1305/2013
EU Regulation (2021/2115) establishing rules on support for strategic plans to be drawn up by Member States under the common agricultural policy (CAP-Strategic Plans)	EU 2021/2115
EU Regulation (2021/2116) on the financing, management and monitoring of the common agricultural policy and repealing	EU 2021/2116
EU Regulation (2022/0394). Proposal for the establishing a Union certification framework for permanent carbon removals, carbon farming and carbon storage in products	EU 2022/0394
European Parliamentary Research Service (2021). EU progress on climate action – How are the Member States doing	EPRS 2021
European Parliamentary Research Service (2023). A Union certification framework for carbon removals	EPRS 2023

LULUCF Regulation, EU 2018/841	EU 2018/841
LULUCF Regulation, EU 2023/839	EU 2023/839

Table 5: Legal and Policy Documents on the national level (DE)

Full Reference	**In-text Citation**
CAP-Strategic Plan for the Federal Republic of Germany of 2023/03/16 (2.0)	CAP-Strategic Plan 2021
CAP-Strategic Plan for the Federal Republic of Germany of 2024/02/21 (4.0)	CAP-Strategic Plan 2023
GAPDZV 2022 - Verordnung zur Durchführung der GAP-Direktzahlungen, BGBl. 2023 I Nr. 343	GAPDZV
Bundesnaturschutzgesetz	BNatSchG
Bundesministerium für Ernährung und Landwirtschaft (2023a). Zusammenfassung zum GAP-Strategieplan 2023–2027.	BMEL 2023a
BMEL (2023b). GAK Rahmenplan 2023-2026	BMEL 2023b
BMEL (2023c). Neue GAP: Förderung gut angenommen, Zurückhaltung bei Ökoregelungen. Inanspruchnahme Öko-Regelungen nach vorläufigen Antragsdaten der Länder ohne Kontrollen und Plausibilitätsprüfungen	BMEL 2023c
BMEL (2023d). Gemeinschaftsaufgabe Agrarstruktur + Küstenschutz - Erläuterungen zu den Rechtsgrundlagen der GAK	BMEL 2023d
BMEL (2023e). Agrarpolitischer Bericht der Bundesregierung 2023.	BMEL 2023e
BEML (2023f). Gemeinsame Agrarpolitik (GAP) - Der GAP-Strategieplan in Zahlen	BMEL 2023f
BMEL (2024a). Info: Anpassungen der Öko-Regelungen ab 2024	BMEL 2024a
BMEL (2024b). Private Mail exchange about preliminary funded area of EC3 in BW and Bavaria	BMEL 2024b
BMUV (2023): Aktionsprogramm Natürlicher Klimaschutz. Kabinettsbeschluss vom 29. März 2023.	BMUV 2023

Table 6: Legal and Policy Documents on the federal state level

Federal State	Full Reference	In-text Citation
BW	Ministerium für Ernährung, Ländlichen Raum und Verbraucherschutz Baden-Württemberg (MLR) (2022). GAP-Förderung, Ausschreibung der Beratungsmodule	MLR 2022a
BW	MLR (2023a). Agrarinvestitionsförderungsprogramm (AFP) - Teil A	MLR 2023a
BW	MLR (2023b) Beratungsmodule Ackerbau. Agroforst - Modul 222	MLR 2023b
BW	MLR (2023c). Agrarumwelt, Klimaschutz und Tierwohl (FAKTI II): C Sicherung besonders landschaftspflegender gefährdeter Nutzungen und Tierrassen	MLR 2023c
BW	MLR (2023d).Agrarumwelt, Klimaschutz und Tierwohl (FAKTI II):F Freiwillige Maßnahmen zum Gewässer- und Erosionsschutz	MLR 2023d
BW	MLR (2024). Landschaftspflegerichtlinie (LPR). Agrarpolitik & Förderung. Infodienst Landwirtschaft, Ernährung, Ländlicher Raum. https://foerderung.landwirtschaft-bw.de/,Lde/1962007	MLR 2024
BA	BAYERISCHES STAATSMINISTERIUM FÜR ERNÄHRUNG, LANDWIRTSCHAFT UND FORSTEN (StMELF 2023). Maßnahme I84 – Einrichtung von Agroforstsystemen. Merkblatt zum Bayerischen Kulturlandschaftsprogramm (KULAP)	StMELF 2023
BA	StMELF 2024a. Actual utilisation of Eco-Schemes and Investment funding in Bavaria 2023. Personal Conversation. 14.03.2024	StMELF 2024a
BA	StMELF 2024b. Agrarumwelt- und Klimamaßnahmen (AUKM) 08.05.2024. https://www.stmelf.bayern.de/foerderung/foerderung-von-agrarumweltmassnahmen-in-bayern/index.html	StMELF 2024b
BA	Richtlinien zur Förderung von Maßnahmen des Natur- und Artenschutzes, der Landschaftspflege sowie der naturverträglichen Erholung in Naturparken (Landschaftspflege- und Naturpark-Richtlinie) des Bayerischen Staatsministeriums für Umwelt und Verbraucherschutz (StMUV)	StMUV 2023

4.2.2. Literature Review: Secondary Literature

First, relevant scientific and grey literature is collected to assess characteristics, ideas, responses, and critics about the policy measures and their wider context. Peer-reviewed scientific papers, press releases, policy assessments, policy briefs, and opinion papers are considered to collect data from diverse perspectives on the broader political environment, the specific policy measures, their design, and their performance. This approach gives first insights into the four SWOT dimensions.

Policy assessments and scientific research projects such as those by Pe'er et al. (2022), Lampkin et al. (2020), Laporta et al. (2021), and McDonald et al. (2021), the EU-funded projects 'Agforward' (e.g., Mosquera et al., 2018a; Burgess and Rosati, 2018), 'Agroecology for Europe' (Donham et al., 2022; Krishna et al., 2023), and the German project 'AgroBaLa' (DeFAF, 2022a), to highlight a few examples, are assessed. Informative press releases and position papers are identified on the EU- and national level and published by a range of organisations (see Table 7). These range from AFS associations (*EURAF* and *DeFAF*), *the German Farmers Federation (DBV)*, small-holder farmer associations and forums (e.g., *Working Group for Rural Agriculture, AbL; European Council of Young Farmers, CEJA),* and environmental organisations and networks (e.g., *WWF*, *BirdLife International, EEB*, *BUND, ARC2020*). In particular, the demands of an open letter to the ministries, senators, and members of the German parliament (DeFAF et al., 2023c) and a policy brief for AFS (Böhm et al., 2024a) are analysed. Both being signed by a wide range of organisations, initiatives, and civil society actors, they provide a comprehensive understanding of the current political debate on AFS policy in Germany.

Table 7: Selection of organisations with published opinions regarding AFS policies.

Level	**Organisation type**	**Organisation name**
EU	AFS association	*EURAF European Agroforestry Federation*
EU	Farmers forum	*European Council of young farmers* (CEJA)
EU, international	Environmental NGO	*World Wide Fund For Nature* (WWF)
EU, international	Environmental Organisation	*BirdLife International*

EU	Network of environmental citizens' organisations	*European Environmental Bureau (EEB)*
EU	European Platform	*Agriculture and rural convention 2020 (ARC2020)*
DE	AFS association	*German Association for Agroforestry (Deutscher Fachverband für Agroforstwirtschaft (DeFAF) e.V.)*
DE	Environmental Agency	*German Environmental protection agency (Umweltbundesamt, UBA)*
DE	Environmental NGO	*The Nature and Biodiversity Conservation Union (Naturschutzbund Deutschland e.V., NABU)*
DE	Environmental NGO	*German Federation for the Environment and Nature Conservation (Bund für Umwelt und Naturschutz Deutschland e. V., BUND)*
DE	Environmental Association	*German Federation of Organic Food Producers (Bund Ökologische Lebensmittelwirtschaft e.V., BÖLW)*
DE	farmers interest group	*Working Group for Rural Agriculture (Arbeitsgemeinschaft bäuerliche Landwirtschaft, AbL)*
DE	Consortium of Associations	*Platform of Associations for the CAP of the EU (Verbände Plattform zur Gemeinsamen Agrarpolitik der EU)*
*For further considered organisations see Böhm et al. (2024a) and DeFAF et al. (2023c).		

4.2.3. Qualitative Semi-Structured Interviews

In a second step, empirical data is collected through semi-structured interviews with key actors in the policy measures. The research does not aim for a conclusive mapping of all agroforestry stakeholders in the two federal states, but rather seeks to identify the in-depth perspectives of the few involved actors specified in 4.2.4.

By exploring, collecting, and analysing context-specific information (Kohlbacher, 2006) and allowing the reflection of intricate, situated, and challenging connections (Stake, 2006), an inductive approach is used in this qualitative content analysis. Qualitative research enables exploring research fields where little case-specific empirical data is available. The exploratory approach serves to ground-truth literature

insights via semi-structured interviews and to illuminate ideas, concepts, categorizations, and individual reasoning of key actors in the dynamic case study environment (cf. Helfferich, 2011). The qualitative character of this study is suitable to generate input for the SWOT analysis and gather insights into leverage points for an SSD.

Following a philosophical interpretivist logic, small sample interviews are conducted to explore multiple socially constructed meanings, interpretations, and realities of the informants (Saunders, Lewis, & Thornhill, 2019). The purpose of qualitative research is to examine the constitution of the social reality of interviewees, which is to be differentiated from the meaning-making of the interviewer (Helfferich, 2011, p. 21). The interaction between the interviewer and interviewee is significant because the interpretation of the constructed reality is inherently shaped through interaction. The context of the social reality and further attempts to understand this social reality add another layer to the construction of meaning-making (Helfferich, 2011, p. 23). With that in mind, reflective subjectivity is a relevant criteria to guarantee the quality of data collection (Helfferich, 2011, p. 158). It assumes being mindful of the subjective implicit assumptions and expectations by which the interviewer and interviewee shape the conversation. Further, reflexivity should not be limited to the interview interaction *per se*, but is indirectly also present in the process of interpretation (Helfferich 2011).

Lamnek (2010) delineates four key principles for qualitative interviews. Similar to Helfferich (2011), the principle of reflexivity is defined as acknowledging the subjective nature of reality, emphasising that researchers operate within their own subjective realities rather than an objective truth. The principle of openness emphasises the importance of allowing interviewees to have an impact on the direction of the interview, while also maintaining transparency in the research process. Furthermore, the principle of communicativity highlights the necessity of conducting interviews orally to facilitate effective communication between researchers and participants, requiring adaptability to changes in language or topics during the interview. Additionally, the principle of explication enables interviewees to seek clarification or further explanations, a feature not commonly found in quantitative research methods. This principle encourages a deeper level of engagement and understanding between the researcher and the interviewee

(Lamnek, 2010). By embracing these principles, qualitative researchers can foster a more collaborative and insightful interview process, allowing for a richer exploration of the research topic. The emphasis on reflexivity, openness, communicativity, and explication serves to enhance the quality and depth of qualitative interviews, ultimately leading to a more nuanced understanding of the research subject.

4.2.4. Developing the Interview Guide

The main goal of the interviews is to compile information regarding the informant's relation to and perception of the policy measures and their contextual factors to foster AFS uptake. A guideline of questions and major topics is employed to identify perceptions of the two policy measures and associated regional specificities (App. A). The interviews are conducted to collect data about the following major topics:

a. Subjective evaluation of the characteristics and current state of EC3 and the IM in BA, referring to strengths and weaknesses inherent to the policy measures
b. Perceived external risks and opportunities of the policy measures and their context
c. Limitations and imagined adaptations to reform the policy measures and their context with regard to the dimensions of an SSD

In accordance with the principle of openness (Lamnek, 2010), open questions predominate in this study to explicitly leave room for prevailing assumptions and elements of the interviewee's own logic and concepts (Mey & Mruck, 2020, p. 321). In accordance with the characteristics of semi-structured interviews, theory-guided questions are developed to confront the interviewees with their subjective theories and stimulate self-critical evaluation (Mey & Mruck, 2020). Subsequently, the perception of SWOT dimensions is examined by asking, for instance, about their perspective of strengths and weaknesses, while further inquiries about specifications deepen their reflexivity. This means systemic types of questions are employed in the interview (Mey & Mruck, 2020, p. 321). Apart from asking interviewees about their own perspective, if suitable to the flow of the conversation, they are also asked about the perspectives of familiar others to illuminate different positions of perception (Mey & Mruck, 2020). Interviews are concluded with hypothetical questions and questions

regarding visions and utopias to gather information about imagined opportunities and recommendations for reforming the policy measures and their broader environment in a way that favours an SSD.

With growing knowledge and experience from previous interviews, the interview guide has slightly changed over time as some topics are identified as requiring more in-depth exploration or different approaches regarding the type of question. Therefore, (sections of) questions are specified, and others are omitted when interpreted in a different manner, not leading to the targeted topics in question. This is enabled by the open nature of qualitative research, which iteratively adapts the interview guide (Mey & Mruck 2020, p. 328).

4.2.5. Selecting the Sample

First of all, it is important to highlight that this qualitative research does not aim for the representativeness of the sample for a general population, and the sample is not selected randomly. Instead, the process of purposeful sampling is applied, which implies a targeted selection to acquire as much knowledge as possible in relation to the research question (Schreier, 2020).

A mix of snowballing and theoretical, heterogeneous sampling is used. According to theoretical sampling developed by Glaser and Strauss (1967), this study orients towards an open-ended, flexible approach to sampling. Thus, cases are selected according to the criterion of their conceptual relevance for the emerging theory. What this relevance consists of in detail only becomes apparent in the course of the investigation (Schreier, 2020). Thereby, snowballing is a useful method to establish contact bridges to samples that fulfil criteria that are identified as relevant through the process. Samples are selected with partly similar and different potentially relevant characteristics, following the principle of replication (Schreier, 2020).

At the beginning, when researching key actors that could suit the sample, the aim was to collect data from the heterogeneous perspectives of relevant AFS-associated actors located in both case study regions. Among that, farmers of AFS that already had applied for, or even received respective funding support in comparison to farmers that did not (for different reasons) are regarded as key actors. It was

anticipated that respective farmers would give insights into different perceptions of the policy measures and potential biases depending on the level of confrontation with these policies. However, due to the very low uptake of the policy measures, finding respective applicants or recipients of AFS funding and farmers generally knowledgeable of the funding measures proved to be a difficult endeavour.

Consequently, the target group of key actors was expanded to include AFS planners and consultants, scientists, extension services for farmers, and representatives of relevant authorities. These actor groups are found to be most conversant with the policy development of AFS and could inform about the different perspectives of policy support required for AFS uptake.

As a basis for sample selection, relevant contact data is researched via Google Search. Particularly, agroforestry network pages by DeFAF and EURAF appeared useful as they managed satellite maps containing contact information for listed agroforestry practitioners, scientific institutes, and information centres. Given the niche character of this field of study, contacts can frequently be established through snowballing via previous interviews and available contact bridges from the research project CDR PoEt. The small and rather informal network of people being engaged in agroforestry in Germany is beneficial for reaching out to potential interviewees and receiving positive responses. This might have a favourable impact on the level of confidence among informants to participate actively in interviews and provide information. Being reflective about a potential bias in the informant's conceptualisation of the respective policies through the snowballing method, additional samples are chosen independently and with the intention to cover different beliefs and conceptions.

The following AFS-associated actor groups are selected to create an understanding of different stand-points ranging from:

a. Individual agroforestry- farmers as potential applicants to the policy measures
b. Consultants and extension services have a long-standing exchange with different actors, scientific disciplines, and policy advisors in the field of AFS.
c. Scientists, researching the developments, challenges, and requirements of AFS-related policy measures from a natural and political science perspective.

d. Locally responsible authorities and associations, consulting and accompanying the process of funding request and approval.

A total of 22 individuals are contacted via mail.

Finally, 13 interviewees are consulted, as displayed in Table 8. Four interviewees are located in BA, whereas another four are based in BW. The remaining five interviewees have no specific focus on or relation to any of the two federal states. Among all the interviewees, seven have a regionally overarching perspective and experience regarding AFS beyond the two federal states.

Table 8: Characteristics of consulted interviewees

No.	Role	Region	Interview Interest
1	Scientific Researcher	BW and national	Natural science perspective to AFS
2	Scientific Researcher	National	Ecological and political scientific aspects of AFS
3	Farmer of meadow orchards	BW	Implementing, maintaining and marketing of Meadow orchards as AFS
4	AFS consultant and planner	National	Cultivation and techniques of AFS, perspective on strengths and challenges of AFS maintenance
5	AFS consultant and planner	BA and national	Cultivation and techniques of AFS, perspective on strengths and challenges of AFS maintenance
6	AFS consultant and planner	National	Consultancy and planning of AFS,
7	Extension service	International, with national expertise in Ger many	Overview over policy instruments and perspectives of key actors on AFS in Germany and beyond
8	Part-time AFS farmer, Forester, Ecologist	BW	Maintenance of silvoarable and silvopastoral AFS, financial
9	AFS consultant and planner, AFS-expert in agricultural working group	National	Focus on environmental aspects of AFS and political requirements
10	Part-time AFS farmer	BA	Expertise in AFS implementation and maintenance, receiver of funding support
11	Founder and teaching supervisor	BA	Vision to make AFS an educational component for agricultural schools,

	of AFS-course		
12	AFS consultant, scientific researcher and teacher	BA	Own AFS cultivation, expertise in implementation, maintenance and funding of AFS
13	Landscape preservation association, and lower environmental authority	BW	Perspectives on AFS from implementing, low-level authority and association, regulatory processes

4.2.6. Procedure of Conducting Interviews

The survey data is gathered from the 12th of March until the 4th of April 2024, after previous mail exchanges. The interviews are exclusively held in German.

Besides one in-person interview and two phone calls, the majority of interviews are conducted via video call via the Google Meet platform. Most interviewees are spread across different regions of Germany and have limited time availability. Interviews are held during the day. In some cases, farmers prefer to be interviewed in the evenings after sunset due to their work schedule in the field.

No specific time frame is pre-fixed for the interviews, which gives the possibility to deepen specific subjects. The eventual duration of each interview is dependent on the interview's personal time schedule, the degree of successful interaction between the informant and questioner, and the interest and openness of the informant to share their perspective. As Helfferich (2011) states, the quality of the qualitative data from interviews depends on the quality of the communication and interaction situation.

Frequent paraphrasing of the interviewee's spoken word aims at comprehending and validating the interviewer's interpretation (Mey & Mruck, 2020); in combination with mirroring back and offering one's interpretation of the spoken word, this aims at maintaining the interview's flow (Helfferich, 2011).

An increasing experience in conducting interviews does not necessarily imply an improved quality of interviews due to declining concentration and attention, according to Helfferich (2011). Maintaining an open attitude is a crucial precondition for

constant reflection and adaptation of the interview guide. Though, for some re-emerging components, for instance, opinions about the eligibility criteria of the policy measures, further inquiries are foregone due to the repetitive and substantial character of the answers received from previous interviews and data collected from literature. Instead, the interview questions are aligned to fill existing data gaps concerning the research questions, for instance, about recommendations for future reforms. Applying the principle of explication (Lamneck ,2010), for instance, interviewees are guided to adopt an out-of-the-box-thinking approach to answering hypothetical questions regarding their imaginations of future (policy) developments.

The majority of interviewees sign a written data protection declaration before the interview. In the few cases where interviewees do not send in the signed declaration, they are informed and confirmed verbally about data protection and processing. They consent to not making their personal and company data available in the context of this work. At the beginning of the interviews, all participants are informed about the process, the aim, and the openness of this work. The dialogue starts with introductory questions about the interviewee's connection to AFS. Finally, the policy measures are addressed by a quick check-in regarding the interviewee’s familiarity with the specific schemes. The perspectives of the strengths and weaknesses of the policy measures are inquired about by asking about their own experiences with the current policy environment. To keep the conversation in fluency, and to principally ensure comprehensive coverage of relevant topics, specific themes are introduced as a support to jog the interviewee’s memory. The inquiry of opportunities and threats is conducted likewise, whereas the terminologies are elaborated on, paraphrased, or exemplified to avoid any unclarity or misunderstandings. On the basis of the shortcomings, limitations, and risks described, interviewees are asked about potential adaptations that could foster the policy measures capability to elicit an SSD. Again, in cases of a short response, different topics are brought up, such as synergies with other policy measures, market developments, or capacity building.

The interviews are recorded to facilitate the data analysis. To follow up on the points of the conversations, notes are taken additionally. The interview duration ranges from 35 to 80 minutes, with the majority lasting approximately 60 minutes.

Furthermore, due to the bad audio quality of the two phone interviews, the audio of these two interviews cannot be recorded in a way useful for transcription. Therefore, the interviews are merely processed by keeping records in memory. The most insightful quotes from the interviews are collected in App. F.

4.3. Data Processing and Analysis

First, the collected data is transcribed using the transcription software noScribe. The spoken word of the interviews serves as one part of the data basis for the qualitative content analysis. For this reason, the expert interviews are analysed using a transcription, according to Gläser and Laudel (2009) and Dresing and Pehl (2020). The interviews are transcribed into 138 pages of text by the author of this thesis using a software programme for artificial audio transcription, namely ‘noScribe’. The audio recordings of the interviews are transcribed in full; only the introductions describing the process and the interviewees' closing remarks are transcribed. In accordance with the data protection declaration, interviews are anonymised. During the transcription process, interruptions and incomprehensible passages are marked (Gläser & Laudel, 2009, p. 194). Potential defects in automated transcription are adjusted manually. The transcripts can be found on the CD that accompanies this work.

The evaluation is carried out based on the framework of a content-structuring qualitative content analysis, according to Kuckartz (2016). This multi-level process of categorization and coding allows for a wide spectrum of fully inductive categorization to largely deductive categorization (ibid.). In this study, categorization and coding are applied by combining deductive and inductive approaches in an iterative process for both the literature material and the interview transcripts. The SWOT matrix provides the structure to order and evaluate findings according to its four dimensions. Methods are triangulated by combining deductive and inductive methods, and data is triangulated by integrating different kinds of materials (Flick, 2020), i.e., policy and legal documents, secondary literature, and semi-structured interview transcripts. This results in more robust and reliable results (Kohlbacher, 2006; Flick, 2020), regarding the determination of SWOT dimensions.

The methodological 7-step process by Kuckartz (2016, p. 98) is adapted to the

limited scope of this study and summarised into four steps:

1. **Initiating text work and the development of deductive main categories**
   First, relevant scientific and grey literature, as well as the interview transcripts, are scrutinised. On the basis of the research questions, insights from the literature, the concept of SSD, and the SWOT framework, deductive main categories are formed (e.g., strengths and weaknesses; bureaucracy or eligibility). In this way, the interview questions translated into everyday language can be linked to the conceptual background.

2. **Coding of the data material with deductive categories and determination of inductive subcategories on the basis of the data material**
   In the first coding process, all available material (literature and interview transcripts) is coded according to the main categories. The coding software Atlas.ti is used for this process of data analysis. Coding is done sequentially, assigning text segments to relevant categories while disregarding irrelevant passages. After gathering all text segments coded under the same category, subcategories are inductively determined for a more precise differentiation of initially broad categories. This iterative process of differentiating and complementing subcategories allows for considering new insights from the material and concludes with organising and systematising the final code list, identifying relevant dimensions, and consolidating subcategories into more abstract or general ones.

3. **Coding with the differentiated category system**
   The entire material is reviewed based on the differentiated deductive and inductive main categories and subcategories. This phase marks a systematic review of text segments previously coded under the main category, now allocating them to the newly differentiated subcategories.

4. **Analysis of coded material and presentation of results**The text passages are systematically analysed at both the case and category level, i.e., summaries or comparisons of cases are possible, as well as the analysis of all text passages within a category such as ‘policy synergies’. Case-specific thematic summaries are developed to attain a concise and pointed analytical reduction of

the material into thematic matrices. This enables delving deeper into interpretations of relevant individual cases and facilitates their comparisons (Kuckartz 2016).

5. Results

The results are structured along the lines of the research questions listed in 1.3.: First, the policy measures and their context are elaborated and evaluated regarding the SWOT dimensions. Second, the complementarity of the policy measures is evaluated on the basis of comparing insights from the case study regions. This serves as a foundation for the subsequent in-depth analysis of the dimensions of the SSD identified in the SWOT analysis. Finally, recommendations to reform the policy measures in order to improve their contribution to triggering an SSD are derived from the SWOT.

5.1. SWOT Findings

This subchapter answers the first sub-research question regarding strengths, weaknesses, opportunities, and threats of the policy measures and their wider context to foster the uptake of AFS in BW as compared to BA. The SWOT dimensions are identified by analysing primary and secondary data. The literature review elaborating the policy measures' characteristics, their funding structure and requirements in 2.3. provides a knowledge base for this result section.

5.1.1. Strengths and Weaknesses

Whereas further details on identified weaknesses can be found in Appendix B, the most relevant aspects of strengths and weaknesses are highlighted in Table 9.

To briefly summarise, the strengths of EC3 and IM include the legal certainty of AFS as determined in GAPDZV (elaborated in 2.3.), the flexibility in programming both measures on a national and federal state level, and the fact that EC3 is coherent nationally. Principally, both measures are aligned to the purpose of addressing the main financial barriers of uptaking AFS (see 2.3). As major weaknesses, the low funding amounts of both measures are highlighted, as are the laborious bureaucratic processes and restrictive eligibility criteria. Finally, non-transparent and implausible political decision-making hampers political trust among AFS proponents.

Table 9: Strengths and Weaknesses of EC3 and IM

STRENGTHS
- **Legal certainty** for AFS through GAPDZV Sect. 3 agricultural activity and sect .4 agricultural area enable reversibility of wooden elements and utilisation assurance with the prior goal of both food or resource production, as foundation for adoption of AFS (ABL, 2022a; BUND, 2021) - Purpose of EC3 and IM principally **address main financial barriers** to AFS adoption - EC3 principally interesting, multifunctional tool with potential to provide **public money for public goods** (Krishna et al., 2023) - National-wide **coherent** programming and funding of EC via pillar Ⅰ, no dependency on regional co-funding - High flexibility of Member States/Federal States to design EC/ IM allows for **context-sensitive** programming (Mosquera-Losada et al., 2017 & 2018a) crucial for diverse AFS; no one size fits all solutions restricted on EU-level - **Low adoption barrier** for farmers regarding EC3 due to one year commitment - AFS is no unfamiliar term in the broad base of society, also addressed by administrations, research institutes and policy - BA as a federal **blueprint** for offering IM, with some relevant funding amount (DeFAF et al., 2023c) ○ Improved bureaucratic processes compared to other federal states ○ Simple and plausible application for EC & IM

WEAKNESSES
- Missing harmonisation of AFS as agricultural utilisation on one hand, and with nature conservation law on the other hand **impedes planning security & self-determination** of farmers - **Little political trust** of AFS proponents due to perceived undemocratic, non-transparent and implausible political decision-making processes on regional and national levels - **Laborious and inconsistent bureaucratic processes** are perceived to be too burdensome for farmers and for relevant authorities. - Eligibility criteria for EC3 (and accordingly for IM) are largely perceived as **disproportionate and restrictive**, leaving **no flexibility** for farmers to implement diverse range of AFS, not fitting the agricultural practice and being **little oriented to ecological benefits** ○ Impracticable EC3-criteria **oppose regulation of GAPDZV** Sect. 3 and Sect. 4 ○ **Restrictive requirements for IM in BA** with rigid, non-expedient criteria, orientation towards EC3 criteria (instead GAPDZV Sect.4), and funding amounts perceived as too little to cover actual investment costs - AFS implementation and funding **barriers for AFS-interested groups** such as small enterprises, part-time farmers, side-line businesses and solidarity agricultural enterprises contradict the principle of equality compared with other agricultural practises - **Low funding amounts** of both measures is not sufficient to compensate for implementation & cultivation efforts, valuing of co-benefits, nor for reaching CSP targets - **Short term funding periods** of EC3 undermine farmers planning security and are ineffective for sustaining environmental and climate benefits - Flexibility of Member States and Federal States in scope of design enables **little ambitious programmes**, 'race to the bottom', or even the absence of measures (cf. absence of IM in most federal states)

5.1.2. Opportunities and Threats

The most salient elements of opportunities and threats are highlighted in Table 10, while Appendix C and D contain more information regarding opportunities and threats.

In short, opportunities include enhanced planning security for AFS, sustainability alignment of measures with public payments for public goods, improved collaboration between authorities, and facilitated engagement of key actors throughout the policy process. Meanwhile, threats involve competition from other low-effort funding schemes, risks of oversimplifying the AFS definition, and challenges in quantifying AFS co-benefits, which affect their financial incentivisation.

Table 10: Opportunities and Threats of EC3 and IM (for details, see App. C & D)

OPPORTUNITIES

- **Increasing planning security** by ensuring **legal certainty of utilisation and flexibility** for the entire duration of utilisation (e.g., harmonisation of AFS as agricultural utilisation and with nature conservation law)
- Aligning CAP measures with the principles of sustainability, multi-functionality and **public payments for public goods**:
  ○ Establishing **clear, targeted, measurable requirements** that assess and prioritise AFS with higher ecological value and leave room for flexibility for context-specific conditions
  ○ Developing a **coherent MRV framework** integrated in CSP for all measures that enables to financially internalising carbon sequestration and ecosystem services in an economically feasible way
- **Increasing funding amounts** to approximate to cover efforts for implementing and maintaining AFS
- **Involving key actors** in the process of selecting and designing policy measures, e.g collaborating with farmers, AFS policy advisors and other practitioners
- **Reducing** hindering **bureaucratic processes** (e.g., removing utilisation concept) and restrictive, implausible **eligibility criteria** including the adaptation of AFS definition to encompass the diversity of AFS
- **Establishing legal certainty and funding eligibility for broader groups** of AFS interests
- Fostering **collaboration between agricultural and nature conservation authorities** from regional to national levels to ensure coherence, efficiency and clear responsibilities
- Explicitly emphasising the **sustainable qualitative feature for marketing AFS products**, to be promoted by public actors; establish AFS labels and tourism
- **Improving knowledge and perceptions** of AFS through networks of expertise, workshops, consultancy programmes , integrated education systems and experimental pilot projects
- **Climate change resistance and resilience** of AFS could sensitise farmers and other key actors (e.g., consumers)
- **Reinforce policy synergies** based on similar or interconnected funding schemes (e.g., combination with other eco-schemes, GAK, ANK, CDR policy frameworks)

THREATS

- **Competition of EC3 and IM with other funding schemes** that have higher financial funding, require less management efforts and ecological ambition
- Low application quote of measures jeopardises measures to be further **reduced and removed**; also low uptake of IM in BA can cause the fallacy for other federal states to refrain from prospective implementation
- Further dependency of other funding mechanisms (e.g., GAK) towards criticised EC3 requirements
- Threats of a **differentiated definition** of ecologically diverse AFS vs. **simplified definition**:
  ○ Differentiated definition: Eligibility might be intricate and unfeasible in practice for policymakers, responsible implementing authorities and potential applicants; potentially complicates bureaucratic processes
  ○ Simplified definition: Elastic concept of AFS falls short of prioritising AFS with high

ecological ambition in funding schemes, and runs the risk for negative, unambitious examples of AFS variants to become politically instrumentalised with an adverse effect for the image of AFS/representative
- **Challenges of quantifying co-benefits** of AFS (e.g., biodiversity, CDR) as precondition to financially internalise public value and incentivise ecologically AFS
- **Lacking prominence and knowledge** about AFS among farmers
- Skepsis, insecurity, lacking knowledge and misinformation of AFS among political and administrative actors (ministries and lower regulatory authorities, administrations)
- **Lacking knowledge exchange** between political levels
- **Silo-thinking** in policy-making, legislation (regulatory law, funding law) and education of agriculture and forestry causes incomprehension, inconsistencies and blurred responsibilities.
- Risk potential of long-term AFS cultivation due to extreme weather events and other indirect consequences of change (wider ecological context) such as pest infestation, erosion, harvest and price fluctuations
- Weak AFS policymaking favours unstable food supply and additional economic burden
- No **adequate economic valuation** of AFS **on markets** for food, timber and fodder results in poor competitiveness of agricultural products; economic uncertainties due to price fluctuations and uncertain market projections (e.g., livestock, timber)
- **Insufficient structural capacities** among key actors to carry sophisticated AFS policy landscape

5.2. Complementarity of EC3 and IM

This subchapter deals with the role of complementarity between the two intertwined policy measures for regionally promoting AFS, responding to sub-research question two. The foundation of this legal comparison is deduced in Chapter 4.1. In short, the legal comparison of the case study regions of BA and BW is based on comparing the nationwide offer of EC3 in complementarity with the BA-specific implementation of IM to the absence of the latter in BW.

Reviewed literature and interview data clearly portray the following status: BA, being one of the first federal states to offer the IM for AFS as intended by the German CSP and the EU CAP, can serve as a blueprint for other federal states, albeit with certain weaknesses regarding its eligibility criteria[9]. Compared to other federal states, Bavarian farmers receive some relevant funding amounts for direct investment expenses, which can alleviate the initial financial burdens of AFS implementation. Therefore, if plausibly implemented, IM can serve as a prerequisite for farmers to adopt funding for the maintenance of AFS via EC3. Additionally, the case of BA appears as a promising precedent insofar as bureaucratic processes have been comparably smoothed; for instance, application processes for both EC3 and IM are

[9] For details of further weaknesses of IM see App. B

reported to be simple and plausible as opposed to narratives about the conditions in other federal states.

Nevertheless, the Bavarian IM faces challenges in terms of eligibility and financial budget. Mostly criticised is the orientation of the Bavarian IM (StMELF, 2023) towards EC3 requirements for AFS, instead of following the criteria of Sect. 3 and Sect. 4 of GAPDZV. Analogous to EC3, staggered funding amounts of IM are criticised for not being high enough to cover investment amounts, and additionally, they do not consider farmers' internal labour as an eligible cost. Including stringent eligibility requirements to provide an investment concept, these factors probably contributed to the low application quotes for IM in BA (StMELF, 2024a). An additional driver for the low application of IM would be other funding mechanisms for AFS in BA, which are financially more lucrative (cf. measure 'K78'[10] in KULAP, and funding of meadow orchards[11] in BayMBl. Nr. 513) and therewith practically outcompete IM. The low application quote of IM in BA implies the threat that federalism interprets this pilot case in a way that other federal states refrain from offering IM due to perceived little interest in investment funding or similar misconceptions. Further, the assumed interdependency of both measures could jeopardise and elicit that EC3 is further reduced in funding or completely removed.

Above all, there is a shared consensus among interviewees and reviewed literature that a complementary offer of both EC3 and IM plays a pivotal role in archiving national AFS targets (CAP-Strategic Plan, 2023) and carbon sequestration targets of LULUCF (EU 2023/839). It is now the task of the state ministries to translate the IM into regional law (*Landesrecht*). The alliance *Agroforst Jetzt!* (2024) expresses the latest expectations of some state ministries to translate further AFS funding programmes of the GAK framework into regional plans. Interviewees with practical experience in cultivating AFS, as well as Baumland-Kampagne (2023), emphasise the need to fund the implementation of new AFS together with tree nursing and training, while establishing an independent programme to support efforts for tree

[10] premium of 12€/fruit tree orchards for difficult cultivation, previously considered in B57 with 8€/tree (StMELF 2024b)
[11] Planting and maintenance of tree orchards funded with up to 90% of expenses (BayMBl. Nr. 513; StMUV 2023)

cutting. This again highlights the interdependency of different funding aspects and purposes to jointly and effectively foster the uptake of AFS.

5.3. Assessment of Dimensions of SSD

The results of the operationalisation of the SSD through the SWOT framework build on the findings from the previous chapters 5.1 and 5.2 and are collected and illustrated in the following subchapters. Perceived effects on the three dimensions of *power structures*, *societal learning,* and *social participation* associated with the policy measures and their contexts are compiled below. This serves to evaluate in what sense the policy measures contribute to facilitating an SSD towards upscaling AFS from the niche level or instead hinder such a transition. In doing so, this section provides an answer to the first main research question.

5.3.1. Power Structures

Insights from the data analysis illustrated the dynamics of power, control, and over-regulation that characterise the two policy measures. The lack of transparency in policymaking, the distribution of decision-making power among key actors, disadvantages in bureaucracy and eligibility for policy measures, and the formation of strategic alliances against hegemonic positions involve power-political dynamics.

On the one hand, the positive achievement of the legal status of AFS in the German implementation of the CAP (GAPDZV, Sect. 3 and Sect. 4) in 2023 symbolises a strength. However, this is accompanied by **non-transparent, undemocratic political decision-making processes** on national and regional levels. An interviewed AFS consultant specifies this weakness, referring to the eligibility criteria of the policy measures: “There is actually no situation in any of the federal states where the ministry actually issues and says that these are the criteria to be checked. The subordinate authorities are not given any information on the criteria to be applied. I clearly see BA as an exception.” Primarily, the excessive bureaucratisation of processes for AFS implementation and funding, and restrictive eligibility criteria meet with incomprehension among AFS proponents, and specifically generate uncertainties for farmers. Among interviewees that experienced AFS projects and efforts to apply for EC3 or IM, they appeared largely disappointed by the

implementing authorities (e.g., agricultural offices, nature conservation authorities) due to regionally inconsistent and implausible bureaucratic hurdles that sometimes even were perceived to be subject to some degree of arbitrariness. AFS consultants referred to the terms ‘complete blockade mentality of administration’ and ‘fear regulations’ (in German; ‘Blockadehaltung’ and ‘Angstregelung’). These describe the administrative and regulatory approach of over-regulation[12], disproportionately restrictive criteria[13], and the exclusion of options as a matter of principle, instead of assessing case-specific implications, as an answer to uncertainties with this often unfamiliar concept of AFS. Namely, inconsistencies between the funding law and the regulatory law can lead to insecurities about the legal status of AFS and create concerns about paternalism among farmers. For instance, differing from the legal treatment of conventional agricultural activities, the German Nature Conservation Law (BNatSchG) can restrict or prohibit the cultivation of AFS in protected areas by declaring AFS components as protected landscape elements or species.

Second, there is dissent about the involvement of multiple actors in **distributing decision-making power** at different policy levels. On one hand, some interviewees perceive involving intermediaries such as landscape preservation associations within funding processes (cf. Baumland-Kampagne, 2023) as a favourable opportunity for AFS policy adoption. This can distribute responsibilities and generates different instances on the operational level that are independent of authorities. On the other hand, clear, centralised responsibilities and processing are a preferable opportunity for other interviewees, mainly for reasons of expected efficiency and effectiveness. At the same time, however, it fosters the decision-making power of relevant authorities and concentrates the ‘target object’ for opposing allies. This consideration involves questions of power (de)centralisation in decision-making processes and in the distribution of responsibilities. Associated with this is the question of whether a re-delegation of responsibilities via the subsidiarity principle would be beneficial for breaking up power structures. Centainly, this would require greater collaboration among national and regional authorities.

[12] E.g., requirement of an utilisation concept (see details in 2.3.1.)
[13] E.g., distance regulation in EC3 (see details in 2.3.1.)

Third, a majority of interviewees and German AFS-related organisations (DeFAF et al., 2023c, Böhm et al., 2024b, Baumland-Kampagne, 2023, BUND, 2023) express the **disadvantage in bureaucracy and eligibility of AFS** compared to other agricultural land-use types. As a consequence, this weakness impedes farmers' planning security and restricts their scope of design, thereby limiting the sovereignty and freedom of AFS farmers. Notably, the DeFAF (2023c) highlights an estimation of around 90 to 95% of AFS already in existence in Europe not fulfilling the necessary requirements for EC3. "All these utilisation variants and options should be promoted instead of being undermined by a bureaucratic regulatory frenzy," appealed a representative of small-holder farmers and AFS consultant. The regulatory and funding frameworks can be observed to imply a priority position for other, more conventional agricultural systems compared to AFS. To illustrate, one interviewed AFS consultant contextualises and interprets the meaning of restricting the cultivation of diverse crops between wooden strips for EC3 as follows: "Then again, the question arises as to who actually benefits from it [the mentioned criteria]? So, from an agricultural policy point of view, is it really desirable that only large farms with, let's say, monocultures then perhaps break up these monocultures in the future with a few wooden strips? [...] Or do we actually want to use the wide range of agroforestry systems because we also recognise the ecosystem services and, let's say, want to create opportunities for action from small to large farms."

This indicates **conflicting interests** between authorities, policymakers, and monoculture farmers on the one hand, and AFS interested groups on the other. The conflict of interest lies in, what is eligible as AFS, who is eligible to receive respective funding, and the principles on how to distribute CAP funding (e.g., area based funding vs. result-based, oriented to ESS). As one AFS consultant states, "[...] I think there are also other interests that play a role. I mean, there are also powerful lobby representatives, even in the ministry, for sure. (.) And I don't always know how they come to their conclusions. So whether they actually take the approach that, yes, agroforestry systems can be established, but only on larger farms or larger fields."

Fourth, alliances can be observed to **counteract hegemonic political positions** that impair AFS in the political and regulatory frameworks. Niche-like AFS alliances, for instance, the alliance '*Agroforst Jetzt'* (and associates in DeFAF, 2023c; DeFAF, 2024a, Baumland-Kampagne, 2023) involve various actors, such as institutions,

private enterprises, foundations, associations, and research institutes from the food, agricultural, and forestry sectors. These aim for an integrated approach to promoting diverse variants of AFS and can be perceived as politically countering regime incumbents, such as strong agricultural lobbyists that favour large area-based monoculture funding. These strategic alliances of AFS proponents represent forces for transitioning the agricultural regulatory and funding systems towards sustainability principles that are in favour of land-use-based carbon farming systems such as AFS.

Overall, the **political will** to promote AFS in Germany is **called into question**: “[...] I think that if there was the will among politics or the administration, a lot could be done." Relating to the policy measures, a **lack of political trust** among AFS proponents results from frequently perceived ‘political headwinds’ due to dominant opposing interests by regime actors, and specific adverse political signals such as the retrospective reduction of the German CSP target area for AFS by factor 10, and the reduction of funding amounts by 75% for the legislation period of EC3 (CAP-Strategic Plan, 2023). The DeFAF (2024c) stresses that these political decisions undermine the sincerity of national policymaking. Additionally, the weak uptake of IM in German federal states, as described in 2.3.2, symbolises the political barriers of AFS at the federal state level, which oppose the will for implementation at the national and EU-level (Böhm et al., 2024b). Instead of repetitively signalling in favour of a long-term AFS path (e.g., including the regulatory continuation of the reversibility of AFS) and coming to terms with historical acts that aimed at removing wooden components from landscapes and specifically agricultural areas, current political developments induce scepticism and distrust among actor groups that are crucial for the adoption of AFS.

Concluding, AFS-related power structures predominantly appear to hamper the uptake of respective policy measures as they adversely affect the arrangement of the regulatory and funding frameworks in which the policy measures are embedded or intervene. Strengthening strategic alliances that advocate AFS, and facilitating discursive platforms for multidisciplinary interaction can provide an opportunity to counter dominant power structures and finally contribute to eliciting an SSD.

5.3.2. Societal Learning Processes

Closely interlinked with power structures, knowledge and learning are social dimensions that are involved in the adoption of policy measures and, finally, the effective establishment and long-term maintenance of AFS. The data analysis revealed weak levels of knowledge and knowledge exchange to restrain societal learning. Breaking up the siloed way of thinking about agriculture and forestry and fostering reflexive learning through participation and negotiation represent opportunities to strengthen societal learning processes.

First of all, **weak levels of knowledge and knowledge exchange** among different social actors are repeatedly stated to be a major weakness that adversely impacts the adoption of policy measures. In this sense, it specifically refers to knowledge regarding AFS implementation and maintenance as a fundamental base of knowledge, and the procedural knowledge of specifics of subsidy law and regulatory law, including bureaucratic processes and eligibility criteria, that is required to adopt the policy measures. The concept of AFS lacks familiarity among farmers, and political and administrative actors, as perceived by a majority of interviewees, and in empirical literature, mainly regarding farmers (Rois-Díaz et al., 2018; Mosquera-Losada et al., 2017; EIP-AGRI, 2017). Reasons for this include several weaknesses: Many interviewees report overall lacking knowledge and practical experience regarding AFS, associated with **disinterest, ignorance, and scepticism** mainly among regulatory and administrative actors, for instance in lower agricultural authorities and district administrations. **One-sided information**, or even **misinformation,** threatens the societal learning pathway when spreading through, for instance, negative and unambitious variants of AFS that become generalised representatives, which creates uncertainties and biases towards AFS. In particular, a lack of communication and knowledge exchange between political levels, and among different regulatory authorities is criticised as inhibiting the effective design and implementation of policy measures.

The **'silo-thinking'** regarding competences and responsibilities for agriculture, landscape and nature preservation, and forestry reinforces this dynamic of lacking communication, collaboration. It further impedes an integrative interdisciplinary approach in AFS-related policymaking, legislation, and education. As an opportunity,

approaches to agricultural education need to be re-adjusted to include perspectives of long-term-thinking based on more holistic curricula that meet the complex features of AFS. Furthermore, improved knowledge transfer between farmers and other knowledgeable actor groups (e.g., AFS associations and extension service organisations) constitutes a crucial opportunity for increasing access to the policy measures.

Moreover, as stated by Aykut et al. (2019), **reflexive learning processes** can enable a reciprocal adjustment of institutions, markets, and practices. As an example, participatory processes of negotiation between authorities and farmers can be an opportunity for a context-specific consideration of issues of nature preservation. This can simultaneously enhance mutual knowledge transfer, empathy, and a shared understanding of the concerned matter. In this sense, BA provides a positive case where AFS farmers and advisors report smoothed bureaucratic processes concerning different authorities after the first year of legislation and compared to other federal states. This can be hypothesised to be the case because a larger variety of AFS-related funding measures are being offered, which exposes authorities to more routine and thereby increases their learning experience (Böhm et al., 2024b).

On the contrary, lacking knowledge and coordination among policymakers and authorities represents a weakness that can cause bad decision-making and implementation, with detrimental effects on the practicability and final adoption of policy measures. In the context of criticism regarding the specific eligibility criteria of EC3, an AFS advisor states: “I know from various background discussions that the people who made this arrangement [of the eligibility criteria of EC3] were ill-informed.”

In conclusion, distinct knowledge biases and gaps concerning AFS still need to be bridged, which resemble forms of power that currently hinder the uptake of AFS in general and impede the adoption of policy measures. For AFS to break through, it presupposes countering the blockade mentality, sparking a willingness to learn among involved actor groups, and facilitating knowledge exchange. This aims at achieving a common understanding of the concept of AFS to effectively communicate, establish shared goals, and realise requisite processes, or at least, attain effective collaboration on the basis of implementable policy measures.

5.3.3. Social Participation and Democratic Decision-making

In the context of redistributing social influence and scope for action, questions of **economic profit sharing** and **participatory governanc**e come into focus (cf. Aykut et al., 2019).

First, the low uptake of the policy measures is influenced by the **weak economic involvement** of AFS farmers in receiving a fair financial share for providing a public good. There is a wide-ranging consensus among interviewees and in the literature (e.g., Verbände-Plattform, 2024; DeFAF, 2023c; UBA, 2023) about the insufficient unit amount of EC3 and the funding amounts of IM. As described in respective sub-chapters of 2.3., funding is far from sufficient to compensate for implementation and cultivation efforts, nor is it sufficient to value AFS's co-benefits. A Bavarian farmer summarises his perception of EC3's financial support: "(...) But at 200 euros, you can spare yourself [the effort associated with EC3]. (...) Better than 60 euros. (...) The 200 euros are a joke." Among all eco-schemes, Böhm et al. (2024b) evaluate EC3 to be the most effortful measure, receiving the lowest financial unit amounts.

The interviews indicated that financial shortcomings are mentioned more often as a major weakness by farmers than by advisors or scientists. One AFS farmer referred to a lack of discourse about the economic feasibility of AFS; instead, topics of biodiversity and ecology are accorded greater importance.

Beyond the financial support through policy measures, opportunities for marketing AFS products need to be seized, which prioritise their sustainable qualities and monetize associated ecological and climate-effective co-benefits through labelling and certification, only to mention a few.

Second, the **weak engagement of multiple diverse actors in decision-making processes** appears to be a major weakness associated with the policy measures. As highlighted by Pe'er et al. (2022), specifically, farmer engagement can enhance "acceptance, cooperation, and uptake of voluntary measures" (p. 5). However, none of the interviewed farmers or AFS advisors refer to positive experiences about their influence or consideration of their demands in political decision-making. Similarly, the position papers, policy briefs, and assessments by associations such as DeFAF (2023c & 2024c), BUND (2021), Baumland-Kampagne (2023), UBA (2023), and AbL

(2022a) rather portray a process of frustration and very little progress concerning political influence. The participation of social actors, specifically AFS proponents, in political decision-making appears to be weak. Hardly any participatory processes were involved in designing the policy measure. Neither were the several demands of active alliances of AFS associations (see DeFAF, 2024c; Baumland-Kampagne, 2023; Verbände-Plattform, 2022; Böhm et al., 2024b; Maaß & Brändle, 2024) for adapting measures to be feasible for farmers adequately responded to. As a result, an interviewed AFS advisor emphasised, “(...) in not a single case that I know of has this public funding played a role up to now, because it is not called up, cannot be called up, or is far too cumbersome, and the authorities themselves do not know how to deal with it.”

High restrictions for AFS in subsidy law and through interventions by regulatory law as elaborated above **restrict the scope of action** and therewith the self-determination of farmers. High regulatory and administrative barriers of the CAP structurally exclude AFS-interested groups from legally implementing AFS and receiving respective funding (Böhm et al., 2024b; DeFAF, 2023c), as both are tied to the CAP. These groups comprise small enterprises, part-time farmers, side-line businesses, and solidarity agricultural enterprises. This exclusion decreases the number of potential funding recipients and reduces the diversity of voices in political discourse.

Hence, there is high **potential for enhancing the pluralization of actor landscapes** in decision-making processes[14] by improving dialogue and collaboration between farmers and other types of professionals to take a farmer-centred perspective (EIP-AGRI et al., 2017). Ultimately, this can be aimed at decentralising the power of decision-making towards multiple knowledgeable actors.

As already elaborated in 5.3.2, participatory negotiation processes provide the opportunity to foster learning among involved actors. They further facilitate democratic decision-making as they elicit open communication between AFS practitioners and regulatory and administrative authorities.

[14] Interestingly, this corresponds with the conceptual literature regarding SSD (cf. Aykut et al. 2019). Further elaborations are discussed in 6.3.

5.4. Recommendations for Reforms to Trigger an SSD

The following paragraphs comprise pivotal reforms of the policy measures and their context for triggering an SSD. More elaborate descriptions can be found in Appendix E.

1. *Developing simplified, plausible bureaucratic processes and integrative eligibility*

To increase farmers' capability to act, bureaucratic processes need to be simplified by establishing plausible examinations that are easy to implement. As frequently mentioned, for instance, the utilisation concept should be replaced by a 'duty of disclosure' that only applies for AFS larger than 10 ha, to particularly relieve bureaucratic barriers for small farmers. Opposing the 'structure conservative' mentality in administration, as referred to by an interviewed AFS advisor, practicable and integrative eligibility criteria should apply for AFS. For example, the eligibility of AFS should not follow EC3 requirements but instead be replaced by general confirmation queries corresponding to the requirements of GAPDZV Sect. 4.

Additionally, 'experimental clauses' that provide sufficient funding and creative leeway for pilot projects can serve as best practices for testing multiple context-specific options of AFS. In addition, the actor landscape of AFS farmers should be diversified by establishing opportunities for potential AFS-interested groups that do not fit the definition of an 'active farmer' (EU regulation 2021/2115, Art. 4, sect. 5) to legally implement AFS and receive subsidies for AFS independent of the CAP. For increasing the planning security of farmers to AFS (components) in regard to interventions by nature protection law, an harmonisation with subsidy law can include differentiated assessments of potential conflicts of AFS with nature conservation law (Böhm et al., 2024b). Analogously to agrarian law, cross-references that guarantee the implementation, cultivation, and removal of AFS are to be integrated into nature protection law (DeFAF, 2023d).

2. *Establishing clear responsibilities and participatory processes*

Establishing consistent and transparent processes, responsibilities regarding the policy measures should be clearly distributed, and collaboration and coordination

among multi-disciplinary authorities should be fostered. Further, the engagement of involved actors should be enhanced by improving political structures , i.e., enabling public evaluation of negotiation and implementation documents prior to CSP approval (cf. Pe'er et al., 2020). In specific, bureaucratic processes for EC3 and IM should be institutionalised by giving mandates to knowledgeable associations: For instance, DeFAF or regional landscape preservation associations could serve as intermediary instances that consult farmers independent of authorities. Still, applying the subsidiarity principle, responsibilities should be re-delegated to relevant upper authorities. Participatory processes should be established by bringing together diverse actors in local and regional operational groups that provide platforms for fruitful farmer-centred discussions and negotiation.

3. *Financially internalising co-benefits (into funding schemes)*

To substantially incentivise farmers to implement AFS and apply for EC3 and IM, the co-benefits of AFS need to be monetised. According to the principle of 'public money for public goods', funding amounts for both policy measures need to increase to mitigate the financial challenges of AFS farmers proportionate to levels of environmental and climate ambition (cf. valuation of ecosystem services in Grunewald et al., 2023) and to the complexity of its cultivation (Krishna et al., 2023). In that regard, there are suggestions for increasing the unit amount of EC3 by a factor of 10. For IM, staggered funding should be oriented towards the wooden area of AFS and the degree of agro-biodiversity (cf. Baumland-Kampagne 2023), which provides an ecologically differentiated evaluation of AFS, is feasible to implement, and gives farmers the flexibility to develop AFS over time. The challenge for differentiated funding consists in the balance between complexity and implementability (EIP-AGRI , 2017).

As concluded by Latacz-Lohmann et al. (2022), point-based payments provide the most suitable model for eco-schemes: The environmental performance is reflected in eco-points per hectare and accordingly translated into payments within an eligibility threshold and variable cut-off. It can well balance targeted, environmentally-based payments with reduced bureaucracy and enhanced flexibility for farmers. Likewise, a premium for public goods with similar functionality is assessed and advocated,

focusing on eco-schemes, in a study from the German Association for Landscape Conservation (DVL, 2020).

4. *Fostering knowledge exchange and learning*

Knowledge exchange regarding the different facets of AFS should be fostered by supporting diverse AFS-related associations and institutions that organise AFS academies (DeFAF, 2023d), peer-to-peer learning groups, AFS-modules in universities[15], and facilitate civil engagement and social events[16]. Capacity building needs to be targeted by expanding, for example, the network of independent extension service providers and accessible, funded advisory support (cf. Veolia Stiftung, 2022; Böhm et al., 2024b). Particularly, the need to build up knowledge concerning administrative comprehension, skills, and capabilities such as the maintenance of AFS is mentioned frequently. Competence networks, best practice projects, and access to easily understandable funding information are further recommendations that can lower the hurdles for policy adoption. Specifically, small-scale platforms for experimentation, subject to reduced bureaucratic efforts and organised by operational groups on local and regional levels, can open a creative leeway that encourages learning and provides flagship projects (cf. EIP-AGRI, 2017). The interdisciplinary dialogue between public authorities, farmers, and associations needs to be encouraged. Finally, research programmes with local evidence-based pilot projects (e.g., AgroBaLa, cf. DeFAF, 2024e) that can provide information to farmers about context-specific AFS potentials should be enhanced.

5. *Enhancing competitive marketing options for AFS*

To create an SSD regarding AFS, it is evident that, in the long term, AFS needs to be financially viable for farmers, independent of the policy measures of EC3 and IM. Consequently, its sustainable value needs to be systemically reflected in the generated market demand. Public actors should aim at promoting consumer awareness and ensuring a comprehensible identification of AFS products through trustworthy and ambitious labelling (Würdig & Skalda, 2020; Böhm et al., 2024b;

[15] E.g., the elective module Agroforestry at the Weihenstephan-Triesdorf University of Applied Sciences (HSWT) in Freising

[16] E.g., AFS monitoring by University of Münster to engage local interest groups in citizen science (https://agroforst-monitoring.de/)

Mosquera-Losada et al., 2017; Mosquera et al., 2018a). Moreover, AFS can be holistically appreciated by food-, nutrition-, and biomass-strategies at the EU- and country-level (DeFAF, 2023c). Diversified, economically viable market options should reach beyond direct marketing and alleviate the organisational, logistical burden and financial risks of farmers. Creating strong, sustainable, and competitive agri-food value chains requires close cooperation between farmers and actors along the value chain via food cooperatives and food hubs.

6. Creating political synergies

For EC3 and IM to trigger social dynamics in favour of AFS, coherence and synergies within other CAP tools and further policy and legal frameworks are crucial. In particular, on a national scale, allowing for the combination of suitable eco-schemes[17] can mutually reinforce their uptake. Other interventions of federal state law[18] and private foundations[19]*,* should be aligned with EC3 and IM to jointly pursue nation-wide AFS targets. Supplementary fundings, especially including consultancy and training, are needed that are not charged with double funding, for instance within the frameworks of *Aktionsprogramm Natürlicher Klimaschutz* (ANK) (BMUV, 2023), and G*emeinschaftsaufgabe 'Verbesserung der Agrarstruktur und des Küstenschutzes'* (GAK) (BMEL, 2023b), and funding of land allocation (Böhm et al., 2024b). Overarchingly, a consistent European Agroforestry Strategy, as suggested by Mosquera-Losada et al. (2017), should foster the promotion, education, innovation, and research of AFS. Moreover, carefully developed policy and market instruments for the deployment and upscale of carbon farming methods can be of great significance for promoting AFS (EPRS, 2023; Hajdukovic, 2023;).

[17] E.g., allowing the combination of EC3 with EC1b/c (flower areas /strips), EC1d (old grass stripe in perm. grassland), EC2 (the combined plantation of diverse arable crops, currently counters the diversification targets of arable land of the CAP) , and EC4(extensification of permanent grassland)
[18] E.g., the Landscape Conservation Guidelines (Landschaftspflegerichtlinie) in BW (MLR, 2024), and the
Landscape Conservation and Nature Park Guidelines in BA (StMUV, 2023)
[19] E.g., Bioland Stiftung (2023), Veolia Stiftung and VRD Stiftung (2022)

6. Discussion: Effectively incentivising AFS

The results are discussed with regard to discourses about the valuation of AFS, the European AFS policy landscape, and influential policy levers in carbon farming for transitioning towards AFS. The discussion is concluded by reflecting on the strengths and limitations of the conceptual framework, as well as the empirical limitations of this study.

6.1. Valuation of AFS in Sustainable Agricultural Policies

This section discusses the transition to result-based funding, the incorporation of relational values in policymaking, the limitations of monetary valuation of ecosystem services, and the proposals for common-good oriented systems for land leases. It concludes by contextualising the results within other European policy landscapes.

Several actor groups (DeFAF et al., 2023c; Verbände-Plattform, 2022; BUND 2023, Böhm 2024a, CEJA et al., 2019b) call for transitioning the remuneration logic for agricultural systems and their funding landscape. Area-based funding should be replaced by a long-term remuneration system for actual public services, i.e., result-based funding. The DVL (2020) supports rewarding agriculture for its ecosystem services through a public goods premium to enhance the CAP's sustainability. The proposal for a nationwide public goods bonus includes 19 measures scored for biodiversity, climate, and water protection. This would reward farms for their actual ecosystem service contributions with public funds. Likewise, Grunewald et al. (2024) advocate the combination of markets and subsidies to help organic farms achieve similar or better profits than conventional ones despite lower yields, which is transferable to AFS.

Moreover, Elbakidze et al. (2021) highlight the lack of recognition of the relational value of AFS in policymaking as compared to the instrumental value that is typically applied to policy instruments. Relational values refer to subjective intrinsic values that emerge from the interactions and relationships between people and nature, including aspects like identity, inspiration, and livelihood (Elbakidze et al., 2021). Mattijssen et al. (2020) distinguished six routes through which relational values can be integrated

into policies[20]. Reflecting on language, education, meaning-making, and the use of technology, future research can deliberate on how relational values could be integrated into the setup of EC3 and IM and the overall AFS policy landscape.

Anyhow, social reasons argue against defining dimensions of nature solely through market and funding mechanisms; Some ecosystem services cannot or should not be measured in monetary terms, for religious, spiritual, and amenity values, leading to their underestimation from an economic perspective (Grunewald et al., 2024). A critical practice of economic evaluation needs to disclose assumptions and methods. Social and distributive consequences of remuneration instruments and agri-structural, context-specific aspects need to be considered when calculating remuneration rates (Grunewald et al., 2024; Maaß & Brändle, 2024).

Furthermore, a leverage point for structurally supporting democratic and pluralistic agricultural land-use is provided by the AbL (2022b), who propose a common-good-oriented leasing system. Landowners significantly influence regional job security, landscape revitalization, and village attractiveness through their choice of tenants, deciding between diverse or large-scale farms. Often, administrations make these decisions without adequate preparation (AbL, 2022b). The AbL (2022b), therefore, proposes using easily accessible criteria[21] from existing documents for leasing, supporting small-scale farming, ecological practices, sustainable, climate-adapted agriculture, and livable rural areas.

Placing the findings into the AFS policy landscapes of other European countries, a comparison by Buratti-Donham et al. (2023) reveals the German AFS policy system to be ‘quite middle ground’ (p. 1035) based on limited support in the CAP. They analyse the policy landscape of AFS in 19 European countries, gathering an overall increase in AFS policies, albeit with existing gaps in each country. They equally conclude that policies that have proven most beneficial in supporting AFS are those that introduce new systems, and provide annual support for the management of

[20] “(1) incorporation of pluralized meanings of nature; (2) the uptake of relational language in policy discourse; (3) a prioritisation of landscape-based policy; (4) empowering citizens in nature conservation; (5) re-orienting nature education to stimulate people’s personal bond with nature; and (6) using digital technology to stimulate new relationships with nature” (Mattijssen et al. 2020, p.402).
[21] These criteria include social aspects, aspects of animal welfare and land cultivation, and exclusion criteria, all to be adapted according to regional specifics by regional associations of AbL (AbL 2022b).

these new systems. The coherence of these measures is emphasised, supporting this study's hypothesis regarding the complementarity of the analysed policy measures. Additionally, Buratti-Donham et al. (2023) highlight the advantage of supporting the maintenance of traditional AFS and point to the Germany CSP as a model example (e.g., programmes for orchard meadows). Moreover, they assume France has the most comprehensive policy framework for AFS, encompassing both CAP support and regional support. However, lacking transparency on the actual farmer uptake and budget spend, it is challenging to comprehend how both CAP and regional measures are applied. As reported by Hajdukovic (2023), France has already included measures for agroforestry in the CAPs 2007–2013 and 2014–2020 in specific areas. In the CAP period 2014–2020, both the establishment and maintenance of AFS elements were funded by AECM, pillar Ⅱ. Additionally, the Biodiversity Programme in Switzerland is emphasised for its balanced provision of providing annual financial assistance for maintenance per tree while offering flexibility to farmers. Consequently, farmers are encouraged to plant agroforestry systems due to the financial stability provided by the programme (Buratti-Donham et al., 2023). The design of these successfully implemented and adopted programmes should be perceived as an exemplary function to be translated and tested in other contexts of policymaking, for instance for CSPs of other Member States.

6.2. Reflections on Transitioning towards AFS

The following section discusses challenges in transferring AFS to be a land-use practice within the norm. The gathered findings indicate a current slow change based on financial, political, and systemic hurdles that undermine farmer uptake on a significant scale. From a socio-political perspective, incoherent policy and regulatory landscapes have to undergo transition processes towards facilitating a high variety, complexity, and autonomy (cf. Wolsink et al., 2020) within agricultural systems. Importantly, lacking policy coherence (cf. Buratti-Donham et al., 2023) needs to be overcome by holistically approaching this multifunctional land-use practice.

It appears obvious that a disempowerment of incumbent influential actors is necessary to introduce a full range of policy levers[22] that foster farmer uptake of AFS and respond to the urgency of the climate and ecological crisis at a higher speed. How this can facilitate destabilising the regime by decreasing the institutional coherence is a difficult, complex endeavour that requires institutionalised ideas and rules to be discursively reflected and challenged (cf. Frank et al., 2024). Therefore, alongside policy change, more profound 'ideational' changes are necessary for regime destabilisation (Frank et al., 2024).

Concerning deep structural transformations being crucial, it might be that external pressures like climate change leverage the uptake of AFS and facilitate stimulating ideational change. As hypothesised by several interviewees, there might be a correlation between severe conditions of climate change and increased uptake of AFS in regions of Northern Germany and France. This adaptability to climate change of AFS farmers might involve overcoming 'cognitive lock-ins' based on prejudices and stereotypes of this alternative land-use practice (Krčmářová et al., 2021).

Additionally, the necessity of coherent policy frameworks further becomes clear when considering the potential of policy approaches to carbon farming, as introduced in 2.1 and 2.2. Whereas the CAP only gradually promotes carbon farming practices, voluntary market-based measures for carbon farming are experiencing an increase in Europe[23] (McDonald et al., 2021; Ecosystem Marketplace, 2024). These represent promising opportunities for integrating result-based incentive mechanisms for AFS (McDonald et al., 2021; Willard, 2023) and allow for stakeholder engagement throughout the design process (cf. Wald-Klimastandard). On April 10, 2024, the European Parliament and the Council adopted a provisional agreement on a voluntary carbon markets mechanism that facilitates private financing for carbon farming, renamed recently to the Carbon Removal and Carbon Farming (CRCF) Regulation (EU 2022/0394). This "first EU-wide voluntary framework for certifying carbon removals, carbon farming, and carbon storage in products across Europe" (EC, 2024) represents a crucial cornerstone, boosting carbon farming and advancing

[22] Policy levers can include incentives (incl. consultancy), taxes, and subsidies together with changes in agricultural and regulatory legislation (cf. Buratti-Donham et al. 2023).

[23] In 2023, the voluntary carbon market (VCM) saw a decline in volume and value for the second year in a row. However, agricultural credit transactions continued to grow, marking the fourth consecutive year of increase (EM 2024)

the EU's climate targets. While farming and forestry practices that reduce CO_2 emissions are intended to be rewarded through the CAP or other initiatives, the CRCF states that they should include practices of agroforestry (EU 2022/0394).

However, there are concerns about the potential risks associated with this expansion of the CRCF, considering that the necessary tools already exist within the CAP but require a more cohesive execution (Nyssens & Caiati, 2023; Willard, 2023). As carbon farming schemes gain momentum, the influence of the CAP is likely to diminish. Farmers who have garnered the highest earnings from the Common Agricultural Policy (CAP) are anticipated to be the primary beneficiaries of carbon farming. The potential effect of carbon farming on land availability is projected to mirror that of the CAP, in fact supporting land rush and speculation (Willard, 2023).

Certainly, the assessment of fair shares is difficult (Hansen & Geden, 2023). Moreover, as highlighted by the IPCC (2023b), ambitious climate change policies could potentially cause "disruptive changes in existing economic structures" (p. 60), leading to significant distributional impacts both within and between countries. Accordingly, questions of justice concerning the deployment of carbon farming require participatory, pluralist, and democratic deliberation. Alongside other societal, economic, environmental, and technological considerations of the current challenges of carbon farming, a policy approach needs to centre on principles of social justice (Bergman & Rinberg, 2021).

6.3. Conceptual Strengths and Limitations

In this section, I discuss how the conceptualisation of the SSD within the field of transition studies helps to understand the dynamics of AFS policy uptake and their context in the transition towards sustainable land-use systems.

The concept of SSD facilitates the refinement of the SWOT analysis regarding the three dimensions of power structures, societal learning and social participation, and their embeddedness within social, technical, and ecological elements. Thus, the perspective is broadened beyond the aspect of financial incentivisation of AFS, as primarily targeted by the two policy measures. The conceptualisation allows for

deeper insights into reflections, interdependencies, and complexities of the AFS-related policy environment in the two case study regions.

Another strength in applying the concept of SSD in this study can be derived from some analogies to the field of energy transitions. Interestingly, emphasised aspects of the social dimensions of SSD in the contexts of energy transitions by Aykut et al. (2019) show overlaps with the findings in regards to land-use transition as mentioned in 5.3. Namely, parallels can be found in both transition systems favouring a pluralization of actor landscapes by involving diverse actor groups through generating empowering political and regulatory frameworks. Involved in processes of production (of energy and, analogously, agricultural products and co-benefits) and political decision-making, interested, diverse actors can generate a driving force for transition. For transitioning towards AFS, the challenge consists of engaging mainly established actors in the land-use sector to endorse AFS. As argued in 5.3.3., the typical attributes of farmers should be broken up by involving further potential groups that can implement AFS. Future research should expand on consequential requirements for the institutional setup, and political and regulatory frameworks to endorse this pluralization of actor groups. Besides, political frameworks that encourage public discourse through small-scale experimentation and negotiation platforms are considered beneficial for both transition systems.

Moreover, the identification of niche strategies in the agricultural sector by Elsner et al. (2024) exhibits conceptual commonalities with the social dimensions of SSD and, in some ways, complements the conceptualisation of SSD. Both Elsner et al. (2024) and Aykut et al. (2019) recognise the role of *coalition formation and alliance building* as represented in one of four niche strategies, and encompassed in power dimensions in the SSD. The approach of *paving* can be linked to the social dimensions of SSD, namely societal learning, but is more profound as it aims at strengthening ideas and visions and therefore considers the role of meaning-making. For the strategies of *anchoring* and *alignment processes,* it appears that these provide explanatory power for how social dimensions finally translate into an SSD. They similarly describe connection processes within the niche, or from the niche to the regime level and to other niches that are transformed from being unstable (*anchoring*) to durable and coherent (*alignment*) (cf. Elsner et al., 2024).

Accordingly, a few aspects appear to be insufficiently considered in this study's conceptualisation of SSD. These involve a comprehensive linkage of SSD to the MLP framework, socio-cultural aspects, ethical consideration, and a critical systemic approach, which are elaborated in the following paragraphs.

Due to the lack of conceptual research on how the SSD can be specifically linked to the MLP framework, elaborations of this conceptual relation remain unclear. Conceptual examinations can approach the question of how the SSD, including the social, ecological, and technical elements and the three social dimensions, can be embedded in the MLP. In particular, power relations within and among the niche at the landscape level require a more in-depth explanation of how they destabilise the regime, and influence the SSD. The 'domains of transformation' by Anderson et al. (2019) can provide a potential point of departure for conceptually embedding the SSD within the space between the levels of the MLP. It describes the overlapping and interconnected area between an alternative approach (in this case, AFS) and the existing regime. In these domains, which include areas like access to natural ecosystems, knowledge, culture, and networks, niches, and regimes intersect and can challenge each other (Anderson et al., 2019). Further attention should be paid to what role the landscape level plays for SSD to ultimately take up. According to Elsner et al. (2024), the landscape level is underutilised in conceptualisations, although it represents the exogenous context on the macro-scale in which niches and regimes assume shape, experience pressures, or windows of opportunity.

Additionally, considerations of socio-cultural structures appear to be missing. The effect of cultural meaning on land-use practices (e.g., family tradition, landscape aesthetics, social awareness; cf. Elbakidze et al., 2021; Sollen-Norrlin et al., 2020; Rolo et al., 2020) seems to pose an impactful aspect of the SSD. For transitioning towards AFS, long-term, inter-generational perspectives shape socio-cultural dynamics; for instance, discourses about the desirability of landscape elements and social imaginaries of sustainable land-use transitions. Deeply intertwined generational worldviews, beliefs, values, and perceptions persist about how agriculture is 'done' and what it should serve. This can comprise an inertia that hinders reflecting incumbent agricultural structures and imagining combined land-use types in forestry and agriculture.

Moreover, ethical considerations are lacking in this conceptualisation. Despite questions of procedural fairness being involved in the dimensions of social participation and democratic decision-making, the following ethical issues are neglected: Whether policymaking produces fair outcomes and how ethical conditions from the niche to the regime level influence the SSD and transition processes in general are not explicitly assessed and evaluated. For instance, deliberations about mandatory requirements for farmers to cultivate a proportion of their land as AFS (cf. Buratti-Donham et al., 2023) involve ethical questions, too. Considerations of a fair distribution of burdens and benefits, as discussed in the assessment framework for CDR policy instruments by Holland-Cunz and Baatz (2024), can be integrated into the dimension of social participation of the SSD. This is particularly relevant when assessing economic profit sharing. Beyond economic aspects, other social, cultural, ecological, and technical aspects that influence the inter- and intragenerational distribution of burdens or benefits deserve a thorough assessment. In addition to distributional effects, the positive and negative impacts of a policy instrument on societal and governance structures (Holland-Cunz & Baatz, 2024) are a normative component that, I argue, is influential for the ability of a policy instrument to trigger an SSD.

Finally, I argue that a fundamental critical systems approach is necessary to understand how AFS relates to and contests incumbent regime structures (cf. Batel & Rudolph, 2021). Accordingly, research should confront what kind of deep changes are needed to combat the environmentally and socially harmful structures of the existing agricultural land-use system. In a similar manner, Dunlap (2021) argues for a more nuanced understanding of renewable energy, recognises its extractive and socio-ecological costs, and calls for a deeper socio-ecological transformation beyond market-based and technological fixes. In analogy to this, when applying the conceptualisation of SSD in the context of the sustainability transition of the agricultural system, a critical systemic perspective is required that questions eco-modernist thought and neoliberal capitalist structures (cf. Batel & Rudolph, 2021). It can help understand how to overcome the deeply rooted socio-political fabrics that reproduce social injustices and agricultural implications for the ecological crisis.

6.4. Empirical Limitations

First, the focused evaluation of the complementarity of two policy measures in this research, gives only limited insights into the potential for further complementarity among AFS-related policies. In particular, the comparison leaves out the potential synergies with other CAP elements, for instance, the AECM, and only slightly touches on the potential of combining different eco-schemes. Furthermore, synergies with other frameworks from different policy levels beyond the CAP, as recommended in 5.4 and discussed above, can be examined in-depth in further research.

Overall, a more holistic comparison of the two case studies can take place on multiple levels. As argued by Bartlett and Vavrus (2017), comparative case studies need to consider two different logics of comparison. Beyond comparing and contrasting identified units of analysis, a process-oriented logic should be considered. Tracing across individuals, groups, locations, and time periods, a processual comparative approach[24] (Bartlett & Vavrus, 2017) can be addressed by further comprehensive research. This could provide relevant insights into socio-historical contingencies and complexities (cf. Batel & Rudolph, 2021), path dependencies, power relations among different groups, and individual meaning-making.

An additional empirical limitation with regard to the case study comparison consists in the limited representation of relevant actors in the interview sample and secondary literature for assessing the social elements of an SSD. Further research could approach a broader mapping of relevant actors by considering the roles and positions of further involved groups. Namely, these can consist of lobby groups, agricultural associations, landowners, AFS-averse farmers, diverse AFS-interested groups, policymakers on a national and federal level, and implementing authorities. Additionally, other characteristics can be considered regarding the diversity of actor groups, including socio-demographic aspects. This could serve as a differentiated assessment of dynamic social elements and dimensions in shaping an SSD.

[24] Bartlett and Vavrus (2017) suggest comparing across three axes, which include “a horizontal look that not only contrasts one case with another, but also traces social actors, documents, or other influences across these cases; a vertical comparison of influences at different levels, from the international to the national to regional and local scales; and a transversal comparison over time” (p. 14).

7. Conclusion

This thesis aimed to investigate the role of policy measures, particularly EC3 and IM of the EU's CAP, in triggering an SSD for promoting AFS. The research focused on the regions of BA and BW, employing the SWOT framework to evaluate the strengths, weaknesses, opportunities, and threats associated with these complementary policy measures. Key strengths include the improvements in legal certainty for AFS provided by GAPDZV, national coherence in the programming of EC3, and the flexibility for federal states to design context-sensitive IM. Weaknesses involve low funding amounts, laborious bureaucratic processes, and restrictive eligibility criteria, associated with a lack of political and administrative advocacy for AFS. Opportunities lie in generating appropriate financial incentives for public goods, allowing for practical design flexibility, collaborating with stakeholders, and fostering policy synergies and education for AFS. Threats include inconsistent regulatory and funding frameworks, silo-thinking in education and legislation, negative biases against AFS, inadequate market valuation, and competition from more financially attractive, low-ambition policy schemes. Justifications for the low uptake of EC3 and IM can be derived from the weight of identified weaknesses and threats.

The research highlights the need for greater regional complementarity between policy measures to enhance regional AFS promotion, with BA's implementation serving as a blueprint despite some weaknesses in eligibility criteria and funding amounts. Effective policy implementation can alleviate financial burdens and streamline administrative processes. Low application rates and competition from other funding mechanisms underscore the need for ambitious and coherent regulatory and funding frameworks to facilitate transitioning towards AFS in a more holistic manner.

This study concludes that EC3 and IM can foster an SSD for promoting AFS on the condition that shortcomings within the social dimensions are addressed. 1.) **Power structures** contribute to restrictive, unambitious, and non-transparent decision-making processes that pose significant challenges. Strengthening strategic alliances and providing platforms for multidisciplinary interaction can help counteract these dominant power structures. 2.) **Societal learning processes** require increasing knowledge exchange, openness, and overcoming silo-mentality. Improved

communication between different levels of political and regulatory authorities and participatory negotiation processes are crucial to bridge knowledge gaps and support AFS adoption. 3.) **Social participation and democratic decision-making** face limited economic incentives and the low participation of AFS proponents as barriers to policy uptake. Enhancing participatory governance, fair economic profit-sharing, and stakeholder engagement in decision-making processes can enhance social acceptance and drive SSDs.

The findings suggest several recommendations for reforming the policy measures and their context. Streamlining bureaucratic processes with practical examinations and implementing integrative eligibility criteria aligned with nature conservation law can enhance AFS accessibility, particularly for small farmers. Financially internalising the environmental and climate benefits of AFS is essential, reflecting the ecological complexity and benefits of AFS. Correspondingly, funding levels for AFS-supporting measures such as EC3 and IM should be increased, rather than rewarding minor enhancements to fundamentally unsustainable practices. Promoting knowledge exchange through AFS academies, peer-to-peer learning, local pilot projects, and interdisciplinary dialogue is vital for enhancing understanding and capabilities among farmers and other stakeholders. Developing sustainable market demand through effective labelling and promotion of AFS products, alongside strengthening agri-food value chains and fostering cooperation among farmers and market actors, supports economic viability and market integration. Additionally, ensuring transparent processes and a clear distribution of responsibilities among multi-disciplinary authorities is crucial. Encouraging collaboration among farmers, agricultural associations, policymakers, authorities, and researchers can facilitate shared learning and collective action. This collaborative approach is essential for developing and implementing effective synergetic policies that support the transition to sustainable agricultural systems, i.e., fostering an SSD conducive to AFS adoption. Creating political synergies with other CAP tools, national and regional regulatory frameworks, and private foundations, is essential for achieving coherence and maximising the impact of AFS initiatives across different policy domains.

By implementing these reforms, EC3 and IM can create a supportive environment for the long-term adoption and maintenance of AFS, though coordinated efforts and the engagement of key actors are essential.

While the monetization of co-benefits is difficult, transitioning to result-based funding approaches aligned to LULUCF targets is emphasised. Actor groups advocate for long-term remuneration for public services provided by agriculture, including ecosystem services. For a significant AFS uptake, the challenge consists in establishing coherent policy frameworks and long-term policy levers that shape socio-political, technical, and ecological contexts to holistically foster transition processes. Frameworks for carbon farming present opportunities but also risks, requiring a focus on social justice and participatory decision-making.

The study identified several areas for future research. 1.) Further exploration of synergies with other CAP elements and eco-schemes, including the potential for combining different policy frameworks at EU- to regional levels, is recommended. 2.) Conducting a broader mapping of relevant actors and a more inclusive representation in the empirical analysis can provide deeper insights into the socio-political dynamics influencing AFS policymaking adoption. This includes considering diverse groups such as lobby groups, agricultural associations, landowners, and different types of farmers. 3.) Future research should expand on the institutional setup, and political and regulatory frameworks required to endorse a pluralisation of actor groups and encourage public discourse through small-scale experimentation and negotiation platforms. d) Moreover, refining the conceptualisation of the SSD, its linkage to the MLP while addressing socio-cultural aspects, ethical considerations, and critical systemic approaches helps to better capture the nuances of AFS adoption and its broader socio-political context.

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10. Appendix

Appendix A: Interview Guide

Characteristics

What is your role/relation to AFS?

AFS implemented (if farmer)
Why did you start with AFS?
Do you receive funding support for your AFS? If so, which one(s)?

No AFS implemented (if farmer)
Is there something that would incentivise you to implement AFS?
Do you receive funding support for your AFS? If so, which one(s)?

Political assessment

- Are you familiar with eco-schemes (ES) and investment measures (IM) of the CAP for Supporting AFS?
- In your opinion, what are strengths of ES and IM for supporting AFS?
- If located in BA (or knowledgable about the Bavarian system), how do you assess the simultaneous offer of both measures?
- In your opinion, what are the weaknesses and challenges for ES and IM to support AFS?
- What limitations do you perceive for ES and IM to support AF?

Future perspectives and external developments

- What opportunities do you perceive for ES and IM to support AF?
    - Considering future (external) developments?
    - Considering synergies with other political/Funding frameworks (e.g., GAK, ANK)? (if policy advisor/ AFS consultant)
- Which external risks do you perceive for ES and IM to support AF?
- Which adaptations/imaginaries could encounter/ remedy the current shortcomings or future risks of ES and IM?

Out-of the-box thinking:

- In your opinion, what is required so that AFS becomes an automatism/sure-fire success (DE: Selbstläufer) in agriculture?

Conclusion

- Would you like to receive feedback on the examination?
- Can I contact you if I have any questions?
- Do you have any questions or comments

Appendix B: Weaknesses of EC3 and IM

WEAKNESSES

Politics:

- Missing harmonisation of AFS as agricultural utilisation on one hand, and with nature conservation law on the other hand:
  - Legal uncertainty of AFS due to potential conversion to protected status due to biotope protection, tree protection and general species protection
  - No differentiated assessment of potential (positive) impact of AFS in respective location of biotope, but generalised exclusion of AFS in protected areas

  → Discrimination of AFS compared to other agricultural systems that unproportionally restrict or prohibit utilisation and cultivation of AF

  → Lack of planning security & self-determination for farmers
- Little political trust due to
  - 'Political headwinds' on different levels of policymaking and implementation (uptake of AFS on MS level (cf. EURAF 2023a), lower agricultural agency, district administration, nature conservation agency)
  - Conflicting interest and dominance of lobby representatives
  - Shortening of funding amounts for most climate effective measures of pillar Ⅰ by 75% for EC3
  - Retrospective reduction of AFS area targets in German CSP
  - Historical political incentive to remove trees on large scales in the course of land consolidation (DE: 'Flurbereinigung')
  - Democratic character of policy measure design is comprised by non-transparent, inconsistent and implausible (-ULB) decision-making regarding funding eligibility and bureaucratic processes that do not involve and consider perspectives with practical experience

Bureaucracy

- Utilisation concept for EC3 and IM practically resembles a permit requirement (needs to be approved before AFS is implemented), and therefore disproportionally discriminates AFS in comparison to other agricultural systems (competitive disadvantage)
- Laborious and inconsistent bureaucratic processes are too burdensome for farmers and for regulatory authorities.
  - Many farmers do not have the capacities to deal with formalities of application
  - Great variety in the handling of bureaucratic procedure on the county level. Criteria used by lower authorities are non-transparent and often implausible

Eligibility

- Disproportionate restrictive requirements for EC3 (and IM, as aligned to EC3) complicate the implementability of diverse range of AFS, do not fit agricultural practice and are frequently little oriented to ecological benefits (DeFAF et al., 2023c):
  - Restrictive, short-term eligibility avoids continued management of areas essential for biodiversity (Lampkin et al., 2020) required tree amounts, distance and width to strict and implausible, restricted tree species
  - **Mostly criticised for EC3 requirements** (analogously criticised for IM in BA):
    - 20 m distance regulation to narrow as does not make sense in many cases, too restrictive; undermines uptake of new AFS
    - AFS frequently have less than 3m width of wooden component
    - Area proportion of wooden strips after GAPDZV max. 40%, however opposed to that in EC3 is restricted to 2-35%
    - Restricts AFS types, e.g., excludes permanent crops, opposing to GAPDZV
    - Negative list for wooden species for most AFS (if no protected area) perceived as disproportionate and exaggerated, and in most cases not balanced
    - No combination allowed with EC 1 a-d
    - Minimum. funding volume as disadvantage for smallholders
  - **Criticised eligibility of IM**/BA:
    - IM is oriented towards the eligibility criteria of AFS from EC3 (see weaknesses

above), instead GAPDZV Sect. 4 should be authoritative, at least in short-term
        - Rigid categorisation of three tree types by some perspectives perceived as invaluable, non-expedient criteria
        - Investment concept as further bureaucratic hurdle
        - Funding amounts for IM do not cover actual investment costs; Internal labour is not eligible as investment cost for IF
        - Minimum funding amount of 2.500 EUR/application excludes small-scale AFS
        - Other funding mechanisms in BA are more attractive with higher (up to 70%,) investment funding. Since no combination is allowed, farmers favour other funding schemes
    - Short time frame for application
    - Short term funding periods of EC3 undermine farmers planning security and are ineffective for sustaining environmental benefits
    - Barrier for small enterprises, part-time farmers, side-line businesses, solidarity agricultural enterprises to implement and use AFS in a legal way as both is tied to the CAP; this barrier to implementation contradicts the principle of equality to other agricultural practises

Financial internalisation:

- Low funding amounts of both measures is not sufficient to compensate for implementation & cultivation costs nor the valuation of co-benefits
  → Competition with other funding schemes that have higher amount and less management effort (ÖR Brache/fallow land)
- Challenges of quantifying co-benefits of AFS (biodiversity, carbon) as precondition to financially internalise
    - Value of carbon sequestered through AFS does currently not benefit and incentivise farmers
    - How to differentiate financial internalisation of various AFS with different ecological value in subsidy law

Other:

- Flexibility of Member States and Federal States enables little ambitious programmes, ‘race to the bottom’: Design sovereignty as disadvantage due to unambitious schemes and inconsistencies
    - IM is not offered by most federal states, as opposed to CAP CSP intentions and EU regulation (2021/2115), which represents important precondition for EC3 uptake due to their complementarity
      → Causes uneven spatial distribution of uptake
- Bureaucratic hurdles restrict design sovereignty and implementation option for regionally flexible programming, which however could be easily overcome by nation and region (DeFAF, 2023c)

Appendix C: Opportunities of EC3 and IM

OPPORTUNITIES

Financial Internalisation:
- All CAP elements should be aligned with the principles of sustainability, multi-functionality and public payments for public goods (Pe'er et al.,2020):
  - Establishing clear, targeted, measurable requirements that assess and prioritise AFS with higher ecological value and leave room for flexibility for context-specific conditions
  - Strengthening MRV: Potentially new technologies (AI satellite images) can alleviate MRV challenges, coherent framework integrated in CSP for all measures (Pe'er et al., 2020, Laporta et al., 2020; eg. CRCF see EURAF, 2024)
  - Financially internalising carbon sequestration via carbon pricing for funding measures or other carbon certifications schemes
- Increasing funding amounts to approximate to the level of efforts and expenses for implementing and maintaining AFS
- Establish stakeholder collaborations by e.g., including farmers and AFS policy advisors for designing policy measures (Pe'er et al., 2020)

Bureaucracy & Eligibility:
- Increasing planning security by ensuring legal certainty of utilisation and flexibility for the entire duration of utilisation
  - Harmonisation of nature conservation law and agricultural law: Regionally coherent regulations that allow for planning security for AFS farmers (through possible estimations, DeFAF et al., 2023c), incl. differentiated assessment of potential AFS impact (conflict or improvement through AFS) in case of protected areas
- Reduce disproportionate bureaucratic processes (no utilisation concept) and restrictive, implausible eligibility criteria including the adaptation of AFS definition to cover the diversity of system (temporary alignment towards GAPDZV)
- Collaboration between agricultural and nature conservation authorities from regional to national levels to ensure coherence and efficiency and clear responsibilities
- Opening funding eligibility to a wider groups of potential AFS farmers and funding recipients (e.g., part-time farmers, solidarity agriculture, small farms, municipalities)
- Eligibility requirement of IM in accordance with GAPDZV, independent of EC3 requirements
- Multi-year implementation of EC3 to approximate fitting the time span of its goals

Knowledge exchange:
- Improving knowledge and perceptions of AFS through
  - Knowledge exchange networks, to educate all relevant actors (as provided by DeFAF)
  - More holistic, integrated education of agriculture and forestry, not only regarding technical and financial aspects but also ecological facets of AFS such as biodiversity and climate effectiveness.
  - Research projects, flagship projects, experimental pilot programmes
  - Funding AFS consultancy programmes (e.g., enhancing consultancy programmes in BW towards higher funding amount and expertise)
  - Easily accessible and condensed information about funding measures

Marketing:
- Explicit emphasis on sustainable qualitative feature for marketing AFS products, to be promoted by governmental nutrition, biomass strategies; labels; tourism

Policy Synergies:
- Reinforce policy synergies based similar or interconnected funding schemes (combination with other eco-schemes, ANK, GAK)
- Design of a European Agroforestry Strategy to holistically foster AFS (incl. research, education, innovation, political support) and provide guidance for national AFS strategies (Mosquera et al., 2017)
- Political upswing of AFS as cost-effective CDR method
- Measures should fit the development of local best practices (EIP-AGRI, 2017)

Other:
- Climate change resistance, resilience and adaptation of AFS (e.g., erosion protection, AFS

vineyard), could sensitise farmers, consumers and policymakers

Appendix D: Threats of EC3 and IM

THREATS

Financial internalisation:
- Differentiated definitions with staggered requirements for ecologically diverse AFS might be to complex and unfeasible in practice for responsible implementing authorities and potential applicants; CAP more error prone in its implementation on farm level
- Precondition to financial internalisation of AFS co-benefits: Challenges of establishing complex MRV systems that are cost-effective, have a low administration, while still covering AFS complexity/environmentally robust to systematically link to specific measures

Knowledge exchange:
- Lacking popularity and knowledge about AFS among farmers
- Scepsicm, insecurity, ignorance, lacking knowledge and misinformation of AFS among political and administrative actors (ministries and lower regulatory authorities, administrations)
- Lacking knowledge exchange between political levels
- Silo-thinking in education and legislation (regulatory law as incoherent with funding law) concerning agriculture and forestry; Role of AFS is 'in between', which results in unclear responsibilities
- Insufficient structural capacities among administration (agricultural agencies & nature conservation agency), tree nurseries, supply of verified planting material, professional consultancies, MRV experts (e.g., soil experts) to carry sophisticated AFS policy landscape
- Elastic concept of AFS: Negative, unambitious examples of AFS variants become popular, generalised and increase prejudice/bias towards AFS among social actors

Marketing:
- No adequate valuation of AFS and its co-benefits on markets for food, timber and fodder;
- Competition of agricultural products on international markets and
- price fluctuations and uncertain market projections (esp. for livestock, timber)

Policy relations:
- Low funding levels of both EC3 and IM are outcompeted by other less demanding, more financially attractive schemes
  → Does not appeal to farmers and rather incentivises the uptake of other measures with weak ecological and climate benefits
  → Low ambition schemes sideline more worthwhile schemes (Donham et al., 2022, Latacz-Lohmann et al., 2022)
  → IM, BA: Other measures are more interesting to fund AFS, jeopardises continued offer of IM in BA and does not incentives other federal states for prospective implementation
- Low application quote of measures jeopardises measures to be further reduced and removed
- Further alignment of other German funding mechanisms (e.g., within GAK) to EC3 requirements (Böhm et al., 2024b)
- Lacking incoherence of approaches within CAP and other EU frameworks (e.g., CRCF) to promote AFS as CDR method can undermine CAP measures (cf. Willard. 2023)

Other:
- Risk potential of long-term AFS due to extreme weather events and other indirect consequences of climate change (pest infestation, erosion, harvest and price fluctuations)
- Limited access to land, restrictions due to expensive land lease
- Weak AFS policymaking favours unstable food supply and additional economic burden (DeFAF, 2024a)

Appendix E: Recommendations for Triggering an SSD

Actions	Targets	Specific Measures
Developing simplified and plausible bureau-cratic processes of subsidy and regulatory law	The effortful bureaucracy and restrictive eligibility regarding AFS implementation and funding is reduced in practicable way that ensures planning security and capacity to act/flexibility for AFS farmers	- Ensuring easy access to overview of funding measures, their process and criteri - Providing comprehensible info brochure via farmer's associations - Providing support for application through instances like project sponsors (e.g landscape conservation association, farmers associations, nature conservatio organisations) - Utilisation concept for all AFS is replaced by a 'Duty of disclosure' (DE:‘Anzeigepflicht’) that is justifiable only for AFS > 10 ha and includes a fundamental, low-threshold plausibility check (e.g., confirming requirements of GAPDZV Sect.4) as part of 'Agrarantrag' - Integrating a differentiated assessment of potential conflicts of AFS with nature protection law and regarding the 'negative list' of plant species. - Alternatively, exception rule from nature protection law which typically applies to agricultural areas, should also count for AFS so that it cannot underlie intervention ruling (e.g., habitat protection) since it is defined as productive activity - Establishing 'experimental clause' for AFS in cooperation with landscape preservation associations, providing sufficient funding for (pilot) projects that serve as best practices for diverse contexts of AFS - Establishing wider time frame for application - Removing requirement for IM of reaching specific funding volume - Sending political signals that build trust of farmers that reversibility of AFS as currently regulated in GAPDZV will be continuous - Requirements for definition of legally certain AFS (Böhm, 2021): - system character must be present and agroforestry utilisation purpose be recognisable, - Total agroforestry area (incl. woody plants) = eligible utilised agricultural area, - Broadly defined max. and min. proportion of wooded areas instead of number of trees/ha, - In principle, free choice of woody species, - Right to remove and change the wooded areas - Guaranteeing legal opportunities for AFS-interested groups apart from 'active farmers' (e.g., small enterprises) to implement AFS outside of CAP funding, e.g., low-barrier application forms outside of Agrarantrag that forgo utilisation concept - Generating AFS Code of landscape utility (DE: ‘Landnutzungscode’) with low application barriers, and high funding coverage - Orienting eligibility of AFS at GAPDZV Sect.4, with following changes: - Allow eligibility of >= 1 wooden stip (to be changed in GAPDZV) and further allow scattered trees (consistent with GAPDZV Sect.4) with less than 50 trees/ha - negative list (GAPDZV) reflects rule of fear, needs context-specific plausible assessment (e.g., Paulownia, Robinia, Red Oak), some even demand to fully freely choose wooden species –>e.g., introducing ‘Erntehecke’ as new landscape element, which allows non-endemic species and deviations from planting, maintenance/care and application standards (Baumland-Kampagne, 2023) - Further changes are particularly needed for EC3 requirements: - Remove minimum distance of 20 m as it excludes many options of AFS - Lift 35% to 40% of wooden share (consistent with GAPDZV Sect.4), or even

Actions	Targets	Specific Measures
		50% (BUND, 2021) - Allow AFS for permanent cultures (consistent with GAPDZV Sect.4, also Mosquera-Losada et al., 2017) - Allowing width of wooden strips with less than 3 m - Facilitated lease access: - Ensuring security of long-term leases needed for investment to be economically viable (CEJA, 2019a) - Schemes for (public) lease allocation and contracts to prioritise AFS, e.g., point-system for allocating lease oriented towards the common good (AbL, 2022b), criteria of sustainable wooden components for lease allocation of public areas (Baumland-Kampagne, 2023)
Establishing clear responsibilities & participatory processes	Consistent and transparent regulatory and subsidy processes are established by increasing the coordination and cooperation of key actors, and clearly allocating responsibilities	- Centralising and institutionalising of application process: Consultancy and processing of application via central contact instance (Böhm, 2024a) - Establishing coherence of subsidy measures among federal states; consolidation at least on level of application process (Maaß and Brändle, 2024) - Application of subsidiarity principle: Re-delegating decisions and their consequences increases responsibility of upper, national authorities and presupposes coordination between national and regional authorities (Lampkin et al., 2020) - Collaboration and coordination of multi-disciplinary regulatory authorities (Chamber of Agr., lower agricultural/forestry and nature conservation authority) - Establishing participatory processes of negotiation including multiple actors representing and bridging different levels, - Organising operational groups on local, regional level to include civil society actors, associations, farmers and other professionals to create farmer-centred dynamic (EIP-AGRI, 2017)
Financially internalising co-benefits	For farmers to receive a fair share for the public goods generated by AFS, funding amounts should align with environmental and climate performance of the policy measure. This 'public money for public goods' approach combines socio-economic, ecological and agri-structural goals	Aligning payment levels of EC3 and IM to expected environmental and climate benefits and complexity associated with implementing the policy measures. - Increasing unit amount for EC3 by factor 10 (2,000 €/ha), with superior funding for first 10 ha of AFS to lower entry barriers while guaranteeing differentiated (higher) amounts for diverse wood areas due to higher efforts for maintenance (DeFAF et al., 2023c). - Introduce staggered funding amounts for IM offered in all federal states, with increasing levels depending on degree of wooden diversity: 1st level: 1-3 wooden species 2nd level: 4-9 wooden species 3rd level: > 10 wooden species while further staggering funding amount according to AFS area: first 10 ha: 100%, further 10 ha: 80%. beyond that 50%; internal labour costs of farmers should be considered as eligible costs to address the farmer's flexibility, responsibility, skillset and capacity to maintain AFS independently.
Enhancing marketing options for AFS	Generate long-term financial viability of AFS independent of funding	Sustainability value of AFS needs to be holistically appreciated: - Integrating AFS into food-, nutrition, biomass- strategies that catalyse product labelling and awareness (DeFAF et al., 2023c, Mosquera-Losada et al., 2017 and 2018a) - Public actors need to help promote and enhance recognition of AFS among the

Actions	Targets	Specific Measures
	schemes	public - Strengthening marketing options the alleviate the burden of farmers: Food cooperatives, Food hubs, direct marketing, creating value chains, AFS label potentially for food retailing - Developing markets/certification schemes that monetize ecosystem services (carbon, soil, biochar, etc.)
Creating political synergies	Improving coverage of AFS in other policy frames from the regional to EU level	- Establishing consistent European Agroforestry Strategy (Mosquera-Losada et al., 2017) that fosters the promotion, education, innovation and research on AFS - Linked policy support for AFS by bridging agricultural and forestry - Recommendation for EC3 on EU scale by European Commission (similar to Ökolandbau-case) - Reinforcing interventions with other policies on EU (Lampkin et al., 2020), national or regional level (LPR, Biolandstiftung) relevant to push for targets covered by AFS - Supplementary fundings needed that are not charged with double funding (e.g., ANK, GAK, funding of allocation of land (Böhm et al., 2024b) - Careful and coherent development of certification schemes/markets (e.g., EU CRCF) that value carbon farming - Allocating AFS as compensation area in eco-account (DE: 'Öko-Konto') while still being able to use it for agricultural cultivation - Allowing the combination of EC3 with other eco-schemes: - EC1b/c (flower areas /strips) & 1d (old grass stripe in perm. grassland), - EC2 (the combined plantation of diverse arable crops, currently counters the diversification targets of arable land of the CAP) - EC4: combination of extensification of permanent grassland (cf. Willard 2023) - Allowing eligible combination with funding premium for ecological farming (DE: 'Ökolandbau') (DeFAF et al., 2023c)
Fostering knowledge exchange and learning	Beyond financial support knowledge gaps and misconceptions need to be dissolved by facilitating educational programmes and knowledge transfer between involved actors	- Supporting diverse associations and foundations (e.g., DeFAF, Veolia Stiftung, VRD Stiftung) in generating programmes for lessons learned/positive examples - Encouraging and expanding educational concepts such as Agroforestry academy (DeFAF, 2023d), first AF-module in university teaching (HSWT) , social/community events (planting campaigns) - Fostering research programmes on AFS (e.g., AgroBaLa) with local evidence-based projects to convince farmers about context-specific AFS potentials - Strengthening knowledge exchange programmes (e.g., peer-to-peer learning groups from Soil Association Scotland) and AFS networks - Building capacities by strengthening networks of independent extension service provider, and arborist - Linking society with science via cooperation networks (e.g., AFS-monitoring by Uni Münster, 2023) to engage local interest groups in citizen science - Creating interdisciplinary dialog between public authorities and with farmers/associations - Holistically approaching agriculture and forestry in (conventional) agricultural education, promoting systems knowledge

Appendix F: Extract of insightful quotes from interviews

1. **Interview**; Scientific Researcher

“Und diese 200 Euro gehen ja pro Hektar Gehölzfläche, also quasi wenn ich ein Zehntel davon, von meinem Hektar Ackerschlag weg nehme für diese Holzfläche, wäre es ja quasi nur ein Zehntel der Förderung, das heißt 20 Euro. Also da könnte ich von den billigen Bäumen ein bis zwei quasi pflanzen. (.) Also so, nur von diesem Rahmen, so unrealistisch ist es. Und vom Management ist es auch extrem aufwendig.”

“ wenn wir jetzt zu arg das quasi auseinander flattern [mit der Vielfalt von AFS] [...], dann wird es zu kompliziert und sowohl die Leute, die es quasi einstufen sollen, außerhalb der Förderer, als auch die, die es anwenden sollen, sind vielleicht überfordert mit der Vielzahl, deswegen muss man es auch vereinfachen, damit es überhaupt mal auf die Fläche kommt, [...], also deswegen gibt es so eine Vielzahl quasi von Interessenslagen, die da mit so rein spielen, also eben Förderung soll möglichst einfach sein, aus wissenschaftlicher Sicht würde man vielleicht aus sinnvoller Weise eher komplexer werden [...] dann machen wir es lieber nicht so komplex, dass es auch irgendwie greifbar und verständlich wird für die Praktiker, die sie dann schlussendlich irgendwie umsetzen sollen.”

“Also entweder zahlen wir quasi den Leuten [Landwirten], die es gut machen, also so ein Positivsystem oder ein Negativsystem, quasi um den Markt ein bisschen zu lenken und sagen dann, okay, naja, also du spritzt alles kaputt. Du hast keine ökologischen Flächen, die du mit Bäumen machen könntest [....] Und deswegen denke ich, soll es der Gesellschaft auch was wert sein. Aber man muss sich dann halt irgendwie Gedanken machen, wie man sowas im Wert setzen kann. Und das denke ich eben über irgendwelche Öko-Regelungen. (..) Und wenn man natürlich nur positiv bestärkt, ist natürlich dann immer ein bisschen die Schwierigkeit, weil unsere landwirtschaftlichen Produkte auf internationalen Märkten gehandelt werden, da sind wir natürlich schon immer auch in Konkurrenz zu sehr intensiven Ländern, die eine sehr intensive Produktion haben und vielleicht nicht unseren Standards entsprechen. Und mit denen konkurrieren aber die Produkte von deutschen Landwirten. Und da muss man natürlich schon auch schauen, naja wie geht man da vor, macht man da noch eine CO_2-Abgabe, also wenn die halt aus Brasilien hierher geschifft werden, dann sind die erst mehrere tausend Kilometer unterwegs und dann gibt es aber jetzt eine CO_2-Abgabe, weil das eben für das Klima jetzt auch nicht wirklich der Bringer ist und schützt dadurch so ein bisschen die Märkte. Oder sagt eben, naja, also ökologisch, du brauchst irgendwie ein Zertifikat oder irgendwie sowas, weil unsere Landwirte, die müssen ja auch quasi mit dem Rahmen arbeiten und andere halt nicht. Und deswegen denke ich, da muss man auf jeden Fall schauen, wie man einfach noch auch für die Produkte und die Leistungen, die Agroforstsysteme bringen, noch mehr Geld generieren kann. Kohlenstoffspeicherung ist ja auch sowas [...] “

“Also aus wissenschaftlicher Sicht, sogar wenn die Regierung jetzt sagen würde, wir wollen das jetzt in den nächsten paar Jahren noch angreifen, müssten wir auch Baumschulkapazitäten ausbauen. Also auch von so einer Seite, wo kriegen wir dann die ganzen Bäume her? Also das ist gar nicht vorbereitet. Naja, ich meine, dass jetzt quasi die Investitionsförderung schon mal da ist, ist ja schon mal gut. Also wir legen das jetzt an,

dass die Länder das wiederum nicht übernehmen. Das ist halt, wir waren da auch schon im Austausch hier mit unserem Ministerium, aber, oder Ministerien, das sind ja verschiedene Player, die da mitmachen. (..) Und das ist halt einfach traurig und manchmal auf Nichtwissen oder falschem Wissen auch basierend. Oder Desinteresse, also das muss man auch sagen. Also manche sagen halt einfach, ah, das ist, brauchen wir nicht, Bäume gehören da nicht, Bäume gehören im Wald.[...] Und bei anderen ist es wiederum auch einfach wirklich Unwissen.[...] Es fängt bei den Landwirtschaftsämtern an, aber geht hoch bis ins Ministerium. (.)

2. **Interview**; Scientific Researcher

“Aber das, dass die Beibehaltung als Ökoregelung mit jährlichen Bezahlungen und so weiter, ähm, gehandhabt wird, das finde ich auch ganz passend. Man muss nicht unbedingt sagen, dass es wieder um fünf-Jahres-Programme geht und so weiter, man kann das schon jährlich machen. Also die, die Leute, die schon investiert haben, werden auch das behalten wollen, also wenn, wenn sie ganz was ändern wollen, weil sie das, ähm, ein Hof verkaufen, ähm, dann können sie da, da, da auch das machen.”

“ Und ich finde es dann besser, dass einige Mitgliedstaaten oder einige Länder in Deutschland irgendwie eine Vorreiterrolle haben, um die anderen zu überzeugen, dass es wirklich machbar ist und es sich lohnt, das zu machen.”

“Also dieses Prinzip Public Money for Public Goods oder Öffentliche Gelder für Öffentliche Güter ist ja sehr gut und schön, aber die meisten Möglichkeiten sind sehr teuer umzusetzen. (...) Entweder von Seiten der Landwirten und Landwirtinnen, dass sie da sehr viel Arbeit reinstecken müssen oder dass die Verwaltung sehr viel Zeit und so etwas hat oder Ressourcen irgendwie ausgeben müssen, um das umzusetzen. (.) [...] Das würde heißen, wenn man zum Beispiel Anteile von Landschaftselementen an einem Betrieb bewertet und sagt, das hat einen Wert für die Umweltleistungen, das könnte man als Indikator benutzen. (.) Agroforst könnte dazu zählen als Landschaftselement und man würde dafür bezahlt und ich denke, wenn man die Möglichkeit hat als Betriebsleiter zu sagen, ich mache dies und das und das und insgesamt kriege ich dann mehr für meine Arbeit, weil ich die Umweltleistungen auch anerkannt bekomme. (.) [...] Das ist einfach eine Diskussion, die wir noch haben müssen in der Gesellschaft, dass wir das wirklich haben können, sodass einzelne Betriebe sehen können, dass sie auch daran Geld verdienen können, wenn sie in diesem Bereich mehr machen würden. “

3. **Interview**; Farmer of meadow orchards in BW

No written transcript available due to poor quality of recording.

4. **Interview**; AFS consultant and planner

“ Es gibt eigentlich in keinem Bundesland die Situation, dass es Ministerium tatsächlich rausgibt und sagt, das sind die Kriterien, die abzuprüfen sind. Es geht sozusagen den

untergeordneten Behörden nichts an die Hand, nach welchen Kriterien das zu machen ist. Ausnahme sehe ich in Bayern ganz klar."

"Wenn Sie mich jetzt fragen, spielt Förderung eine Rolle, sage ich, in keinem einzigen Fall, den ich kenne, spielt diese öffentliche Förderung bis jetzt eine Rolle, weil sie nicht abgerufen wird oder abgerufen werden kann oder viel zu umständlich ist und die Behörden selber nicht wissen, wie sie damit umgehen müssen."

"Keine Einbeziehung von Bau-Behörden, keine Einbeziehung von irgendwelchen großen Förderinstituten, keine Ab-Delegation auf die unterste Ebene in irgendeinem Landwirtschaftsamt, der keine Ahnung hat, der sagt, **oh ((incomp))**, da macht der drei Tage krank. [...] Zentrale Bearbeitung von Förderanträgen, klare Festlegungen von Regeln, Regeln müssen erreichbar sein und es muss primär auf Progressivität berufen, es darf keine umweltschutzfachliche Prüfung mehr da sein. . "

5. **Interview**; AFS consultant and planner

No transcript available due to poor quality of recording.

6. **Interview;** AFS consultant and planner

"Aber wenn es jetzt darum geht, in komplexe Agroforstsysteme reinzugehen, die auch von der Förderfähigkeit wieder schwieriger sind [...]. Wir brauchen eine gewisse Experimentierklausel. (.) Wir sind an dem Punkt, (..) niemandem tut es weh, wenn wir eine Rechtssicherheit für Experimente geben. Es gibt einen Grundbetrag. (..) Es gibt Gremien, die entscheiden, die jenseits von Behörden betrieben sind.

" [..] Agroforstsysteme sind durch die EU schon lange anerkannt. (..) Das ist also nicht das Problem an der Stelle. Das ist wirklich ein nationales Problem. (.) Wir haben also die Gestaltungshoheit, wir müssen sie aber nutzen. "

"Das macht Schwierigkeiten aus, dass sie [die Behörden] sich doppelt und dreifach absichern. Dass niemand vorwerfen kann, sie hätten ein Problem produziert. (.) Das führt zu einer strukturkonservativen Haltung. Die kann aufgelöst werden, wenn die Politik das sieht. Und das freigibt."

"Wir müssen sowieso die Diskussion an den bestimmten Stellen, wenn das gepflanzt wird, zwischen Amt und Landwirt haben. Wenn der sagt, das ist ein Agroforstsystem, kann dann das Amt widersprechen. Oder das Amt sagt, das ist ein geschütztes Landschaftselement, kann der Landwirt widersprechen. Ein Aushandlungsprozess einzubauen, ist etwas, was leider nicht Standard ist, aber was relativ einfach wäre."

"Es (GAPDZV) ist eine Verordnung, es ist kein Gesetz. Das heißt, sie kann auch wieder geändert werden. So dass eine Skepsis der Landwirte bleibt, ob das nicht hinterher wieder unter Schutz gestellt wird. Wir sind durchaus Landwirte. Da braucht es neben einer Verordnung immer wieder verschiedene Signale, die das wiederholen. Es bleibt reversibel, es bleibt reversibel, es bleibt reversibel. Das muss im Grunde genommen die nächsten 10 Jahre wiederholt oder 20 Jahre wiederholt und benannt werden. Erst wenn die ersten wieder entfernt werden und diese Geschichten bekannt sind, wird es wahrscheinlich geglaubt."

7. **Interview**; International extension service provider

“Also wenn man dieses kurzfristige Denken, das dem Landwirt zu eigen ist, von Beginn an kombiniert mit dem langfristigen Denken, also mindestens eine Generation, wenn nicht sogar zwei, drei, (..) der jetzt Baumwirtschaft betreibt, dann wäre das bestimmt, oder gäbe es besser gesagt, (.) eine größere Offenheit gegenüber Bäumen an sich. Und wenn dann die Kinder reinwachsen, also ich denke - ich bin ja auch Pädagogin - das ist eine Generationenfrage.”

“Dann kam eben auch raus, weil die drei [Berater von Landwirtschaftsbehörden] aus unterschiedlichen Ländern waren, dass es in den unterschiedlichen Bundesländern in Deutschland unterschiedliche Regeln gibt. (..) Das halte ich auch für ganz prekär, denn so gibt es dann eben keine einzige Meinung, die vorangetrieben werden kann bezüglich Agroforst. Wenn da der [eine Berater einer Landwirtschaftsbehörde] sagt, aber ich darf das nicht machen, dann sagt man, wieso darfst du das nicht machen, ich darf doch das machen.”

“Und natürlich ist es sinnvoll, wenn die Förderung von Agroforst aus der ersten Säule passiert. (..) Weil nämlich vorher, als es nicht aus der ersten Säule war, musste das Bundesland die andere Hälfte dazu schließen. Und dann die Bauern, die da auf der Förderzentrale waren, zu sagen, haben sie das nicht bewilligt. Das war ja auch so eine Unertragung. (...) Jetzt gibt es das aus der ersten Säule, aber wenn man das jetzt so richtig rausrechnen muss, ob man da mehr Zettelwirtschaft hat als wie 200 Euro Zahlung. (..) Und dann noch die ganze Pflege, die dahinter steckt, der Maschinenring nicht die entsprechenden Geräte hat, die eben auch mal was Stärkeres häckseln können. (...) Ich sehe da noch ganz viele Probleme auf der politischen Seite. Aber die Politik geht ja auch immer wieder in die Praxis hinein. Und die Praxis muss die Politik zufüttern und da ist noch ein großer Gap. [...] Aber es könnte natürlich auch sein, die großen Bauern haben natürlich eine Riesenlobby. Und die wollen ihre Flächenförderung. Und die bestehen auf ihrer Flächenförderung. Da bleibt es eben für die Kleinen gar nicht mehr viel übrig. Die Kleinen können sich noch so anstrengen und mit Agroforst und sonst wie und sonst was. (..) Aber die kommen halt gegen die Großen nicht an. So das ist auch nochmal Politik, denke ich. “

“Und da sehe ich eben auch die Verpflichtung von Seiten der Landwirtschaftskammer oder unterer Landwirtschaftsbehörde, (..) sich abzustimmen mit den anderen, die eben auch diese Möglichkeit offerieren. Und nicht, also im schlimmsten Fall, gegeneinander zu arbeiten.”

8. **Interview;** Part-time AFS farmer, Forester, Ecologist in BW

“Was ich halt erfahren habe, es ist die Unwissenheit auf den Landratsämtern, [...] in der Landwirtschaftsbehörde. (.) Hier in Baden-Württemberg oder zumindest in meinem Landkreis, für die war das ein totaler Neuland. Man konnte da keine fundierte Auskunft bekommen. Und dann, das ist leider bei uns immer so, wenn jemand nicht weiß, ob es Neues gibt und man nicht genau weiß, wie es funktioniert, dann kommt man eher immer auf eine ablehnende Haltung, weil die ja nichts falsch machen möchten. (.) Und eigentlich möchte man ja was Innovatives machen, das eben von der EU oder Deutschland weit gefördert werden soll. (.) Man will was voranbringen, also man springt da auf dem Pferd

auf. Das, was positiv ist, wird [...] aber von den Behörden durch die Unsicherheit dann gebremst."

"Die Forschung ist sich eigentlich einig, dass diese Systeme [AFS] Vorteile haben. Aber ich bin jetzt, und die übergeordnete Politik, die ist sich auch einig, warum das jetzt nicht auf Landrats-, auf die unteren Landwirtschaftsbehörden durchgedrungen ist. Also da fehlt irgendwie ein Wissenstransfer. Ich weiß nicht, wo das Defizit ist. Ich habe so den Eindruck, das Hauptproblem, diese Agroforst-Geschichte, die ist eine Nische, die ist sehr klein. Die wurde ja auch nicht abgerufen. Neulich war ich bei einem Vortrag von Landwirtschaftsverband. Die haben glaube ich weniger als ein Prozent überhaupt in Anspruch genommen(.) Und man hat sich da, glaube ich, eher auf die größeren Probleme gestürzt. Also diese neue GAP hat ja sehr viele Änderungen. (..) Und es geht ja auch um viel Geld. Ich bin ein kleiner Betrieb, das ist nicht so entscheidend. Aber es gibt ja Großbetriebe, da geht es dann um andere Dinge. [...]. Ich glaube, da wurden die Prioritäten auf andere Dinge gesetzt."

"Aber man könnte ja auch diese Ökosystemleistungen, die diese Systeme bringen [...]. Ob das jetzt CO_2-Speicher wäre, Wasserrückhalt, Bodenverbesserung, und vielleicht, also wir gehen ja nur, die Förderung aktuell bezieht sich auf diese Agroforstfläche. [...] Und dann irgendein Markt für, wie soll ich sagen, Landwirte bekommen Geld, für das Diesel-Verfahren, warum sollen wir nicht Geld bekommen, auch für das CO_2 Speichern."

"Ja, würde meiner Meinung nach Sinn machen, wenn wir jetzt rein ökologisch betrachten. Also wenn ich jetzt eine reine Energieholzplantage anlege, beziehungsweise Agroforst-Systeme, wo ich nur schnell wachsende Pappeln pflanze oder Weiden, jemand der Obstbäume pflanzt und auch was macht für die Biodiversität (..) Da könnte man natürlich schon gewichten. Das macht natürlich dieses ganze Fördersystem nicht einfacher."

"Vielleicht müssten sich die Behörden mehr austauschen. In Baden-Württemberg sitzen die ja beide auf dem Landratsamt, die Forstbehörde, die Landwirtschaftsbehörde, die Naturschutzbehörde. Und vielleicht könnten die sich dann untereinander besser abstimmen. Also ich glaube, sicherlich auch landkreisbezogen"

9. Interview; AFS consultant and planner

"Und ich denke, wenn der Wille da wäre, seitens der Politik oder Verwaltung, ließe sich vieles machen. Aber es würde halt auch bedeuten, dass einige Regelungen geändert werden müssen, also zwangsläufig. Weil man sonst garantiert niemals diese Zielgrößen erreichen wird. Auch jetzt diese verringerten Zielgrößen, die jetzt in der neuen GAP-Strategieplan, wird man nicht erreichen können, wenn man nicht auch an den anderen Vorgaben halt weiter herumschraubt"

"Aber ich habe halt gemerkt, also da gibt es halt irgendwie ein Tabu, dass man dann halt nicht irgendwie angreifen darf. Wenn es jetzt aber, sage ich mal, nur für Wald-Ökosysteme und für Landschaftselemente gelten würde, dann wäre schon einiges getan, wenn es aber auf den anderen Flächen, sage ich mal, also wenn da die Regelung kippen würde. Genau. Ja, und dann denke ich, sind halt auch noch andere Interessen spielen da eine Rolle. Also

ich meine, da gibt es ja auch mächtige Lobbyvertreter, selbst im Ministerium sicherlich. Und ich weiß nicht immer, wie sie da zu ihren Schlussfolgerungen kommen. Also ob sie jetzt wirklich dann tatsächlich den Ansatz fahren, ja, also Agroforst-Systeme kann man gerne etablieren, aber halt nur mehr so auf größeren Betrieben oder größeren Schlägen."

"Genau, und dann irgendwann kann es auch sein, dass die dann am Ende der Förderperiode sagen, also 2027 hat ja alles nichts gebracht, die Regelung wurde nicht angenommen und deshalb streichen wir sie. Genau, und das wäre halt einfach die falsche Schlussfolgerung. Es müssten halt genau auf anderer Ebene die Änderungen passieren und dann hätte, glaube ich, auch die Agro-Forstwirtschaft in Deutschland eine Perspektive."

10. Interview; Part-time AFS farmer in BA

"Aber jetzt über die Öko-Regelung, die Abstände habe ich auch gar nicht mehr umsetzen können, weil die Gesetze kamen erst danach. Und da war alles schon gepflanzt.[...] Da müsste ich jetzt Bäume wieder verpflanzen oder wieder rausnehmen, um da die Öko-Regelung 3 zu beantragen."

"Ja, und was ich auch schwierig finde, oder was eigentlich gut ist in Bayern, es gibt sehr viele andere Förderungen, die interessanter sind für den Landwirt als die I-84. Also ich habe einen Teil der Flächen bei LNPR-Maßnahmen gefördert, das sind Landschaftspflege-Maßnahmen. Da bin ich über 70 Prozent gefördert und meine Eigenleitung. Das kriege ich bei I-84 nicht. Bei I-84 wird meine Eigenleistung nicht honoriert, sondern entweder ich mache es selber, ohne Rechnung zu stellen, oder ich vergebe es, aber habe dann keinen Eingriff. "

"Und dann halt, ja, die Robinie und die Paulownia, wäre schön, wenn die wieder mit reinkommen würden [aus der Negativliste herausgenommen würde] Ja, das höre ich auch von vielen, vom Naturschutz, also lieber eine Robinie als gar keinen Baum. Aus bayerische Sicht ist es, ja, da gibt es auch Flächen, da sind ein Kilometer kein Baum und kein Magerrasen. Was soll eine Robinie machen? Also man muss es halt ein bisschen abwägen. Also eigentlich wäre es geschickter, wenn es da halt noch so ein Naturschutzrecht ist, Naturschutz dann nochmal drüberschaut, über so einen Förderantrag."

" Was ich positiv sehe, bei Öko-Regelungen oder auch bei Investitionsförderung, die Anfragestellung ist eigentlich relativ einfach [in Bayern]. Also es sind nur zwei Frontblätter, also da ist wenig, ja, also ich habe es nicht in Anspruch genommen, aber wie man es so ansieht, also das müsste ziemlich einfach durchgehen. Wenn es schlüssig ist. Also das sind jetzt nicht zwei Seiten, das ist ganz minimal."

."... vor allem in Bayern mit den anderen Fördermöglichkeiten [als die I84], da kannst du alles pflanzen. Da bist du 90% gefördert. Ja, da muss man einfach nur gut reden können und das gut rüberbringen. Da kann man das meiste pflanzen."

11. **Interview;** Founder and teaching supervisor of AFS-course in BA

"… das zweite Problem ist, meiner Meinung nach, die jungen Landwirte, die das wollen, die vielleicht, die da echt Bock drauf haben, und das gut finden, Vorteile auch erkennen, müssen vielleicht ihrem Vater, der vor 50 Jahren die Bäume rausgerissen hat, und Fördergelder bekommen hat, jetzt wieder überzeugen, hey, lass uns Bäume pflanzen. Das ist auch ein Generationenkonflikt, dem es wahrscheinlich noch abzuwarten gilt."

"Aber ich kann es Ihnen nicht sagen, was da [in der Landwirtschaftlichen Ausbildung] die Gedankenspiele sind. Ich glaube, dass wirklich die Menschen, die das sagen, auch in Triesdorf, die haben eine landwirtschaftliche Ausbildung gebraucht, haben Meister gemacht, haben studiert, diese klassische konventionelle Schiene gefahren. Und für die sind Bäume Konkurrenten. Nährstoff- und Lichtkonkurrenten. Alles schlecht."

."... die Abstandsauflagen,[...], es wurde ein wenig gelockert, aber da werden momentan, gerade die Betriebe, die da Lust drauf hätten, benachteiligt, die einfach viele kleine Schläge haben, wo allein von der Schlaggröße es schon nicht möglich ist. [...] Diese Monsterbetriebe aus Ostdeutschland, mehr als 1000 Hektar, die haben Vorteile, für die wäre das auch prädestiniert, aber die machen es nicht, die wollen lieber die großen Mähdrescher düberfahren lassen können."

12. **Interview;** AFS consultant, practitioner, scientific researcher and teacher in BA

" Ja, ähm, also die größte Hürde [bei der Antragsstellung für beide Fördermaßnahmen] war tatsächlich, das Agroforstsystem so anzupassen, dass die Bedingungen alle erfüllt werden für die Ökoregelung oder auch die Investitionsmaßnahmen"

" Wir brauchen natürlich auch Forschungsergebnisse aus Südbayern, aus Deutschland und Bayern und so. (..) Und das ist natürlich auch gegenüber Landwirten viel glaubhafter, wenn man sagen kann, dieser Versuch fand in der Region statt und liegt ganz anders. "

" Und tatsächlich ist es auch so, dass die Landwirtschaftsämter das teilweise auch rausgegeben haben, dieses Merkblatt oder dieses Formular zum Ausfüllen und das eigentlich sehr unproblematisch abgelaufen ist. Für mich ist das eine Genehmigung, das muss geprüft werden vom Landwirtschaftsamt. (.) Aber ich hatte da bisher keine negativen Erfahrungen damit. Aber ich glaube, da ist es natürlich wiederum wichtig, dass die Landwirtschaftsämter generell informiert sind, was als Agroforst ist. Und wie gesagt, im Jahr 2023 war es dann schon so, dass ich dem am Landwirtschaftsamt erklärt habe, was das jetzt ist. Das war kein Problem, er fährt mal kurz raus auf die Fläche und schaut sich es an. (.) Und ich habe ihm kurz erklärt, was ist eigentlich Agroforst."

13. **Interview**; Landscape preservation association, and lower environmental authority in BW

"Also genau, ich denke schon, wieder ein Teil findet das [Nutzungskonzept] wahrscheinlich abschreckend. Aber ich kann nur sagen, wenn das bei uns tatsächlich landen würde oder ich das bekäme oder wir darüber entscheiden, dann würde es schon versucht werden, das

irgendwie gemeinsam noch fertig zu machen, so hinzukriegen, wie es sein soll und dass man da bestimmt nicht von unserer Seite da eine Hülle reinlegt. Da wo wir Spielraum haben oder wenn die Mindestanforderungen erfüllt sind, würde man einfach versuchen, das hinzukriegen. Aber klar, es gibt welche, die scheuen sich beim Amt anzurufen und wollen nicht auf sich aufmerksam machen und andere nehmen das ganz gerne in Anspruch, dass man einfach mal mit jemandem was besprechen kann. Das ist aber leider nicht die Mehrheit."

"Da gibt es tatsächlich immer wieder Landwirte, die da so ein bisschen Angst davor haben und was tatsächlich meiner Meinung nach auch teilweise dazu führt, dass manchmal die Strukturvielfalt gezielt von Landwirten gering gehalten wird, weil diese Angst vor, ich entwickle jetzt was, was hier auf einmal dann geschützt ist und was ich dann am Ende auf meiner Fläche nicht mehr machen darf, was ich will, kann ich mir vorstellen, dass es bei einem gewissen Prozentsatz, oder natürlich bei einem ein Teil der Landwirtschaft, eine Rolle spielt."

"Aber es scheint einfach so zu sein, dass in dieser Ausgestaltung [der Maßnahmen] dann immer dieser Praxisbezug ein bisschen hintenrüberfällt oder nicht priorisiert wird auf jeden Fall."

"Ja, ich meine, man scheut sich eben auch, gerade jetzt schon wieder was zu ändern, das ist eh schwierig, oder zu viel, zu schnell zu ändern. Glaube ich, dass es, selbst wenn man jetzt merkt, das funktioniert so nicht, habe ich das Gefühl, dass der politische Wille da nicht so da ist. (..) Und letztlich wollen die Landwirte natürlich immer einfach, dass sie sich das in Wert setzen können. Und ich meine, man will jetzt eben auch nicht unbedingt ein Biodiversitätslabel einführen oder so, aber wenn die wüssten, dass sie sowas eben wirklich bezahlt bekommen, oder dass das ein Anreiz ist, oder dass sie dann ihr Produkt entsprechend verkaufen können, dann würden die sehr vieles machen. Aber so eben, das kann ihnen natürlich auch keiner garantieren, oder dann müsste man ihn auch an ganz anderen Stellen ansetzen."