

## Review Article

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# Motivations for farmers' participation in agri-environmental scheme in the EU, literature review

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**Abstract:** Agri-environmental schemes (AESs) play a pivotal role in aligning agricultural practices with environmental objectives, promoting sustainable land management, and conserving biodiversity. This article presents a comprehensive synthesis of recent advancements in AES research within the European Union context, focusing on ecological, economic, and socio-political dimensions. Through a systematic review of literature published since 2013, we identify emerging trends, gaps, and research priorities, providing novel insights into AES effectiveness. We examine the factors that influence participation in AES such as biodiversity, habitat fragmentation, and agricultural ecosystem services. We also explore the economic factors influencing farmer participation, including financial incentives, income stability, and cost–benefit analysis. Furthermore, we investigate the socio-political dimensions of AES, including institutional frameworks, stakeholder engagement, and the role of trust in programme implementation. Key findings highlight the need for adaptive management strategies, incentive structures aligned with environmental objectives, and inclusive governance mechanisms to enhance AES effectiveness. Our research underscores the importance of context-specific approaches that account for farm characteristics, socio-economic factors, and institutional arrangements. Practical implications for policymakers, practitioners, and stakeholders are discussed, emphasizing the importance of evidence-based policymaking and iterative learning in promoting sustainable agriculture and environmental conservation.

**Keywords:** agri-environmental scheme, farmers, EU

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## 1 Introduction

Agri-environmental schemes (AESs) aim to harmonize agricultural production with environmental goals by integrating sustainability into agricultural practices. These schemes have emerged as practical and effective approaches for governments worldwide focused on ensuring sustainable land management and the preservation of biodiversity [1–4]. In the European Union (EU), AESs are crucial for promoting sustainable agriculture, safeguarding the environment, and ensuring food security.

AESs have become increasingly central to the EU strategy for promoting sustainable agriculture. Embedded within the Common Agricultural Policy (CAP), AESs encourage farmers to adopt practices that mitigate environmental impacts, enhance biodiversity, and contribute to broader climate goals. These schemes have been rebranded as Agri-Environment-Climate Measures to reflect their expanded scope in addressing climate change.

The growing emphasis on AESs is a response to the environmental challenges posed by conventional agricultural practices, including biodiversity loss, soil degradation, and greenhouse gas emissions. AESs offer a mechanism for addressing these challenges by incentivizing farmers to engage in practices that align agricultural production with environmental stewardship. However, the uptake of AESs varies significantly across the EU, influenced by a complex interplay of ecological, economic, and socio-political factors.

In the past 10 years, there has been an increase in research focusing on AESs, reflecting a growing interest in understanding the factors that influence farmer participation. While earlier studies primarily investigated the environmental impacts of AESs on biodiversity and habitat, recent research has broadened to encompass the various factors that motivate or hinder farmers' participation in these schemes. This expanding body of literature offers valuable insights for policymakers and stakeholders aiming to enhance the adoption of AESs among farmers. Previous research has provided comprehensive examinations of the factors influencing the implementation of sustainable management practices both within and outside of the EU [5,6].

While the ecological impacts of AESs have been extensively studied, demonstrating benefits such as enhanced biodiversity, reduced habitat fragmentation, and improved ecosystem services [7,8], understanding the factors that influence farmer participation remains crucial. The success of AES in achieving environmental goals ultimately depends on the willingness of farmers to adopt these practices. Therefore, recent research has increasingly focused on the motivations, barriers, and determinants of farmer participation in AES.

Previous research has emphasized the economic variables that impact farmers' involvement in AES [9,10]. Monetary rewards serve as a motivating factor for engagement, but they must align with environmental goals to be effective. Analyses have evaluated the cost–benefit ratio of AES, specifically regarding income stability, farm size, and the influence of subsidies on farmers' decision-making [11]. This literature helps policymakers understand the economic motivations and limitations of farmers, enabling the formulation of incentive systems that balance economic feasibility with environmental sustainability [12].

The socio-political aspects of AESs have also been examined, focusing on institutional frameworks, stakeholder engagement, and the influence of trust on farmer participation [13]. Researchers have emphasized the significance of inclusive and participatory governance structures in encouraging farmers to adopt AES by addressing socio-cultural contexts. Social science research has demonstrated the influence of peer networks, trust, and policy instruments on farmers' behaviour and decisions to participate in agricultural schemes [14–16].

Despite extensive research on AES, the literature is often fragmented, with studies focusing on disparate aspects of farmer participation and acceptance. Some research has concentrated on economic incentives, while others have examined socio-political contexts influencing farmer decisions. This fragmentation reveals the need for a comprehensive synthesis that brings together these diverse perspectives, identifies common trends, and highlights gaps that require further investigation.

The present article aims to fill this gap by systematically reviewing recent literature on the factors influencing farmer participation in AES within the EU. By synthesizing findings across economic, socio-political, and environmental dimensions, this review contributes to a deeper understanding of the determinants of AES adoption and provides insights for enhancing the design and implementation of these schemes to improve participation rates.

The remainder of this article is structured as follows: Section 2 outlines the methodology used for the systematic review, Section 3 presents the findings categorized by key

themes, and Section 4 discusses the implications for policy and future research, and the final part of the study draws conclusions.

## 2 Methodology

As defined by the European Environment Agency, “Agri-environmental schemes are government programmes designed to help farmers manage their land in an environmentally friendly way. Agri-environment schemes are important for the conservation of high nature value farmland, for improving genetic diversity and for protecting agro-ecosystems.” Protecting the environment, combating climate change, and preserving biodiversity are all ways of improving the condition of agricultural land and disseminating good practices [7,17,18].

We focused on publications in scientific journals that highlight the acceptance of AES in EU member states. To ensure a thorough and unbiased analysis, we employed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology [19], a recognized framework for conducting systematic reviews and meta-analyses. This approach enhances transparency and reproducibility by providing a structured process for literature search, study selection, data extraction, and synthesis.

Our systematic review began with a comprehensive literature search using electronic databases such as Web of Science, Scopus, and ScienceDirect. We utilized specific keywords including “Agri-Environmental Scheme,” “EU,” and “acceptance” to identify relevant studies. The search was limited to peer-reviewed articles published in English between 2013 and 2023 to capture recent developments in the field.

The main research question of the reviewed papers was to identify the factors that determine the participation of EU farmers in AES. To gain a comprehensive understanding of AES, their purpose, and their general functioning, we initially used broad keywords such as “Agri-Environmental Scheme.” This allowed us to capture a general picture of agri-environmental programmes within the EU context.

We then narrowed down the number of items by selecting studies focused on EU Member States to ensure regional relevance. Recognizing that not all studies exclusively address the motivations behind farmers' acceptance of environmental practices, we further refined our search with the following keywords: “Agri-Environmental Scheme and EU,” “Agri-Environmental Scheme and EU and acceptance,” and “Agri-Environmental Scheme and EU farmer acceptance.”

Although keywords are frequently used, they can sometimes be irrelevant to the aim of the research if not appropriately contextualized. Therefore, we applied additional exclusions at the beginning of the systematic search. We required that the primary keywords appear in the title, abstract, or author keywords to ensure the studies' direct relevance. The search was restricted to peer-reviewed reviews, research articles, and empirical studies. Non-academic sources such as patents, books, theses, and conference proceedings were excluded to maintain the quality and reliability of the evidence base.

The initial search resulted in a large number of articles. After removing duplicates, titles and abstracts were screened based on predefined inclusion criteria: studies must investigate factors influencing farmers' acceptance of AES in EU countries and provide empirical data through

quantitative, qualitative, or mixed-methods research. Studies focusing solely on environmental impacts without addressing farmer acceptance were excluded.

During the full-text review, we applied additional exclusion criteria to ensure relevance and quality. Studies lacking methodological rigour, not providing sufficient data on acceptance factors, or not focusing on EU member states were excluded. The final selection comprised studies that met all inclusion criteria (Figure 1).

Data extraction was standardized using a coding framework developed specifically for this review, which included various elements: study characteristics such as author(s), year of publication, country or region within the EU, and study objectives; methodological approach encompassing research design (quantitative, qualitative, mixed-methods), data collection methods (surveys, interviews, case studies),

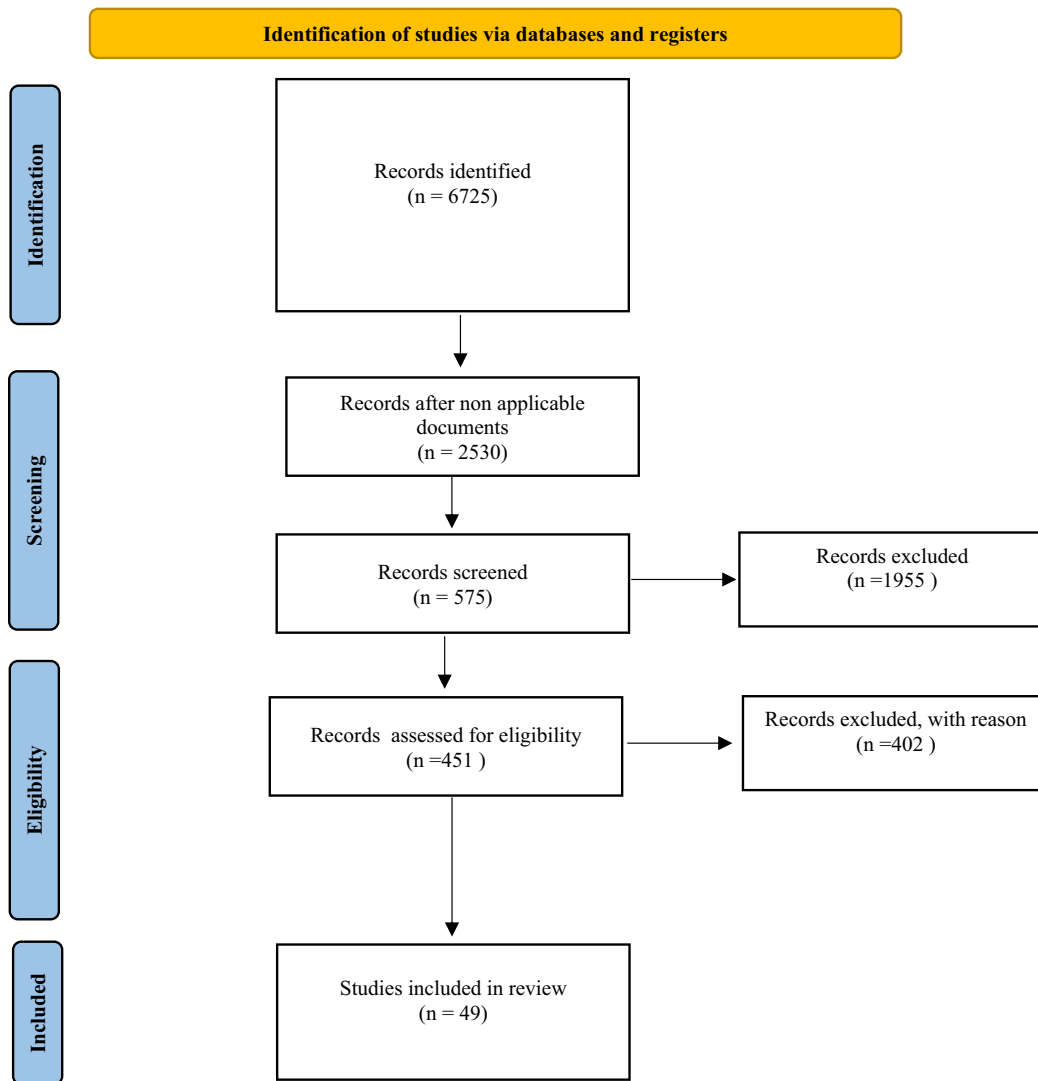


Figure 1: PRISMA flow diagram. Source: Wohllbe et al. [19].

and sample size; AES characteristics detailing the type of scheme, environmental objectives, incentive structures, duration, and administrative processes; factors influencing acceptance, covering economic factors (financial incentives, cost-benefit perceptions), social factors (peer influence, community norms), psychological factors (attitudes, beliefs, values), and institutional factors (policy support, trust in authorities); and key findings, which provided a summary of results related to farmer acceptance, identified barriers and motivators, and recommendations offered by the study.

Qualitative data were compiled through thematic analysis. We identified recurring themes and patterns by coding significant statements and grouping them into categories that reflect the factors influencing AES acceptance. This process involved iterative reading and coding to ensure that all relevant data were captured and accurately represented.

The synthesis of extracted data involved aggregating quantitative findings using descriptive statistics where applicable and integrating qualitative insights to provide a comprehensive understanding of the factors affecting farmer acceptance. We identified common trends, such as the importance of financial incentives, the role of environmental attitudes, and the impact of bureaucratic complexity on participation decisions.

Our literature search intentionally focused on the keyword “acceptance” to delve into the key aspects of how AESs are perceived and received by farmers, policymakers, and other stakeholders. While terms like “adoption,” “uptake,” and “implementation” are commonly used to discuss the practical engagement with AES, “acceptance” captures a broader, more conceptual understanding of the willingness and readiness of individuals and communities to engage with these schemes. This focus is crucial for exploring the underlying factors that influence the success of AES, including psychological, social, and cultural dimensions that may not be fully addressed when concentrating solely on practical implementation.

Regarding terminology, the use of “Agri-Environmental Scheme” remains a well-established term within EU agricultural policy and academic research. While we acknowledge that terms such as “measure” or “practice” are also prevalent, our use of “scheme” maintains consistency with much of the existing literature and policy documents. Although the latest CAP refers to these initiatives as “agri-environmental-climate measures,” the term “Agri-Environmental Scheme” continues to be widely used and recognized, allowing us to capture a broad range of studies, including those that span different CAP periods.

Our focused approach was designed to provide an in-depth analysis of the conceptual factors affecting AES

acceptance among EU farmers. By concentrating on “acceptance,” we aimed to highlight the psychological and socio-cultural elements that underpin farmers’ engagement with AES, offering valuable insights that might be overlooked in studies emphasizing practical adoption or implementation. This deliberate choice of keywords was guided by the specific objectives of our research and the desire to explore the nuanced dimensions of farmers’ willingness to participate in AES.

While our approach may not encompass every study using alternative terminology, it effectively captures the relevant literature needed to address our main research question. We believe that this methodology provides a focused and meaningful contribution to understanding the factors influencing EU farmers’ participation in AES.

We acknowledge that relying solely on “acceptance” as a keyword may have resulted in the omission of some relevant studies that use terms like “adoption,” “motivation,” or “attitude.” To mitigate this limitation, we conducted supplementary searches using these additional keywords when initial results were insufficient. However, our primary focus remained on studies explicitly addressing “acceptance” to maintain the specificity of our research question.

## 3 Results

### 3.1 Different perspectives

The studies published within the past decade can be categorized into three distinct groups. The initial set of studies has a primary emphasis on ecology. Subjects pertaining to conservation biology, such as the biological efficacy of agri-environmental programmes, as well as the impacts of habitat fragmentation and edge effects on different terrestrial species, are discussed [8]. Additionally, there are studies that focus on enhancing the fertility and productivity of agricultural land, which is crucial for supporting the growth and development of living organisms. Multiple studies have demonstrated alterations in the diversity of species and the benefits they offer to agriculture and its development [20,21].

Several studies differentiate between the environmental factors of voluntary participation and the economic consequences. The second significant category of studies comprises economic studies. Examining the acceptance of agri-environmental linkages on farm income stability is a key area of research due to the significant challenge it poses to farms [22]. The papers that specifically examine the evolving characteristics

of farms or farmers or the societal effects of programmes in the last 10 years are significant. A significant portion of the research focuses on the possibility of implementing outcome-based agri-environmental payments [23–26].

The third category of studies focuses on the socio-political aspects. The involvement of farms and their farmers is influenced by their specific characteristics. The acceptance of environmental management practices by farmers is primarily influenced by economic and structural factors. Ecological studies primarily examine matters pertaining to conservation biology, whereas the economic approach focuses on assessing the economic consequences of agricultural activity, considering the prevailing market conditions [27].

### 3.2 Theoretical frameworks

Approximately 50% of the studies analysed conducted concurrent investigations in multiple EU member states, while the remaining 50% concentrated on a single EU country. Approximately 33% of the published studies consisted of structured literature reviews. Roughly 66% of them employed a methodological approach to measure the underlying attributes that contribute to farmers' involvement in AESs. Over 50% of these studies employed an econometric approach to examine their hypotheses. The majority of the models employed cross-sectional data, while approximately one-third of them utilized panel data for their analyses. In the subsequent studies, the authors employ alternative qualitative methods to corroborate the findings of the research. The reviewed studies are grounded in various theories, including consumer preference theory, participation theory, decision theory, relational theory, reasoned action and planned behaviour theory, difference-in-difference theory, cooperation theory, utility theory, and experimental theory. The studies differ in terms of sample size, ranging from a few hundred to fifty thousand participants.

Extensive research is conducted on the topic of cost-benefit analysis. The financial incentives for participating in an AES are analysed due to the potential negative consequences it may have on farmers. The consequences are influenced by the utilization of land resources. Hence, the expense of engaging in such a programme is a crucial factor. Furthermore, various other endeavours, such as implementing a contractual agreement that includes incentives for meeting specific goals, which in turn leads to additional financial rewards for farmers on their own property, significantly enhance farmers' trust and assurance. The conditions established by these schemes also impact the level of voluntary participation.

### 3.3 Drivers of AESs

In the last 10 years, numerous publications have focused on the economic and social factors that drive European farmers to engage in various AESs [27,28]. Researchers also regard landscape and farm characteristics as crucial factors for involvement in environmental programmes [29]. The subjects covered in this text include the connection between agri-environmental regulation and ecosystem services [11], the cost-effectiveness of regulation [30,12], and the economic impacts of such regulation [9,10,31]. The AES literature examines the economic and political environment in which the systems operate, as well as strategies for enhancing AESs, such as the utilization of technology and policy instruments [32].

### 3.4 Ecological consideration

The literature consistently emphasizes the positive ecological outcomes of AES, particularly in terms of biodiversity conservation, habitat restoration, and the enhancement of ecosystem services. Numerous studies, such as [7], demonstrate that AESs contribute significantly to the preservation of plant and animal species, especially in regions where intensive agriculture has led to significant biodiversity loss.

A notable trend in the literature is the growing recognition that AESs are most effective when implemented at a landscape scale rather than at the level of individual farms. This approach allows for greater ecological connectivity, which is crucial for the movement and survival of species across fragmented habitats [8]. Studies have shown that landscape-scale AESs can lead to more substantial and sustained biodiversity gains compared to isolated, small-scale interventions.

### 3.5 Economic factors

Economic considerations are central to the decision-making process of farmers when it comes to participating in AES. The literature widely acknowledges that financial incentives are a key driver of AES acceptance, but there is considerable variation in how these incentives are perceived and their effectiveness across different contexts.

The studies indicate that farmers are more inclined to engage in a certain activity if they perceive a distinct economic benefit, such as higher crop yields, lower expenses, acceptable profit margins, and enhanced farm management.



**Table 1:** Synoptic table: summary of findings from the literature review

Category	Type of studies	Key findings	Main drivers
Ecological and environmental factors	<ul style="list-style-type: none"> <li>• Conservation biology</li> <li>• Biodiversity studies</li> <li>• Habitat fragmentation</li> <li>• AES efficacy</li> <li>• Ecological impact studies</li> <li>• Landscape-scale conservation</li> <li>• Biodiversity analysis</li> </ul>	<p>AES acceptance depends on</p> <ul style="list-style-type: none"> <li>• Contribution to biodiversity conservation and ecosystem services</li> <li>• Positive outcomes noted in habitat restoration and species preservation</li> <li>• Landscape-scale AES provide more substantial biodiversity gains than isolated schemes</li> <li>• Habitat restoration and increased ecosystem service</li> </ul>	<ul style="list-style-type: none"> <li>• Ecological connectivity</li> <li>• Landscape management strategies</li> <li>• Biodiversity conservation</li> <li>• Ecosystem services</li> </ul>
Economic factors	<ul style="list-style-type: none"> <li>• Econometric studies.</li> <li>• Cost–benefit analysis</li> <li>• Income stability studies</li> <li>• Financial incentives</li> <li>• Farm management</li> </ul>	<ul style="list-style-type: none"> <li>• Economic benefits are key to AES acceptance</li> <li>• Farmers prefer AES that offer clear financial advantages</li> <li>• Financial incentives are often viewed as insufficient</li> <li>• About one-third of farmers will not accept AES</li> <li>• Economic concerns often outweigh environmental benefits</li> <li>• Continued participation depends on compensation or wage increases</li> </ul>	<ul style="list-style-type: none"> <li>• Financial incentives</li> <li>• Income stability</li> <li>• Cost–benefit considerations</li> <li>• Profitability</li> <li>• Economic benefit perception</li> <li>• Incentive structures</li> </ul>
Socio-political factors	<p>Studies on</p> <ul style="list-style-type: none"> <li>• Socio-economic attributes</li> <li>• Policy analysis</li> <li>• Technology adoption</li> <li>• Farmer attributes</li> <li>• Social influence</li> <li>• Policy stability</li> </ul>	<ul style="list-style-type: none"> <li>• Socio-economic factors (farm size, farmer age, education) influence AES acceptance</li> <li>• Social networks and peer influence are significant</li> <li>• Political and institutional stability affect farmer acceptance of AES</li> <li>• Participation shaped by farm size, location, farmer education, and environmental awareness</li> <li>• Peer influence and trusted intermediaries are crucial</li> <li>• Political and institutional environments play a significant role</li> </ul>	<ul style="list-style-type: none"> <li>• Socio-economic characteristics</li> <li>• Social networks</li> <li>• Policy and political context</li> <li>• Farmer characteristics</li> <li>• Peer networks</li> <li>• Political stability</li> </ul>

In contrast, environmental concerns are regarded as insignificant [33–35]. Some farmers may perceive the financial incentives provided by the programme as insufficient to justify the amount of effort required. Additionally, research has revealed that approximately one-third of farmers will never engage in AES [36]. The continued involvement of the remaining farmers hinges on receiving compensation payments or a rise in their wages [37,38].

### 3.6 Socio-political aspects

The widespread acceptance of AESs has been extensively documented in the literature. Scientists have analysed the variables that influence farmers' choices to engage in AES, including their socio-economic attributes, the accessibility of the technology, and the perceived advantages of participation [39]. Agri-environmental programmes are influenced

by various interconnected factors, including attitudes, motivations, and social factors. Furthermore, numerous studies have provided insights into the influence of the adjacent economy [40,11].

The participation of farms and their farmers is determined by their respective characteristics. Various factors, such as the size and location of the farm, the specific activities carried out on the farm [35,41], the age and education level of the farmer, as well as their strong environmental awareness or experience in scheme management, can influence the willingness of farmers to participate in AES [42–45]. The participation of farmers in social networks can be influenced by the opinions and behaviours of their peers, as well as the presence of trusted intermediaries [46,47]. The political and institutional context, including the stability and effectiveness of the political and institutional environment, can also impact farmers' inclination to engage in AES [15,16].

Research on environmental performance focuses specifically on the market conditions in which farms function. The findings indicate that both the internal structure and managerial resources have the potential to enhance performance and foster a greater willingness to adopt environmental best practices [48]. Table 1 summarizes the key literature findings, addressing socio-political, ecological, environmental, and economic factors.

## 4 Discussion

AESs have the objective of preserving the quality of agricultural land, biodiversity, and natural environmental values, while also addressing the issue of climate change [7,49,50]. Nearly 50% of the published studies focus on considering the environmental impact of agri-environment schemes, ignoring other factors that may also have an impact. One crucial aspect is the conservation of species and their habitats on agricultural land to achieve biodiversity goals. The ecological effects of AES are diverse and vary based on landscape and system characteristics, as well as the indicators being evaluated. Environmental concerns among farmers have minimal influence on their acceptance of AES. Participation in AESs is more probable in less intensive production systems; however, the payments associated with these cases are generally lower.

Extensive research demonstrates the beneficial effects of AESs on the environment, such as enhancing biodiversity, improving habitat quality, and promoting ecosystem services. Nevertheless, there are still several constraints that remain, including the absence of extended research studies and inconsistent approaches for evaluating ecological results. Future research should give priority to conducting comprehensive and long-term evaluations of the effectiveness of AESs in various farming systems and landscapes. Furthermore, investigating the efficacy of particular management strategies within AES can yield valuable knowledge for enhancing conservation endeavours.

Financial incentives play a crucial role in motivating farmers to participate in AESs. However, it is necessary to conduct rigorous cost–benefit analyses to assess the economic feasibility of these schemes. An additional investigation should prioritize the identification of optimal incentive frameworks that strike a balance between economic profitability and environmental sustainability. By investigating novel funding methods and reward systems, we can increase the involvement of farmers in AES and optimize the advantages for society.

The presence of institutional frameworks and the active involvement of stakeholders are crucial in determining the

outcomes of AES. However, there are still obstacles to effectively addressing power dynamics and social inequalities during the implementation phase. Future research should further investigate the socio-political aspects of AESs, specifically examining topics such as governance frameworks, dynamics of stakeholder influence, and considerations of social fairness. Moreover, employing interdisciplinary methods that involve a wide range of stakeholders in the decision-making process can promote more comprehensive and efficient policies for agricultural and environmental sustainability.

Although current research already incorporates an interdisciplinary approach, there is a requirement to enhance the integration of ecological, economic, and socio-political perspectives. Effective collaboration between researchers, policymakers, and practitioners is crucial for jointly creating knowledge and formulating comprehensive policies for AES. Future research should prioritize the development of novel methodologies and frameworks for interdisciplinary research in AES. This includes the use of participatory approaches that involve stakeholders throughout the entire process of policy development and implementation.

The significance of contextual factors, such as farm characteristics, socio-economic status, and trust, in influencing farmer engagement in AESs is extremely important. Future research should investigate the wider socio-cultural, institutional, and policy factors that impact the implementation and results of AESs. Gaining a comprehensive understanding of the interconnections and compromises between AES and other agricultural policies is essential for incorporating environmental goals into wider agricultural policy frameworks.

Effective assessment of AESs relies heavily on robust monitoring and evaluation. However, there are still difficulties in establishing standardized indicators and methodologies. Future research should give priority to the advancement of comprehensive evaluation frameworks and data collection methods. By utilizing remote sensing technologies, citizen science initiatives, and participatory monitoring approaches, we can improve our comprehension of the impacts of AES and facilitate evidence-based policymaking.

The integration of ecological, economic, and socio-political factors is crucial for understanding the dynamics of AES acceptance. The literature increasingly recognizes that these factors do not operate in isolation; rather, they are deeply interconnected and influence one another in complex ways.

The trends and controversies identified in this review have significant implications for AES policy. Policymakers must navigate the complex interplay of ecological, economic, and socio-political factors to design AESs that are effective, equitable, and sustainable.

## 5 Conclusions

AESs are a crucial component of the EU's strategy for promoting sustainable agriculture. To enhance their impact, several policy-related adjustments are recommended. Policymakers should focus on optimizing incentive structures to ensure that they are both economically feasible for farmers and aligned with environmental goals. Detailed cost–benefit analyses are needed to develop incentive mechanisms that encourage long-term participation. Additionally, the design and implementation of AESs should account for the diverse cultural and social contexts in which they operate. Recognizing regional differences, social networks, and trust can lead to more tailored and effective AES that resonate with farmers' lived experiences and local realities. Finally, effective monitoring and evaluation frameworks are essential for assessing the success of AES. These frameworks should include standardized metrics for consistent measurement of ecological and economic impacts across various agricultural systems and regions.

While this review offers a comprehensive examination of AESs, several limitations should be acknowledged. First, much of the research reviewed focuses on short- to medium-term impacts, leaving gaps in our understanding of the long-term sustainability of AES. Second, the analysis may be limited by the availability of comparable data across different regions, which could hinder the assessment of broader trends. Additionally, the diverse socio-political contexts in which AESs operate may not be fully captured, limiting the generalizability of some findings.

Future research should focus on longitudinal studies that assess the sustained impacts of AESs on biodiversity, soil health, and farm economics. Understanding these long-term effects is essential for refining AESs and ensuring their continued relevance. Furthermore, a more integrated research approach, combining insights from ecological, economic, and socio-political perspectives, is necessary. This comprehensive understanding will help identify the factors influencing AES acceptance and effectiveness, facilitating the development of more holistic policy interventions.

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