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# Exploring private financing for biodiversity conservation: stakeholder perspectives and governance in the case of wildflower strips in Germany

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## ABSTRACT

This study explores the understudied role of privately financed ecosystem service provision in biodiversity conservation, focusing on the example of wildflower strips in Germany. Using qualitative methods, it investigates the diversity of private financing schemes, stakeholder involvement, scheme implementation and farmers motivations to engage in private schemes. The results draw on literature-based stakeholder analysis and expert interviews, including ecologists and practitioners, in three German federal states: Baden-Württemberg, Bavaria and Lower Saxony. Findings include a stakeholder map, the identification of four types of private financing schemes, and the formulation of 17 design criteria covering ecological, economic, and social aspects. These criteria aim to guide providers and sponsors and to emphasise the diverse nature of private wildflower strip financing schemes and their role as crucial links among farmers, the private sector, and society. The study highlights private schemes as viable alternatives to public funding but raises concerns about quality control and coordination with public measures. Combining publicly funded agri-environment schemes with private financing is controversial among stakeholders. Government intervention could formalise the private market, improving control and protection, possibly limiting private sector flexibility and attractiveness due to higher levels of bureaucracy. In any case, transparency in management and financial structures is crucial. Policy recommendations overall include incentivising private sector conservation involvement, offering tax credits for private financing, improving government mechanisms, streamlining coordination of public and private conservation at the landscape level and fostering stakeholder networking. Consequently, this study lays a foundational framework for further exploration into the realm of private financing in biodiversity conservation.

## KEY POLICY HIGHLIGHTS

- **Private Financing as a Conservation Tool:** Private financing schemes, such as wildflower strips in Germany, can serve as viable alternatives to public funding for biodiversity conservation, linking farmers, the private sector actors and society.
- **Different Scheme Types Identified:** The study identifies four distinct types of private financing schemes, which differ based on whether they involve direct partnerships between farmers and sponsors or companies, or indirect partnerships with intermediaries facilitating the sponsorship.
- **Comprehensive Scheme Design:** Effective private WFS schemes should integrate ecological, economic and social elements, guided by established design criteria to ensure sustainability and practical implementation.
- **Policy Incentives:** Governments should incentivise private sector involvement in conservation through measures such as tax credits for sponsors of certified schemes and streamlined coordination of public and private initiatives at the landscape level.
- **Transparency and Stakeholder Networking:** Transparency in management and financial structures of private schemes is crucial. Additionally, fostering networking and knowledge exchange among stakeholders can enhance private sector engagement in biodiversity efforts.

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## 1. Introduction

The world is facing an urgent need to halt and reverse the dramatic decline in biodiversity (IUCN 2022). In terms of insects, 40% of insect species are threatened worldwide, while the overall insect biomass is declining, including the reduction of common species (Pilotto

et al. 2020; van Klink et al. 2020; Wagner et al. 2021). Evidence also suggests a strong decline in insect populations in Germany (Hallmann et al. 2017; Seibold et al. 2019). Causes for insect decline, in particular, include the loss of habitat and foraging opportunities provided by plants (Haaland et al. 2011) as the remaining areas and

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plant communities are rather species-poor and dominated by single species (Schmidt et al. 2020). A major factor for the loss of habitat is the intensification of agriculture that is associated with larger field sizes, lower crop diversity and the use of fertilisers and pesticides (Hallmann et al. 2017; Wagner et al. 2021). Biodiversity is essential for agricultural production, forming the foundation for critical ecosystem services like pollination, pest control and nutrient cycles (Mei et al. 2021). Thus, more and more biodiversity conservation measures are applied to halt and reverse the decline. Wildflower strips (WFSs) are considered one of the most commonly applied and effective measures to improve ecosystem services connected to cropland, counter insect loss and enhance biodiversity (Tschumi et al. 2016; Albrecht et al. 2020; Schmidt et al. 2022). WFSs provide herbaceous vegetation within a field aiming to provide food and shelter to insects and other animals, thus enhancing farmland biodiversity (Haaland et al. 2011). Many of the attracted insects are functional arthropods that benefit the ecosystem (Haaland et al. 2011).

Farmers are incentivised by payments to establish WFSs (Piqueray et al. 2021). For example, WFSs have been included in agri-environmental schemes (AES) under the umbrella of the Common Agricultural Policy (CAP) of the European Union (EU) since the 1990s (Haaland et al. 2011). Under the current CAP period from 2023 to 2027 and within Pillar 1, WFSs are part of the eco-scheme catalogue in many EU states including Germany as an annual AES (Runge et al. 2022). In Pillar 2 of the CAP, WFSs are part of AES programmes designed at the federal-state level within the framework of rural development schemes (BMEL 2022). Programmes for WFS subsidies at the federal level are designed based on regional characteristics (dvs 2022). While the funding and implementation requirements vary, there are commonalities for WFS funding at the federal level, e.g. specifications on the minimum width of the strip, the commitment period, seed mixture, sowing time and rate and maintenance measures. The federal schemes define clear requirements regarding compensation payment, size, seed mixture, sowing, management and pesticide and fertiliser application in combination with other AES (see Appendix A).

An alternative to public funds is the private sector engagement for WFS establishment. Actors providing financing schemes for WFSs are, e.g. climate and environmental organisations, farmers' associations or companies. One key private sector initiative is the format of WFS sponsorship platforms.

Wildflower seed mixtures are cultivated annually or perennially (Uyttenbroeck et al. 2016), including wild native and non-native flowering plants (Albrecht et al. 2020). WFSs are grown on productive farmland and generally not treated with nitrogenous fertilisers, chemical pesticides, or herbicides (Dietzel et al. 2019).

In practical terms, WFSs differ strongly with respect to flower abundance and diversity depending on different seed mixtures applied, whether grass species are included, whether the specific flower species are especially rich in pollen or nectar, as well as differing management practices, duration, size and overall varying circumstances (Haaland et al. 2011). Due to these differences, assessing their ecological effects is a non-trivial task (Dietzel et al. 2019). Several studies conclude that species richness is higher in WFSs than in control fields without wildflower seed mixtures (Stroot et al. 2021; Knuff et al. 2021; Schmied et al. 2022). Despite the generally positive effects of WFSs on biodiversity, not all taxa benefit equally, especially if they rely on specific habitats (Dietzel et al. 2019). Variation occurs mainly based on factors like the choice of field, seed mixture and sowing, duration and vegetation structure (Ganser et al. 2019; Scheper et al. 2021; Henningson 2021; Schmied et al. 2022). WFSs are also criticised for functioning as ecological traps (Ganser et al. 2019; Schmied et al. 2022) and for promoting common species instead of endangered ones (Haaland et al. 2011).

Thus, WFS financing schemes have to be designed carefully to support the establishment of long-lasting WFSs contributing to biodiversity conservation instead of short-term WFSs only serving as a temporary forage resource (Henningson 2021). Mei et al. (2021) emphasise that public schemes rarely take into account quality differences between WFSs and that including quality criteria would increase biodiversity and ecosystem services.

Other studies have investigated the effect of management practices (Piqueray et al. 2021) and the quality of seed mixtures on environmental outcomes (Schmidt et al. 2020). Furthermore, the literature provides insights into the effects of WFSs on various parameters like pollinators, pest control (Albrecht et al. 2020) and crop yield (Sutter et al. 2018), concluding with suggestions for improved WFS establishment. WFSs and payments for their establishment are thus far mainly studied in the context of AES (Tschumi et al. 2016; Uyttenbroeck et al. 2016; Albrecht et al. 2020; Schmidt et al. 2022). Without referring to WFSs but generally to payments for ecosystem services as AES, Meyer et al. (2015) formulate policy design principles.

Regarding the role of private sector financing of WFSs, there remains a research gap. Clark et al. (2018) generally stress the need and potential of private financing for nature conservation arguing that public funding is insufficient. Regarding the exemplary case of WFSs, little is known about what types of private WFS financing schemes exist, their design, how they differ regarding WFS quality, and how they impact biodiversity and ecosystem services. Increased adjustments in the current CAP period,

such as higher payments per hectare tied to stricter requirements than previous periods, strengthen interest in private sector WFS financing schemes. This especially encompasses potential requirements, implementation and scheme design. Moreover, while publicly funded WFSs are based on clearly defined requirements, private schemes are not organised under one umbrella. Without external rules, private schemes may vary.

This study aims to investigate private WFS financing schemes in Germany by addressing the following research questions:

- (1) What types of private financing schemes for WFS exist with a focus on the stakeholders involved?
- (2) What is the motivation for farmers to engage with private WFS financing schemes?
- (3) What are design criteria for sustainable private WFS financing schemes?

The study is based on the holistic understanding of sustainability, thus the three dimensions of ecological, economic and social sustainability (Schulz et al. 2001) are considered.

## 2. Material and methods

### 2.1. Study context

The study focuses on private sector contribution to WFS financing in Germany, where the number of WFS sponsorships has increased in recent years. Concretely, the three federal states Baden-Württemberg, Bavaria and Lower Saxony build the cases. These are the three largest states in terms of total and agricultural land area (Destatis 2021) and represented 42.2% of Germany's total agricultural land area in 2021. Baden-Württemberg, Bavaria and to a lesser extent Lower Saxony, are suitable case areas, as functioning initiatives build positive examples of private WFS financing. For example, in Bavaria public interest and successful initiatives such as the 'save the bees' petition resulted in the passing of ambitious biodiversity conservation laws (Henley 2019). However, on average farm and field size is larger, the percentage of permanent green land and organic farming is lower in Lower Saxony compared to Baden-Württemberg and Bavaria (Destatis, editor 2023).

In the German private sector, regional schemes are provided by different organisations (Dietzel et al. 2019). The initiative for private sector WFS financing schemes, mainly WFS sponsorships, emerges in the realm of the petition for a referendum 'save the bees' (Leykamm 2019). Farmers offering WFS sponsorships argue that they offer a low-threshold possibility for civil society to act, leaving the responsibility for biodiversity enhancement not only to farmers (Leykamm 2019). The main components and features of a WFS sponsorship can be described as follows: private actors financially support farmers to establish WFSs on agricultural fields which are taken out of production. Commonly, a yearly contract regulates the price (usually expressed in EUR/m<sup>2</sup>), the size, and the seed mixture. In return, sponsors receive a certificate indicating their engagement. Overall, WFS sponsorships are described as an easy way for everybody to get involved, as after getting in contact, signing the contract and making the transfer, farmers take over the workload (Leykamm 2019).

### 2.2. Methodological approach

The study employs a mix of methods which are largely based on qualitative empirical social research. The approach consists of four steps as outlined in Figure 1.

First, scientific and mainly grey literature was explored to identify existing private financing schemes and their involved direct and indirect stakeholders in the three study areas. This served as the basis for the stakeholder analysis (Zepke 2016), which was summarised in a stakeholder map (step two). Literature was identified using the databases Scopus and AgEcon Search based on the search terms 'wildflower strip', 'private financing' and 'sponsorship' in German and English, each term appended with 'Baden-Württemberg', 'Bavaria' or 'Lower Saxony'. However, this search led to only a few results. Grey literature included web page entries of farmers' associations, environmental and other non-governmental organisations, regional farmers newspapers, subject-specific media such as AgraEurope, and reports and general information provided on WFS sponsorship scheme web pages. These were identified using the Ecosia search engine and scanning web pages of ministries (Ministry of Agriculture at federal and state levels of

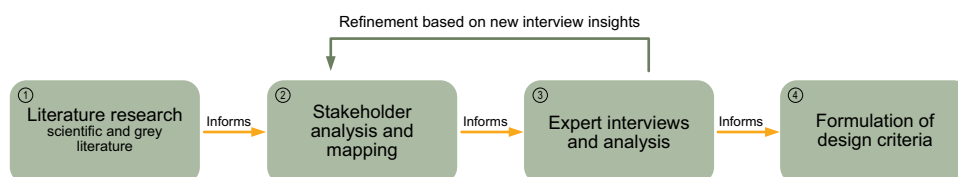


Figure 1. Overview of methodological steps, own source.

Baden-Württemberg, Bavaria and Lower Saxony), farmers' associations (German farmers' association, Baden Main Agricultural Association, State Farmers' Association Baden-Württemberg, Bavarian farmers' association, Landvolk Lower Saxony), associations (German Raiffeisen Association, German Association for Landscape Conservation), the Federal Environment Agency and environmental non-governmental organisations (German Federation for the Environment and Nature Conservation, German Environmental Aid, German Nature and Biodiversity Conservation Union, Nature Conservation Ring, Greenpeace). Information on the scheme provider, programme design, who can engage as a sponsor (if the information was shared), requirements for farmers and sponsorship costs and items were collected.

The stakeholder analysis and mapping were applied according to Zepke (2016). The analysis allows the systematical collection and graphical illustration of interest groups that are key for understanding the actors involved in private WFS financing and their relations.

Third, a selection of experts was interviewed to collect knowledge on the ecological impact of WFSs, and insights from the practical implementation of private financing schemes. The stakeholder analysis was completed and updated retrospectively based on the information shared by the interviewed experts. The expert interviews were split into two groups. One group included subject matter experts in landscape ecology, vegetation science, ecology in agricultural systems and ecosystem services in agricultural landscapes, identified based on their expertise. The second group focused on practitioners directly involved in a private WFS financing scheme to obtain a practical perspective. As an exploratory study aiming to identify and understand general models of private WFS financing schemes, various practitioners were contacted as interview partners. We tried to cover as wide a range of stakeholders as possible in the three regions to identify different constellations and schemes. Within each region, we randomly sampled stakeholders involved in private

programmes (stakeholder analysis results) trying to address different actors (farmers, farmers' associations, companies and registered societies) in different regions. There was a low response rate for interview requests from stakeholders in Lower Saxony, which explains the low representation. The interviews were guided qualitative expert interviews (Gläser and Laudel 2010; Bogner et al. 2014). Two separate interview guidelines were prepared (Gläser and Laudel 2010; Kaiser 2014), available in Appendix B. The interviews with ecologists focused on the topics of biodiversity, ecological effects of WFSs, and criticism of WFSs. Stakeholders were asked about their concrete private financing scheme, involved stakeholders and motivation and interests. Both groups were asked about criteria they consider important for a private scheme. In total, 10 interviews (Table 1) were conducted, three with academic experts (F\_1–F\_3) and seven with stakeholders (S\_1–S\_7). After 10 interviews, saturation could be recognised, as no completely contradictory cases were found.

The collected data, namely interview transcripts, were analysed using qualitative content analysis, a common approach for evaluating and systematising expert interviews (Bogner et al. 2014). According to Kuckartz (2018) and Kuckartz and Rädiker (2020), qualitative content analysis was conducted as a code-based and content-structuring approach. The codes are developed in a mixed process of inductive codes based on the research question and interview guideline, and deductive codes based on the interview material (Kuckartz 2018). The final coding frame is illustrated in Appendix C. The interview transcripts were evaluated using the program MAXQDA.

The analysis results were considered to define a typology of private financing schemes and to formulate design criteria for sustainable private WFS financing schemes. Criteria addressing ecological, economic and social aspects allow for designing sustainable private financing schemes for WFSs. Sustainable schemes provide ecologically stable WFSs and are also economically and socially acceptable for actors involved. The results and especially the design criteria are predominantly

**Table 1.** Overview of conducted interviews [June 2nd – August 4th, 2022], own source.

Interview partner	Interviewee background	Federal state	Date	Duration	Modality
F_1	Professor at university, ecologist	–	02.06.2022	1 h 7 m	On-site
F_2	Post-doctoral researcher at university, ecologist	–	08.06.2022	42 m	On-site
F_3	Agricultural engineer (Dipl.) at research centre	–	04.07.2022	39 m	Online
S_1	Registered Society	Baden-Württemberg	09.06.2022	1 h 22 m	On-site
S_2	Farmers' association	Baden-Württemberg	28.06.2022	1 h	On-site
S_3	Farmers' association	Lower Saxony	08.07.2022	45 m	Online
S_4	Farmer	Bavaria	15.07.2022	1 h 9 m	Online
S_5	Company	Baden-Württemberg	25.07.2022	1 h 8 m	Online
S_6	Farmer	Bavaria	02.08.2022	49 m	Online
S_7	Company	Bavaria	04.08.2022	1 h 7 m	Online

based on the perspectives of stakeholders. The criteria definitions are sourced and based on the coded segments of the interview transcripts. We coded criteria, when they were mentioned, defined, or stated as such in the interview transcript. Additionally, explanations, background information on criteria and implemented requirements that were repeatedly mentioned were considered when determining the design criteria. Moreover, some aspects were not formulated as core criteria but as additional, 'nice to have' criteria. In order to substantiate or contradict the interview findings, an additional literature search was conducted as final step. The search tools applied to find the scientific literature on design criteria for WFS and financing schemes were Scopus, AgEcon search, Wageningen Economic Research, Thünen Institute and additional snowball search with the terms 'wildflower strips', 'criteria' and 'requirement'.

### 3. Results

#### 3.1. Types of private WFS financing schemes and actors involved

The literature search, mainly grey literature, led to an overview table that displays 44 private sector financing schemes in Baden-Württemberg, Bavaria and Lower Saxony as of July 2022 (see Appendix D). Despite an intensive search, this list is non-exhaustive.

Farmers either offer sponsorship schemes directly or indirectly based on third-party involvement and facilitation. The majority of private financing schemes are executed in the form of WFS sponsorships. Out of 44 identified schemes 23 can be characterised as direct sponsorship between private

individuals or companies as a sponsor and farmers. On the other hand, 19 schemes are indirect sponsorships facilitated by registered societies, companies, or farmers' associations at the federal, state and district level and, in one case, by a private individual. The indirect partnerships are usually organised via an online platform where farmers and sponsors meet. Farmers register their WFS project, and individuals or companies choose which project they preferably support. Two schemes are outliers as they provide awards including prize money to farmers for extraordinary WFS establishment.

A common format of the partnership is the scheme of sponsorships where farmers offer the establishment and maintenance of WFSs. This service is (co-) financed by sponsors, who in turn receive a certificate of sponsorship. The partnership builds on a simple, one-page contract in most investigated cases.

Based on the gathered information, supplemented by insights from expert interviews on involved actors, their influence and their relations three internal and two external stakeholder groups are identified and mapped (Figure 2).

The internal stakeholders comprise farmers, individuals, registered societies, companies and farmers' associations, as they are the key actors in private WFS financing, depending on the type of partnership. Beekeepers, media and research institutions are identified as external stakeholders with a supportive but indirect function. Further external stakeholders that benefit from WFSs and increased biodiversity without direct contribution are other farmers, beekeepers, and civil society. Furthermore, Figure 2 highlights three major stakeholder groups: WFS providing

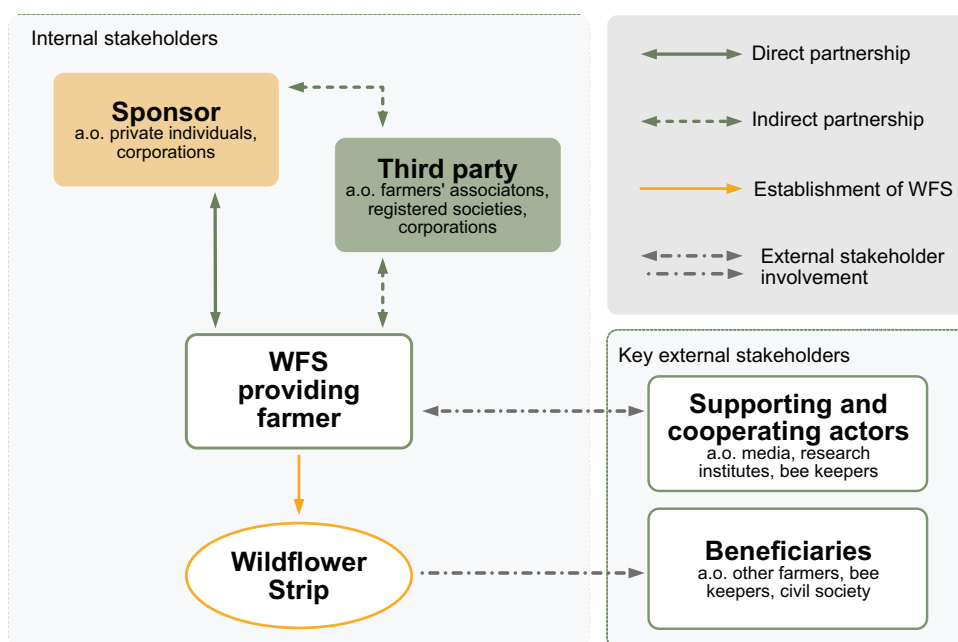


Figure 2. Stakeholder map of private WFS financing, based on literature research and expert interview transcripts.

farmer, sponsor and facilitating third party. As an interviewee formulated, ‘without a farmer, there is no WFS sponsorship, and without sponsors, there is no WFS sponsorship either’ (Interview S\_4).

The stakeholder group of farmers functions as the provider and executing force of WFSs. Their main tasks include project supervision, administrative work like setting up sponsorship contracts, reporting, general communication with sponsors and practical implementation, including seedbed preparation and management (Interviews S\_2–S\_6). Offering a private WFS financing scheme usually implies more work for farmers than the cultivation of cash crops. Thus, a certain level of motivation and willingness for direct communication with sponsors is essential (Interviews S\_3, S\_5). The time needed to interact with sponsors is a fixed transaction cost independent of the size of the contract, which decreases with the length of the WFS sponsorship.

Sponsors are either private individuals or business entities, which provide financial means and support the farmer to establish a WFS. In contrast to individual sponsors, corporate sponsors (all companies independent of their legal entity) usually pay higher total amounts, sometimes based on higher prices per square metre (Interviews S\_1, S\_7). Moreover, companies are perceived as solid sponsors as they are more likely to fund larger plots (and thus lower transaction cost) or assign for perennial commitment (Interviews S\_5, S\_6). The funding of perennial WFS is especially attractive to WFS providers because annual transaction costs are particularly high in the first year of sponsorship.

Another key finding is that farmers’ associations, registered societies and companies function as facilitators between farmers and sponsors. The facilitator provides the infrastructure for providers and sponsors to meet (Interview S\_2), typically by offering a platform that fulfils several functions. The platform allows farmers to present their own WFS project and enables sponsors to decide which farmer to support, e.g. based on price comparison. This possibility for comparison allows the uninformed sponsor to deduce a fair and reasonable price (Interview S\_7). Depending on the level of engagement, the facilitator also serves as an intermediary in terms of communication, provision of information and sometimes even as a tool for sponsorship price transactions (Interviews S\_2, S\_3, S\_7).

There is high variability in directly and indirectly involved actors, and in the ways the schemes are implemented. Also, information displayed on scheme webpages varies strongly. It ranges from minimal information about location, contact and price per sponsorship over more details about the seed mixture and ecological background to detailed information, including specifications about WFS management,

relevant cost items on sponsorship price and combination or renunciation of AES funding. For 31 of 44 schemes, the EUR/m<sup>2</sup> sponsorship price is indicated on the web page. Across all private schemes that provide price data, the average price ranges from 7.50 to 159 EUR/100 m<sup>2</sup> with a median value of 50 (Figure 3). This is substantially more than the 6.50 EUR/100 m<sup>2</sup> that are provided on average for WFSs under the CAP Pillar 2 with a range from 4.00 to 13.20 EUR/100 m<sup>2</sup> (see Appendix A).

Please note, when comparing privately to publicly funded WFSs, we refer to WFSs funded under the CAP Pillar 2 (hereafter called Pillar-2-WFS). At the time of the interviews, farmers did not yet have the option to choose WFSs as an eco-scheme within the CAP Pillar 1. Moreover, the WFS eco-scheme seems to be rather unattractive among German farmers, as in 2023 only one per cent of the budget earmarked for WFS eco-schemes was used (BMEL 2023).

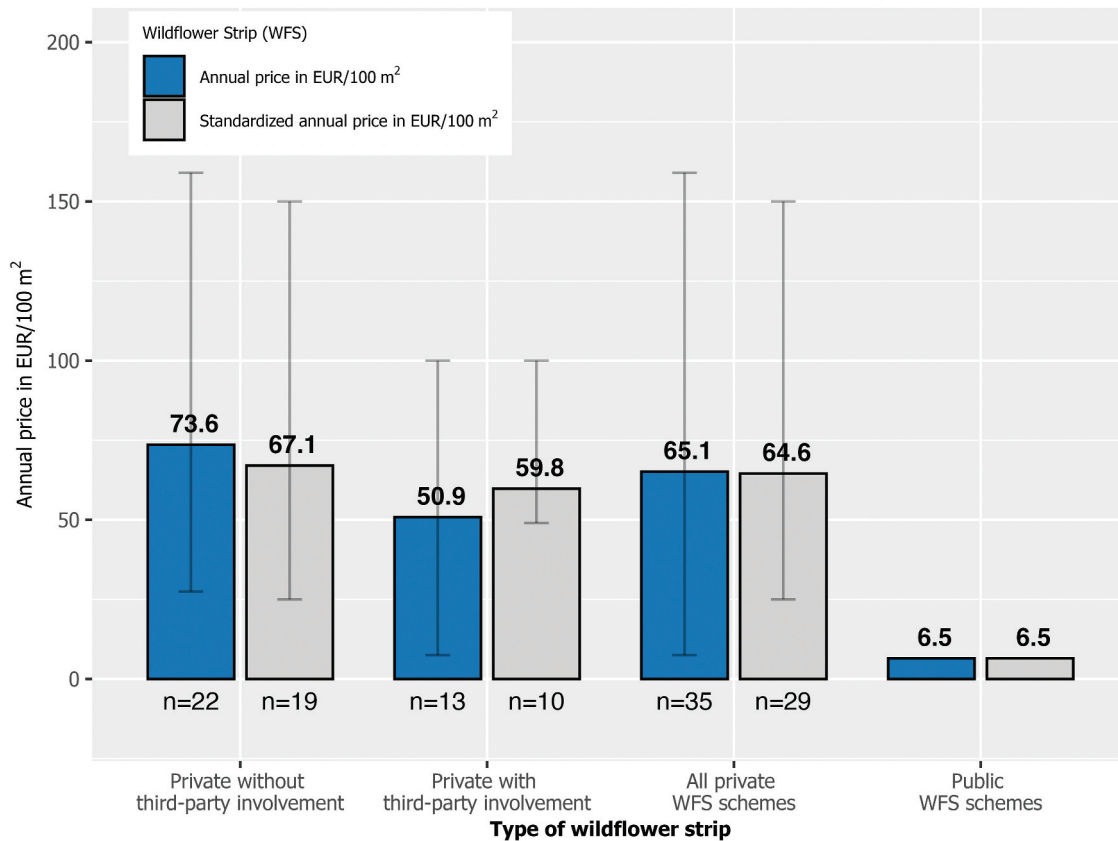
In comparison with public funds, private WFS schemes may involve higher transaction costs and sold sponsorships may not entirely cover the cultivated area. Actually, interviewees indicate that the number of sponsors has decreased since 2022. The Russian invasion of Ukraine and related economic and political challenges is mentioned as contributing factor, alongside increased private expenses due to increased prices and exhausted budgets of supporting aid programmes (Interviews S\_3, S\_4).

To provide an overview of the pricing Figure 3 displays identified private WFS financing schemes with and without third-party involvement, highlighting the price per hundred square metres and the plot size of the WFS supported.

Finally, based on the analysis of grey literature and interview insights, four types of private WFS financing schemes have been identified (Table 2). The identification is based on information on scheme characteristics, financial structure and requirements. These types vary with respect to partnership modality, involved actors, general scheme characteristics, financial structures and instructed requirements. Both *facilitated direct sponsorship* and *indirect sponsorship* types set minimal requirements that farmers need to fulfil, but the requirements and level of ambition vary between examples of private schemes.

### 3.2. Motivation and rationales for private wildflower strip financing – comparison with agri-environmental schemes

Interview insights allow to draw on the motivation for stakeholders to participate in private WFS financing schemes. Ecological, economic and social rationales are drivers for all involved internal stakeholders. Ecological aspects are mentioned especially frequently by all stakeholder groups.



**Figure 3.** Annual prices of WFS financing schemes in Euro per 100 m<sup>2</sup>. The bars show the minimum and maximum range of prices. Source, own presentation. In some cases, the EUR/100 m<sup>2</sup> price had to be scaled because the price on the website was provided per 1 m<sup>2</sup> or other units e.g. 50 m<sup>2</sup>.

Moreover, farmers, farmers' associations and companies have an interest in marketing for their own business and image gain as well as in improving the exchange between farmers and citizens. According to interviewees, individual sponsors are altruistically motivated to support a measure against the decline in biodiversity.

Furthermore, insights on rationales for farmers to engage in private and public financing schemes are summarised in Table 3. Some aspects are perceived as beneficial for some actors while others have opposing opinions. For instance, the five-year commitment of Pillar-2-WFSs is perceived as burdensome by some, while others see it as promoting stability (Interviews S\_1, S\_5).

Moreover, the combination of both, private schemes and Pillar-2-WFSs, was a subject of the interviews. Obtaining public and private sector financing for the same WFS is legally possible (Interviews S\_2, S\_7), but it is tainted for some actors, and opinions vary strongly. Some say it is not reprehensible to receive both, arguing that Pillar-2-WFS payment, depending on the federal state, is not high enough to cover costs and yield loss (Interview S\_7). Opponents of receiving private and public funding argue that sponsors might feel

displeased paying for a service provided the farmer is already compensated for with public means (Interview S\_2).

According to a farmer (Interview S\_4), WFSs under the CAP and private financing schemes are entirely different. Pillar-2-WFSs are reasonable on marginal land, e.g. small strips of arable or unproductive land. However, establishing WFSs on larger or productive fields requires private financial support because the public funds do not allow realising a sufficiently high contribution margin per hectare, essential for a farm income (Interview S\_4). This is one main criticism of CAP funding for WFSs, i.e. the amount of compensation per hectare is generally not high enough to compensate for costs incurred and lost yields (Interviews S\_4, S\_7). Furthermore, in Pillar-2-WFSs, farmers bear the potential risk of refunding in case requirements are not fulfilled (Interviews S\_1, S\_2, S\_4). Strict requirements of AES, like field measurement, perennial obligations and deadlines, seem burdensome for farmers (Interview S\_1).

Public and private WFS schemes also differ in terms of transaction costs. Private schemes require additional time for communication and exchange with sponsors, while AES measures are impersonal,

**Table 2.** Classification of private WFS financing scheme types, own source.

Scheme type	Description
Direct sponsorship e.g. S_4, S_6	<ul style="list-style-type: none"> <li>Actors – Farmers and sponsors (private individuals or companies)</li> <li>Modality – Direct sponsorship initiated and offered by farmers</li> <li>Characteristics – Direct contract and communication between farmer and sponsor</li> <li>Financial structure – Direct transaction of the sponsorship price from sponsor to farmer</li> <li>Requirements – No external requirements are set and the implementation completely lies in the responsibility of the farmer</li> </ul>
Facilitated direct sponsorship e.g. S_2, S_3	<ul style="list-style-type: none"> <li>Actors – Farmers, sponsors, facilitator</li> <li>Modality – Indirect sponsorship, initiated by facilitator</li> <li>– Registration of farmer on platform</li> <li>Characteristics – Interested sponsor directly approaches the farmer based on provided contact details to align on sponsorship conditions</li> <li>– Direct contract and communication between farmer and sponsor</li> <li>– The facilitator provides infrastructure and support for connection, and assists with communication and public relations</li> <li>Financial structure – Direct transaction of the sponsorship price from sponsor to farmer</li> <li>– In some cases, the facilitator charges a facilitation fee from the farmer</li> <li>Requirements – Minimal requirements for registration but with different criteria</li> </ul>
Indirect sponsorship via intermediary e.g. S_1, S_7	<ul style="list-style-type: none"> <li>Actors – Farmers, sponsors, intermediary</li> <li>Modality – Indirect sponsorship, initiated by intermediary</li> <li>– Registration of farmer on platform</li> <li>Characteristics – Interested sponsor approaches the intermediary or uses the platform as a tool</li> <li>– Indirect partnership, contract and communication; intermediary engages with both parties; direct exchange only in some cases</li> <li>– The intermediary provides the infrastructure, organisation, communication, public relations and general support for the farmer</li> <li>Financial structure – Indirect transaction of the sponsorship price; price is transferred to the intermediary and does not reach farmer directly</li> <li>– Usually the intermediary charges a facilitation fee, either paid by the farmer or as part of the sponsorship price</li> <li>Requirements – Minimal requirements for registration but with different criteria</li> </ul>
Corporate initiative e.g. S_5	<ul style="list-style-type: none"> <li>Actors – Farmers, company, additionally but not necessarily private individuals</li> <li>Modality – Company initiates, organises and implements the project</li> <li>Characteristics – Farmers engage as project partners with the task of sowing, managing and maintaining WFSs</li> <li>– Direct contract and communication between the company and farmers</li> <li>Financial structure – Financing of the project by the company, additional support based on sponsorships is possible but not the core aim</li> <li>– Farmers are compensated for the establishment of WFSs</li> <li>Requirements – Company instructs the requirements for implementation</li> <li>– Tendency for stricter requirements to promote the company's image</li> </ul>

**Table 3.** Rationales for private and public WFS financing schemes, own source based on interviews S1-S7.

Rationales	Private WFS financing scheme	WFS schemes funded under Pillar 2 of the CAP (Pillar-2-WFS)
Compensation	<ul style="list-style-type: none"> <li>– Higher per ha payments but usually on smaller plots</li> <li>– Arrangement on a yearly or bi-yearly basis</li> <li>– Providers determine price per ha themselves</li> <li>– Higher transaction costs</li> </ul>	<ul style="list-style-type: none"> <li>– Lower per ha payment (not high enough to compensate for costs incurred and lost yields) but secured for five years</li> <li>– Additional risk of refunding in case requirements are not fulfilled</li> <li>– Reasonable on marginal land, e.g. small strips of arable or unproductive land</li> </ul>
Time commitment	<ul style="list-style-type: none"> <li>– High time commitment for communication with sponsors and information provision</li> </ul>	<ul style="list-style-type: none"> <li>– Less additional time commitment</li> </ul>
Social aspect	<ul style="list-style-type: none"> <li>– Social exchange with sponsor, inclusion of society</li> <li>– Visibility of WFS through communication channels</li> </ul>	<ul style="list-style-type: none"> <li>– No exchange with society, impersonal, formal application process</li> </ul>
Flexibility	<ul style="list-style-type: none"> <li>– High flexibility to adjust for local conditions</li> </ul>	<ul style="list-style-type: none"> <li>– High level of requirements</li> <li>– Fixed commitment for five years</li> </ul>

Note: The option to receive subsidies for WFSs as an annual eco-scheme were not available to farmers at the time of the interviews.

and only the application process takes time (Interviews, S\_2, S\_4). While private schemes are more flexible concerning the time horizon and local adjustments, AES are fixed for 5 years. The flexibility is advantageous for some, while others favour the stability and secured funding for 5 years (Interviews S\_1, S\_5).

In contrast to Pillar-2-WFSs, one core interest of private schemes is the inclusion of society and improving the relationship between farmers and society (Interviews F\_3, S\_1, S\_2).

Ultimately, the 'co-existence' (Interview S\_7) of public and private funding is also considered critical. On the one hand, public payments are not high enough; on the other hand, the private sector alone would not be able to finance a reasonably large enough area of WFSs in total (Interview S\_7). A core interest of WFS financing is getting into intensively used areas to increase the scope and effect. If only private financing is allowed and additional Pillar-2-WFS funding is prohibited, some farmers may not be incentivized to establish WFSs

(Interview S\_1). Another argument for agreeing with the combination is that AES commitments usually last 5 years and cannot be cut without financial consequences. Thus, some farmers are in the middle of a Pillar-2 AES commitment when offering WFS sponsorships (Interview S\_7). An option is to switch from public to private and not extend the public one after the end of the committed period (Interview S\_7).

However, not all actors involved accept drawing financing from both sources for the same WFS, thus private WFS financing schemes combined with CAP funding remain a critical issue. In our case, interviewees S2, S3 and S4 speak out against the combination.

### 3.3. Design criteria for private wildflower strip financing schemes

When evaluating the scheme development, Farmer S\_4 states that sustainability is fundamental. In line with the applied dimensions in this analysis, he argues that his scheme is sustainable if it is ecological, economic and social. He summarises: *‘Given that the ecological effectiveness [of the scheme] was verified by international experts, I can confirm the economic part myself, and for the social component, I think I also fulfil it because I include all social classes, or at least open up the possibility’* (Interview S\_4). However, despite a potentially high ecological effectiveness, interviewed ecology experts emphasise the limits of WFSs and stress the need for a diversified mix of nature conservation measures, including hedges, shrubs, meadows and orchards meadows (Interviews F\_1, F\_2, S\_1).

To provide other actors with the possibility to run a low-threshold evaluation of available private WFS financing schemes, a list of design criteria is formulated that may serve as a guideline for providers and as an evaluation orientation for interested sponsors.

Overall, 17 criteria are formulated (Table 4). Six criteria are related to ecological farming practices and inputs used. Economic and social aspects are covered by five criteria each. Economic criteria mainly refer to the farm business and WFS prices, while social criteria touch on the relationship between the farmer and the sponsor. One general criterion implies scientific support for farmers if needed. *Italicised criteria* are additional criteria that are reasonable but not necessary for sustainable measure implementation, rather an additional ‘nice to have’. Not all the formulated design criteria fit the purpose of serving as an evaluation frame for potential sponsors; some are rather potential guidelines for scheme providers (farmers and facilitators). The criteria ‘clear ownership and tenure arrangement’, ‘establishment on productive arable land’ and ‘scientific support’ concern the farmers’ perspective. Moreover, compliance information is held by the

farmer and usually not publicly available (these criteria are marked with an asterisk in Table 4).

The opinions on whether WFS sponsorship schemes shall be subject to controls are controversial. Controls could increase the reliability of proper project implementation and trustworthy handling of sponsorship funds and provide sponsors with some security (Interview S\_1). Despite executing controls in their scheme, Interviewee S\_5 indicates that there is no general need for controls in private WFS financing schemes. The controls they conduct are due to corporate interest. An advantage of WFSs as a private free market is that competition allows for little mistakes and usually creates innovative projects where controls can interrupt the dynamic (Interview S\_1). Control systems might discourage farmers by adding barriers (Interview S\_5), therefore not offering sponsorships and not establishing WFSs (Interview S\_1). Resources spent on controls and evaluation could be invested to establish more WFSs (Interview S\_5). Despite mixed and overall opposing attitudes towards controls expressed by stakeholders, control in terms of ‘quality assurance’ is added as a criterion to the catalogue.

Principally, private WFS financing can be obtained in combination with public WFS funding, as technically speaking double funding only occurs if money is received from several public sources. The issue of ‘double funding’ (in the sense of combining private and public resources) has been raised by multiple interviewees. However, there has been no consensus on whether this should be considered good practice or not and thus, it is not considered as criterion.

Stakeholders mentioned flexibility as an important aspect which means the adaptability allowing them to adjust to natural aspects, operational opportunities and individual special cases (Interview S\_1). Farmers offering a sponsorship scheme themselves can usually set the terms, but also platform providers should provide farmers with a certain level of adaptability. As an interviewee (S\_5) formulated, programme participation needs to allow for a low-threshold entry to motivate farmers to participate. As adaptability is a broad term that provides a vast range for interpretation and contradicts the requirements implemented in most described schemes, it cannot be defined as a criterion based on the interview insights.

## 4. Discussion

This study contributes knowledge to the understudied field of private actor involvement in financing biodiversity conservation measures using WFSs as an illustrative case. The study results are critically reflected in the following discussion, namely the typology of different private WFS schemes, the rationales for engaging with private schemes and finally, the design criteria for sustainable private schemes.

**Table 4.** Design criteria for private WFS financing schemes, own source.

Core criteria	Short description	Mainly on the basis of the following interviews
<b>Ecological</b>		
E.1 - Perennial WFS	WFSs shall not be established on annual, but on a perennial basis of three to five years.	All except S6
E.2 - Species- rich, autochthon perennial seed mixture	Species-rich, autochthonous, i.e. regional and perennial seed mixtures need to be applied. Species-rich does not necessarily mean a specific number of species but a mix of species that includes different flower shapes and provides continuous flowering phenology.	F1–F3, S1, S2, S5
E.3 - Prohibition of pesticide and fertiliser use	Prohibition to apply pesticides or fertiliser on the WFS.	F1–F3, S3, S5, S6
E.4 - No mowing, and if needed partial mowing	Management measures and especially mowing shall be avoided to leave the WFS undisturbed. If problematic development necessitates mowing, it shall be done in spring or partially, mowing about half and leaving the other part to rest over the winter.	F1, F2
E.5 - Minimum width of strips	WFS need a minimum width of six to ten metres.	F3, S5
E.6 - Distribution of WFSs	<i>Ideally, farmers coordinate WFSs with neighbouring farmers to jointly achieve a spatially balanced distribution of WFSs in the landscape, i.e. avoiding establishing WFSs directly next to each other.</i>	F1, S7
<b>Economic</b>		
EM.1 - Registered farmer	A farmer offering WFS sponsorships need to be a registered farmer or agricultural holding and not a hobby landowner or beekeeper. One possible indicator is the membership in a farmers' association or related association.	S4, S6
EM.2 - Fair price	The sponsorship price shall be defined as fair price, meaning that the farmer is compensated at least with a net zero but does not ask for unjustified prices to make a massive profit from a nature conservation measure. A core condition is transparency about cost items and indication of cost recovery.	F1, F2, S1, S2, S3, S7
EM.3 - Direct marketing or local connection	<i>It is reasonable to (already) do direct marketing or have a certain degree of local connection to provide an economically viable sponsorship programme.</i>	S6
*EM.4 - Clear ownership and tenure arrangement	Ownership or tenure arrangement of the fields must be secured to be able to establish perennial WFSs without the risk of terminating them earlier than three to five years.	F3
*EM.5 - Establishment on productive arable land	Strips or areas that are used for WFS establishment in the context of private financing schemes need to be previously utilised arable land, thus taken out of production.	F3, S1, S2, S5, S7
<b>Social</b>		
S.1 - Communication between farmer and sponsor	Communication between farmer and sponsor is encouraged and shall either take place directly or via the platform as an intermediate tool. A core element of the communication is a regular update on the WFS, e.g. in the form of newsletters and blog entries.	F1, S1, S2, S3, S4, S6
S.2 - Web presence	It is essential that a farmer has an own web presence informing about the WFS project, i.e. a web page or social media channel. A link shall also direct interested sponsors to the farmer's web presence if the sponsorship is facilitated.	S4, S6
S.3 - Different sponsorship packages	A sponsorship provider shall offer different sponsorship packages, i.e. different sponsorship prices, accordingly supporting different amounts of square metres, in order to give sponsors with different financial backgrounds the opportunity to take on a sponsorship.	S2, S4
S.4 - Quality assurance	A sponsorship provider shall provide appropriate means for quality assurance of the WFS, checking if it is applied as defined. Facilitators could take random samples and farmers in direct schemes could apply trust-building measures like providing opportunities for sponsors to visit the WFS.	S1 (others mention the advantages but describe the effort as too great)
S.5 - Yearly personal exchange	<i>The farmer shall offer a yearly possibility for personal exchange. The concrete format varies and lies within the freedom and responsibility of the farmer.</i>	S4, S6
<b>General</b>		
*G.1 - Scientific support	<i>If the farmer has no relevant knowledge of WFS establishment, he or she shall approach experts, research institutes or agricultural offices for professional support.</i>	S1, S2, S3, S5, S7

Note. *Italicised* criteria are additional criteria that are reasonable but not necessary, 'nice to have'.

\*Indicate that these criteria are relevant for the farmers' and providers' perspective as they build on information usually not publicly available.

Furthermore, limitations are reflected on, policy implications are derived and potential future research is highlighted.

#### 4.1. Critical reflection of study results

##### 4.1.1. Types of private WFS financing schemes

Four different types of schemes are identified that mainly differ in terms of the actors involved, their role and responsibility, the degree of facilitation, financial structures and level of set scheme

requirements. The dominance of the facilitator strongly varies and characterises the relationship between farmer and sponsor.

Providing a scheme classification of different types, on the one hand, allows interested sponsors to reflect on which type of scheme fits best for them. For example, are they interested in direct exchange with the farmer, or do they intend to support WFS establishment due to ecological effects without being interested in communicating with the farmer? On the other hand, providers can use the classification to

design, improve and communicate their WFS scheme. This can benefit the common understanding and expectation management between provider and sponsor. Furthermore, the types highlight the differences of a third-party facilitation, i.e. provision of a platform for farmers and sponsors to meet, and the intermediary who takes an active role between farmer and sponsor, leading to an indirect partnership and limited direct exchange. Despite not being in the interest of all farmers or sponsors, the social effect of direct communication helps to strengthen the exchange between farmers and private individuals beyond the topic of WFS. Corsi and Novelli demonstrate that ‘personal relationships do have an impact on consumers’ economic behavior’ (Corsi and Novelli 2015, p. 11). Showing interest and exchanging about farm practices and agriculture builds a relationship and improves mutual understanding. However, this also increases the transaction cost borne by the farmer.

#### 4.1.2. *Motivation for engaging with private WFS financing schemes*

The identified motivation of stakeholder groups improves the understanding of private sector involvement in biodiversity conservation. Understanding the rationales for farmers to engage in private WFS financing schemes provides relevant information on how to design private biodiversity conservation schemes also beyond WFSs, e.g. whether they are interested in direct personal exchange with sponsors or prefer a third-party facilitation.

The interviews highlight two main strings of argumentation for private WFS financing schemes: economic and social aspects. Private WFS financing schemes provide farmers with a higher income per square metre of WFS compared to public schemes while adding organisational and communication responsibilities. An additional, immaterial value created by private schemes is the direct contact between farmer and private individuals and companies. Improved relationships could also have a positive impact beyond the WFS, e.g. in terms of shared understanding of the role of farmers and society in biodiversity conservation and valuing local agriculture. Behavioural factors such as communication, exchange with peers and advice support farmers’ participation in AES (Schaub et al. 2023) and may also positively influence the decision on private financing schemes for biodiversity conservation.

One controversial topic in this context is the combination of public funds and private WFS financing. The possibility of ‘double funding’ was defended by some of the stakeholders arguing that the public funds are insufficient to cover the entire cost of WFS provision. On average farmers receive 6.50 EUR/100 m<sup>2</sup> for WFSs under the CAP Pillar 2, which equals 650 EUR per

hectare. However, private financing alone usually engenders only small strips of less than 10,000 square metres (i.e., one hectare). As interviews illustrate the number of small plots funded by sponsors within one scheme does not cumulate to large areas. Furthermore, farmers may still be bound to ongoing AES commitments when deciding on a private scheme. In contrast, it can be argued that this undermines the additionality. Private sponsors arguably have the motivation to achieve an additional positive impact by financing a WFS. This motivation would be undermined if their funds ‘top-up’ an existing WFS that is already financed with public money. Cases may exist in which only the combination of both public and private funds is sufficient for farmers to establish a WFS. In this case, the private sponsorship would have an additional positive impact. Another relevant positive impact is the social impact and benefit of improved relationship and understanding between farmers and sponsors which is not considered in monetary terms. Yet, private WFS prices exceed prices of public schemes on average by a factor of nine to ten. This rather indicates that there is a high degree of information asymmetry between farmers and sponsors, meaning that sponsors have less knowledge of costs and potential combinations with public funds than farmers do, which is an advantage for farmers that likely allows them to realize higher prices. Ensuring additionality would not come at a high cost to farmers (less than 10% of the total average price they receive) and would boost trust between sponsors and farmers. If farmers benefit from ‘double funding’ nevertheless one could expect transparency.

Considering the above-mentioned arguments, one potential compromise could be to introduce conditions for ‘double funding’ of WFS: i) to draw from both sources only in the case costs (inputs and yield loss) are not sufficiently covered by one source and ii) to transparently inform sponsors accordingly on the webpage, enabling interested sponsors to take an informed decision. Following the interview findings on the relevance of communication between provider and sponsor it is essential for private scheme providers to be transparent about the financial structure, ideally explaining the rationales to sponsors. In this context, facilitators must inform farmers about the legal terms, as already practised in some cases, and share an explanation in case they ask farmers to refrain from drawing both sources. However, the issue of parallel funding from several sources is not yet conclusively investigated, and future research should include sponsors’ perspectives on this.

#### 4.1.3. *Design criteria for sustainable private WFS financing schemes*

Finally, there is considerable variety in the criteria that are associated with a sustainable private WFS financing scheme, including ecological, economic

and social aspects. These criteria may serve two purposes. Firstly, private WFS sponsorship providers can use them as a guide for designing the scheme and communicating key information, motivations and interests that farmers sometimes fail to convey (Interview S\_2). This includes ecological, economic and social interests incentivizing farmers to engage in private WFS financing schemes. Transparent reporting on the criteria's fulfilment improves communication, understanding and builds trust. Secondly, interested sponsors can use the criteria to check whether a particular scheme meets their expectations of a WFS sponsorship, for example whether they are interested in a direct exchange with the farmer, and base their decision about a sponsorship on this. Overall, if complied with, the set of criteria allows for more transparency and attractiveness of private WFS financing schemes. Furthermore, the list could serve as a basis for the development of a commonly agreed quality standard for sustainable private WFS financing schemes, which could further strengthen trust and accountability.

As such, private WFS financing schemes fulfil a relevant 'socio-economic component' (Interview F\_3) and may serve as low-threshold entry point for further private sector engagement in biodiversity conservation measures and closer cooperation between agricultural and societal actors. This cooperation between the private sector, civil society and governments is essential for transformative change (Turnhout et al. 2021). Reinforced by the general recommendation to not only rely on WFSs as a biodiversity conservation measure (Schmied et al. 2022), it can be suggested that farmers should extend their portfolio beyond WFS by including other measures in private financing schemes.

When reflecting on the formulated criteria, it is essential to consider that they are predominantly based on stakeholder perspectives. Thus, while reflecting practitioners' points of view, they are prone to bias and conflicts of interest. Overall, they are general enough for regional adjustment and still specify for example the use of species-rich, autochthonous seed mixtures without indicating concrete species.

*Quality assurance* was defined as a criterion, although most interview partners were not in favour of it. Despite reasonable arguments shared by stakeholders (see Chapter 3.3), a criterion that focuses on securing the fulfilment of promised WFS characteristics is essential. Another argument for including quality assurance is the general information asymmetry between provider and sponsor that can only be tackled by being transparent and sharing information. This includes information on the measure's success, particularly as sponsors' core interests in paying for the establishment include environmental

consciousness, interest in diverse landscapes, and biodiversity protection. This is in line with the findings of Lindenmayer et al. (2023) who argue that successful market-based initiatives depend on proper scheme designs, robust structures, monitoring and reporting.

An important aspect to be considered in quality assurance is the 'optimal' spatial distribution of WFS captured by Criterion E.6. The ecological effectiveness of WFSs is highly dependent on the landscape context (Hellwig et al. 2022). For instance, Schubert et al. (2022) have shown rare wild bees benefit more in WFSs established in the proximity of semi-natural habitat structures. Moreover, a coordinated and balanced spatial distribution of WFSs is preferable to an uncoordinated distribution (Geertsema et al. 2016). WFSs may have limited additional impact in areas that are already characterized by either very high or very low habitat value, as the marginal benefits of additional habitat in such areas are typically reduced (Kleijn et al. 2011). As WFSs enhance pollination services (Campbell et al. 2017; Ganser et al. 2018), it is also of interest to establish them in proximity to pollination-dependent crops such as rapeseed or strawberry fields or apple orchards.

The criterion *fair price* is intuitive but not clearly defined. The results show that it is key to financially incentivise farmers to establish WFSs, by ensuring a fair income to compensate efforts and lost revenue. Some of the stakeholders claim that WFSs are not financially lucrative and that they are motivated by other reasons to establish them. This may be a strategic response which could be addressed by future research on the full cost of privately financed WFSs. A possible approach for designing a fair price could be a fixed lump sum for administration and a staggered price per square metre that reduces for larger plots – as already implemented by some providers. Such a fair price would be in line with Criterion S.4, providing *different sponsorship packages*.

Many interviewees highlight adaptability as an important success criterion, which is difficult to define. An example of adaptability requested by interviewees is the possibility for farmers to adjust to external factors like climate conditions or unfavourable locations without taking the risk of losing financial support. Private schemes provide a certain level of adaptability if they are not simultaneously subject to public AES conditions in case of double funding. The relevance of keeping this independence from state influence for private WFS financing is in line with arguments put forward by advocates of market-based payments for ecosystem services, who argue that the efficiency of such payments is best if the measure can be implemented without state interference (Kehl 2015). Nevertheless, it is essential to fulfil

the design criteria of WFS establishment and sponsorship scheme; hence, i) meet the objectives of the WFS as a biodiversity conservation measure and ii) satisfy the expectations of sponsors and society regarding WFSs and their impact on biodiversity.

Scientific literature that formulates criteria for private WFS financing or other private conservation measures is rare. Sattler et al. (2013) determined a multi-classification system for payments for ecosystem services, defining 10 categories for each characteristic and possible specifications. As the classification scheme evaluates payments for ecosystem services, including public funding, it is not considered here for the criteria list. The grey literature search reveals two sources providing criteria.

The NaturPlus Standard defines ‘criteria for designing efficient nature conservation projects that aim to provide biodiversity and ecosystem services’ (ZALF 2020). Yet, the twelve defined criteria are rather general to inform project development, evaluation, and reporting (ZALF 2020). Thus, a direct comparison is not possible. The second source is the Bavarian Society for the Protection of Birds (LBV) which provides six criteria for WFS sponsorship schemes (LBV 2019). This set of criteria mainly focuses on ecological criteria, largely omitting economic and social aspects. The only exception is the criterion of a contract and a price ceiling for the sponsorship price. The suggested price ceiling by LBV of 12 EUR/100 m<sup>2</sup> is way below the identified average price of the surveyed private WFS schemes in this study. Only one of the investigated schemes with price information complies with this ceiling reporting a price of 7.5 EUR/100 m<sup>2</sup>. All other schemes exceed this ceiling by far. Following the rationale to set an incentive for farmers to establish WFSs in the private sector context, accepting a comparably large workload and effort for communication, the LBV price ceiling is unrealistic based on the current study results. A farmer (S<sub>4</sub>) claimed that even with a sponsorship price of 50 EUR/100 m<sup>2</sup>, the minimum wage is not covered in intensively implemented sponsorship schemes as WFSs usually do not have a size of 1 ha and not all sponsorship plots are covered. This argument becomes more relevant, as the number of sponsors is declining, leading to already established WFSs that are only partially funded through private financing. The WFS price should be discussed in relation to the contribution margin foregone in the absence of a WFS, the WFS area, the length of the WFS contract, and other factors influencing the transaction costs.

#### 4.2. Limitations

The study uses an explorative approach and focuses on the three largest federal states in Germany in

terms of land area and agricultural area. While these three states comprise more than 40% of total agricultural land in Germany, the transferability of the study results to other states is nevertheless limited and investigating other federal states could have led to an even larger heterogeneity of programme types. Generally, the results are not representative but show examples that allow obtaining a cross-section of stakeholders involved in different types of private WFS financing schemes. Another caveat is that only farmers are considered as WFS providers, excluding initiatives offered by municipalities or other actors responsible for establishing WFSs. This limitation in the scope may have influenced the results and the definition of stakeholder groups and scheme types.

The study’s scope is also limited as sponsors (i.e. private individuals or companies) are not part of the interviewed stakeholders. Including their perspective could have added valuable additional insights to the results, e.g. the perception of quality assurance or fair price. Including these stakeholders is beyond this study’s scope, but would certainly benefit future studies on private WFS financing schemes.

Despite the rather small number of interviews and the usual limitations of qualitative case study approaches focusing on expert perspectives (Flick 2021), the reliability of the results is supported by the fact that responses were going in the same direction. While content differences emerged in statements regarding the implementation of various WFS financing schemes, a saturation level was reached with similar answers and only a few unexpected statements. These differences primarily underscore the sector’s heterogeneity.

Overall, caution must be exercised in generalising the results of qualitative methods and interviews, especially with a small number of cases. Thus, it is not claimed that the results of the current study can be generalised as such. However, the classification of scheme types and the criteria catalogue provide a general overview and a comprehensive basis for further research.

#### 4.3. Policy implications

The findings show that private WFS financing schemes have been well established as an alternative to publicly financed WFS schemes. With a growing market, the question of minimum quality control and coordination with other, publicly funded measures arises. The government could provide resources and guidelines or pass legislation that would result in a certain formalisation of the private market of biodiversity conservation measures. This could allow for improved quality control and consumer protection, e.g. based on the introduction of WFS as a protected term. However, a formalisation could also result in

higher bureaucracy and a reduction of certain flexibility the private sector has provided so far. In any case, transparency about the WFS management and financial structure of private schemes and potential combinations needs to be available for interested sponsors.

Promoting the private sector engagement in biodiversity conservation should be a policy priority. The government should set incentives for farmers as well as private actors to engage in private biodiversity conservation measures beyond WFSs, e.g. by allowing sponsors to claim tax credits when financing certified private WFSs. Moreover, current public schemes funding biodiversity conservation measures could be streamlined with privately funded activities to allow for coordinated implementation at the landscape level (see Nguyen et al. 2022). Furthermore, creating a conducive investment environment may unlock private-sector financing (see Clark et al. 2018). Creating a supportive environment also includes reducing perceived hampering factors. One example could be to improve information provision and transparency about the legal status of ‘double funding’ (combination of private and public funds) or provide guidelines.

Finally, the government could foster the process by supporting networking and mutual knowledge exchange between private actors. A low-threshold possibility would be an online platform that is hosted by the respective agricultural ministries. These suggestions are in line with findings from Seidl et al. (2024) who stress the importance of smart incentives, and supporting market structures to provide the right environment for private investment in nature conservation.

#### 4.4. Future research

There is potential to dive deep into some core aspects outside this study’s scope. The geographic scope could be widened to investigate if identified stakeholder groups, scheme types, rationales and formulated criteria also apply to other geographic contexts. Moreover, the high variance in prices of private WFS financing schemes highlights the need to better understand the role of transaction costs when providing WFSs to private sponsors. This would be important for identifying a ‘fair’ price for WFSs. The design criteria were identified based on stakeholder views and could serve as a first basis for an evaluation framework. Here, further research with stakeholders, particularly with expertise on the effectiveness of AES, would allow for addressing the critical issue of quality assurance. Furthermore, increasing the research scope by including sponsors, e.g. via surveys, could add valuable insights into social aspects.

One interviewee’s statement summarises the need for future research by stating that there is plenty of scientific knowledge about the ecological effects of WFSs. What is still missing is research about acceptance and social aspects, aiming to bring the topic and awareness about biodiversity loss in agriculture into the mainstream (Interview F\_3). Ideally, this transforms into a willingness to engage, e.g. through sponsorship and other private financing schemes. Future research could investigate the role of sponsors in more detail, i.e. how do they justify the sponsorship, how do they monitor the establishment of the funded WFS, and finally how do they react to non-compliance?

Overall, the list of design criteria can be further developed by critically reflecting on and evaluating the current stakeholder-based criteria, including backing scientific literature. This supplement ideally includes a weighting and scaling of criteria and potentially leads to an evaluation framework for private WFS schemes. The relevance of the criteria can vary between the scheme types and further strengthen the respective character. Such work would provide essential information for the improvement of the governance of private WFS schemes.

## 5. Conclusion

This study addresses the understudied role of privately financed ecosystem service provision in biodiversity conservation, focusing on the example of WFSs in Germany. Through an analysis of different private WFS financing schemes and the stakeholders involved, four scheme types were identified: direct, facilitated direct, indirect sponsorship or corporate initiative. The second research question addressed farmers’ motivation to engage in private WFS financing schemes. The analysis reveals economic, ecological but also social aspects. Furthermore, the rationales behind farmers’ decision to choose public or private financing were identified as compensation payment, time commitment, social aspects and the level of flexibility. Lastly, interviews with stakeholders and experts were conducted to identify relevant design criteria for sustainable private WFS financing schemes, resulting in 17 criteria that primarily address ecological, economic and social aspects. A potentially contentious issue that emerged in this process, is the simultaneous use of public and private financing, which warrants further investigation beyond the scope of this study.

In summary, the study provides new insights into the established community of involved actors, the variety of stakeholders and scheme types, governance aspects and farmers’ motivations to engage in private WFS financing schemes. It is shown that sustainable private WFS schemes need to fulfil more than

ecological aspects – economic and social elements are essential too. The list of formulated design criteria for private WFS schemes offers a preliminary guideline for scheme providers and sponsors. Furthermore, the results highlight the neglected potential of private financing and the active involvement of the private sector in biodiversity conservation.

The identified patterns and concept of design criteria could be transferred to other biodiversity conservation measures, enhancing existing schemes and inspiring the development of new ones.

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