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Farmers' perspectives on the drivers, challenges and opportunities of biodiversity conservation measures in the Seewinkel region: a qualitative analysis

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Abstract

Grassland management in the Seewinkel region faces a multitude of challenges, which include both sociological and economic drivers. Changes can be observed in yields and biodiversity. The aim of this thesis is to present the perspectives and suggestions of local farmers on how sustainable management in the Seewinkel region can be achieved in accordance with economic interests. The following research questions were asked: *Which social, political, economic, environmental, technical and cultural drivers influence farmers' willingness to implement biodiversity-enhancing measures on grassland and expand grassland areas in Seewinkel? Which challenges and opportunities do farmers perceive for preserving or expanding extensive grassland management, as well as grassland areas, in the Seewinkel?* In order to answer these questions, a qualitative study was conducted using semi-structured interviews with farmers in the Seewinkel region. Their statements were then coded and analysed. The results show that the farmers' opinions in society are a particularly influential factor. Political framework conditions also count as a decisive influence among farmers. With climate change on the advance, only through better cooperation between the relevant actors can the conservation of grassland areas and their economic viability be mastered. Better involvement of farmers is recommended for future initiatives.

Key words: grassland management, nature conservation, climate change, Seewinkel, agricultural policy, farmers

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1.Introduction

Biodiversity embodies all life on our planet and cannot be captured in a single definition. It provides the framework for ecosystem services, which are particularly important for human welfare (Duraiappah et al., 2005). In recent years, the term "biodiversity decline" has been used with increasing frequency. It refers to the fact that the different dimensions of biodiversity (genes, species and ecosystems) (Secretariat of the Convention on Biological Diversity, 2010) are constantly changing and, for the most part, decreasing. The greatest loss of megafaunal diversity occurred in the late Pleistocene (Barnosky et al., 2011). According to the IPBES Global Assessment Report (2019), it was determined that the global extinction rate of species is at least tens to hundreds of times higher than the average rate over the last 10 million years and continues to increase (Barnosky et al., 2011; IPBES, 2019). To this day, natural habitats continue to diminish in many areas of the world. Ecosystems such as freshwater wetlands or salt marshes are diminishing in size. (Secretariat of the Convention on Biological Diversity, 2010). Studies indicate that approximately 35 percent of wetlands have disappeared between 1970-2015. In Asia, the degree of decline in these ecosystems is even higher (Courouble et al., 2021).

It is well known in biological science that certain organisms adapt their niche to make the best use of available resources and thus minimize selection pressure (Erwin, 2008). In this regard, we humans are no exception. We have learned to transform and utilize our environment to maximize its benefits and ensure our survival (Pereira et al., 2012). The expansion of global civilization and humanity's growing ecological footprint are threatening biodiversity (Barnosky et al., 2011). The use of resources by society not only contributes to the loss of biodiversity but also results in fundamental changes in the composition and distribution of species (Pereira et al., 2012). In the context of global population growth, land use has become an increasingly significant driver. The fragmentation of land, and thus the habitats of flora and fauna, is a threat to biodiversity (Secretariat of the Convention on Biological Diversity, 2010). This issue can be witnessed all over the globe for the different types of ecosystems. For the purposes of this research, the main focus will refer to land use in Europe and in particular grasslands in the Seewinkel area in Austria.

In Europe, some ecosystems are considered to be very species-rich at small scales, especially semi-natural grasslands (Wilson et al., 2012). Semi-natural grasslands are the outcome of traditional agricultural practices, such as mowing for hay or livestock grazing (Bonari et al., 2017; Gorris et al., 2025). Grasslands are characterized by their extreme conditions. Climate, topography, and soil type determine the distribution and type of these ecosystems. Local interactions between soil, water, nutrients, grazing, and even climate influence the abundance of different vegetation types on these open grass-dominated areas, ranging from grasses to woody plants (Grasslands, Rangelands, Savannahs and Shrublands (GRaSS) Alliance et al., 2024). Grasslands are found in a variety of climate conditions, but water is an essential resource. Many grasslands experience periodic draughts (Blair et al., 2014) flooding (Joyce et al., 2016). Grassland areas are significant producers of biomass, serving as the foundation for the animal production industry. Consequently, they contribute to ensuring global food production (Swacha et al., 2022; O'Mara, 2012). The study by Wilson et al. (2012) confirms that temperate grasslands managed in Central Eastern Europe, alongside tropical rainforests, harbour the highest diversity of plant species at smaller grains (≤50 m^2). This can be explained by Connell's (1978) Intermediate Disturbance Hypothesis (IDH). According to this hypothesis, biodiversity in an ecosystem is at its highest when there is an intermediate level of disturbance. This allows disturbance-tolerant and disturbance-sensitive species to coexist (Yuan et al., 2016). The use of various resource niches related to water, light, or nutrients by plant species also leads to a high degree of coexistence in these ecosystems. Many of these habitats are characterized by a high degree of heterogeneity, which also contributes to the high abundance of species (Petermann & Buzhdygan, 2021).

According to the Food and Agriculture Organization of the United Nations (n.d.), about 70 percent of agricultural land is grassland, providing a source of existence for more than 800 million people. In Europe, grassland is the main type of land used for agriculture, about 35 percent of agricultural land is grassland. However, the size and productivity of grasslands varies widely among EU countries (Smit et al., 2008). In addition to its role as a habitat for many species of flora and fauna and in contributing to climate change prevention through carbon sequestration, it is also used for livestock grazing in Europe (Van den Pol-Van Dasselaar et al., 2019). For agriculture, grassland areas are not only essential for the production of food and, as a result, the ability to secure income for farmers, but also the management of hydrological processes and

the processing of toxic chemicals (Altieri & Letourneau, 1982). In combination with a growing population and the associated increase in production, there is a heightened interest in these areas (Van den Pol-Van Dasselaar et al., 2019).

If one compares grassland management in Europe as a whole with that in Austria in particular, it becomes clear that grassland in Austria is used in a variety of forms. This diversity results from different frequencies of utilization, fertilization rates and grazing regimes. The conditions of the individual areas also contribute to this variance (Pötsch et al., 2009). Inefficient management practices and intensified use of pesticides and fertilizers can affect the soil by causing increased levels of nutrients and toxins in ground- and surface water. As a result, the outputs of production processes lead to a reduction in biodiversity and high costs of remediation (Matson et al., 1997; Cassman, 1999; Tilman et al., 2002). Grassland ecosystems face threats such as the disruption of their ecological processes or disturbance in their spatial extent (Shipley et al., 2024). In order to guarantee the expansion and protection of grassland areas, the management of grassland must be extended beyond the boundaries of the specific grassland system to the level of the entire farm and the surrounding landscape (Peeters, 2009).

In this context, farmers play a central role in the sustainable management of grasslands. In order to address the challenges caused by past agricultural practices more effectively, a greater understanding of farmers in the regions has to be established first (de Snoo, 2013). Their decisions affect biodiversity and the balance of the local ecosystem. Thus, the success of conservation measures depends on their willingness and commitment (Klebl et al., 2023) and the cooperation between the parties involved to finding constructive solutions (de Snoo, 2013). Management measures such as grazing or reducing mowing frequency contribute to biodiversity conservation and farmers can actively contribute to restoring or maintaining these habitats (Fekete et al., 2024b; European Environment Agency, 2024) in the Seewinkel region.

In examining changes to grasslands in the Seewinkel region and possible sustainable management practices, it is necessary to consider the drivers underlying farmers' decisions. The influences have been the subject of scientific research in recent decades (Dessart et al., 2019). However, these drivers, both internal and external, have not yet been linked to changes in Seewinkel grasslands specifically and have not

yet been studied. The following drivers have been identified through research and will be the focus of further analysis:

- **Politics:** Studies show that farmers often see a need for action on the part of governments and that other stakeholders, like politicians, have more responsibility to act. Often, targeted requirements, like precise mowing schedules, are seen as a form of punishment for farmers (Fleming & Vanclay, 2010). Around the world, politicians are using agricultural subsidies for land management, creating a powerful tool for environmental protection. The EU utilizes agri-environment schemes (AES), which provide financial support to farmers who engage in environmentally friendly methods (Publications Office of the European Union, 2017).

  The success of environmental programs is influenced above all by by providing active assistance with the implementation of environmentally friendly practices given to farmers. Financial compensation payments or other forms of funding certainly help to increase their motivation and make it easier for farmers to participate in nature conservation programs (Runhaar et al., 2017).
- **Economic efficiency:** Without a guaranteed stable income in the short and long term, farmers cannot provide services and products to the population (European Commission, 2022). Income and profitability of grassland areas are linked to the implementation of sustainable practices (Tindale et al., 2020).
- **Environmental changes:** In recent years, climate change has become an increasingly important topic in the agricultural community due to the many ecosystem services provided by grassland areas (Bellocchi & Picon-Cochard, 2021). Extreme weather events, such as droughts and water scarcity, have become a greater concern for farmers (Kropf et al., 2024).
- **Technology:** Much of the research on technological innovation has focused on arable crops due to economic considerations. However, grasslands also benefit from these developments (Schellberg et al., 2008). In particular, the rise of precision technology has sparked the interest of grassland farmers. Among other things, precision technology can increase efficiency and reduce costs in grasslands (Shalloo et al., 2018).
- **Social background:** Personal opinions and experiences affect farmers' agricultural practices (Dang et al., 2019). Farmers' knowledge, beliefs and values, the existing social structure and possible backgrounds of their decisions

must be taken into consideration (Adams et al., 2003). The perception by their colleagues is also important to them (Beedell & Rehman, 2017).

- **Cultural background:** Many farmers feel distant from the general population, pressured, and undervalued (Wheeler et al., 2021). However, they would value a more positive perception by the public (Beedell & Rehman, 2017).

Including regional stakeholders in the decision-making process is an important step towards developing long-term solutions for the preservation of grassland areas. Several studies show that good planning, the involvement of local stakeholders and a long-term monitoring plan are important drivers for lasting success (Waldén & Lindborg, 2018). The Seewinkel region is also confronted with the problems in the agricultural field (e.g. changed climate conditions, human disturbance, invasive species) that are already being addressed at an international scale (Zhang et al., 2024¸ Zulka et al., 1998). This research is designed to contribute to a differentiated understanding of farmers with regarding the protection of grassland in this area, in order to form a foundation for effective implementation of conservation measures. This master's thesis aims to cover research gaps, specifically the insights of farmers and more broadly the overall socio-economic factors in the unique Seewinkel area by addressing the following research questions.

- Which social, political, economic, environmental, technical and cultural drivers influence farmers' willingness to implement biodiversity-enhancing measures on grassland and expand grassland areas in Seewinkel?
- Which challenges and opportunities do farmers perceive for preserving or expanding extensive grassland management, as well as grassland areas, in the Seewinkel?

2. Literature Review

Subchapter 2.1 provides an overview of biodiversity in Europe, focusing subsequently on the Seewinkel region in Burgenland, Austria. Subchapter 2.2 describes agricultural farming measures that promote biodiversity in grasslands, specifically in the Seewinkel region. Subchapter 2.3 discusses the impact of climate change on the Seewinkel region. Finally, Subchapter 2.4 explores the challenges and opportunities that farmers face when implementing biodiversity-enhancing management practices in grasslands.

2.1 From Europe to Austria's Seewinkel: Biodiversity in grassland areas

Grasslands have been present in Eastern Europe for millions of years, but they vary in size and distribution. Evolutionary mechanisms such as specialization or species exchange with other biomes have led to this high level of biodiversity (Pärtel et al., 2005). The plant communities that can be found on grassland areas are among the most species-rich biocenoses in Europe. This ecosystem provides a habitat for many flora and fauna species and therefore also has an essential ecological function (Unger, 2013). However, it is not only evolutionary mechanisms that have influenced the diversity of these areas, but also human activities. Many species found in grasslands have evolved as a result of human cultivation. In Central Europe, natural grasslands were rare after the glacial period. The majority of grassland areas developed as a result of low- intensity land use through human activity. The vegetation there is therefore considered secondary vegetation. It replaced the former forest and open woodland vegetation (Hejcman et al., 2013, Poschlod et al., 2009). The biodiversity in these areas and the way they are managed has been changing steadily over the last 20 years. Over the past 20 years, about 12 percent of permanent grasslands have been eliminated (Soussana & Duru, 2007).

In Austria, the use of permanent grassland consists of 53 % intensively used grassland (permanent pastures and mown pastures with three or more utilizations per year plus forage) and 47 % extensively used grassland (including pasture forage areas and mountain pastures) (Bundesministerium für Landwirtschaft, Regionen und Tourismus, 2024).

The Neusiedler See-Seewinkel National Park in the Seewinkel region is home to an enormous diversity of species. The Seewinkel is a mosaic of landscapes influenced by the Alps, the Pannonian Plain, Asia, and the Mediterranean regions. Wetlands, pastures, sand steppes, meadows, salt marshes, and dry grasslands adjoin one another. This variety of habitats makes the area a hotspot for flora and fauna (Zulka et al., 2024). Grassland areas also serve as buffer zones. In the Seewinkel region, valuable habitats (such as salt marshes) for biodiversity can be found in these landscapes. Due to the intensification of agriculture and the presence of croplands and vineyards, grassland areas in the Seewinkel region have also functioned as refuges for various animal and plant species (Unger, 2013).

2.2 Biodiversity-promoting agricultural farming measures in grassland from Europe to Seewinkel

As agriculture has developed over the last few decades, it is now facing a multitude of environmental challenges. This situation and the general ambition of sustainable development led to the concept of sustainable agriculture (Goodland, 1997). Compared to conventional methods of agriculture, sustainable methods are intended to have a positive impact on biodiversity, water, landscapes, climate change and water (Dessart et al., 2019). The primary goal of sustainable agriculture is to reduce environmental impacts while maintaining economic goals. To ensure the necessary production, more land is needed for agricultural purposes. Most of this land is forest, wetlands or grassland. However, the conversion of these landscapes leads to the loss of biodiversity and an increase in global greenhouse gas emissions (Garnett et al., 2013; United Nations Department of Economic and Social Affairs, 2014). Biodiversity-promoting practices in grasslands are important for the preservation of biodiversity and the ecosystem services of the agricultural sector. Especially in Europe, the protection of grasslands is of great importance (Batáry et al., 2015). Intensive management practices, such as conversion to cropland or overgrazing, are leading to a number of global grassland declines and thus biodiversity losses (Zhang et al., 2024; Cui et al., 2021).

However, sustainable measures can be designed to protect vulnerable species and minimize the impact of invasive species (IPBES, 2019). Sustainable management measures are based on extensive practices, such as crop rotation or extensive grazing. The reduced use of pesticides or landscape conservation are also examples of sustainable methods (Dessart et al., 2019). These practices aim to improve soil quality by activating soil organisms, thereby increasing crop yields (Altieri & Nicholls, 2004). Adaptation measures also include improved drainage systems, education programs, changes in land use, improved irrigation technology, changes in the types of crops planted, reduced tillage, coordinated use of surface and groundwater, and the production and distribution of climate information. The provision of climate information is particularly helpful for measures that involve long-term decisions with high costs (Karner et al., 2019). These include, for example, new irrigation equipment or changes in land use (Mitter et al., 2018). In the future, artificial irrigation systems will be very

essential, primarily for the purpose of using water efficiently and sustainably. In addition, the irrigation systems should be soil-friendly and energy-efficient (Achs 2021).

The European Environment Agency (2024) has described extensive grazing adapted to the carrying capacity of habitats as a biodiversity-friendly farming practice. Grazing is considered an effective method for restoring semi-natural grassland areas. Optimizing grazing times, restricting grazing and/or mowing, and even adapting rotational grazing to local conditions can have a positive impact on biodiversity (European Environment Agency, 2024). The addition of a seed mixture can also promote plant diversity and pollination (Liu et al., 2025).

Other adaptation options include public funding, diversification of production systems or the adaptation of agricultural support programs (Dolan & Geography, 2001). In Austria, one agricultural program is the ÖPUL (Austrian Program for the Promotion of Environmentally Friendly, Extensive Agriculture that Protects the Natural Habitat). It is part of the EU's common agricultural policy. Since Austria entered the EU in 1995, this program has been the sixth agri-environmental program. Twenty-six measures address issues such as climate, animal welfare, and conservation of water resources. These measures can be voluntarily implemented by agricultural businesses throughout Austria. Farmers receive subsidies for obligations that exceed legal requirements. The goal is to achieve comprehensive environmental improvements to arable land, grassland, and permanent crops. ÖPUL is a subsidy program that encourages farmers to implement resource-conserving and biodiversity-promoting measures on their farms (Bundesministerium für Landwirtschaft, Regionen und Tourismus (BMLRT), n.d.).

In the Seewinkel region, the concept of sustainable agriculture is primarily associated with the sustainable use of local water resources and the improvement of water use efficiency, as droughts in particular are a problem in the region and throughout Central Europe due to climate change (Cotera et al., 2023). As the Seewinkel region is one of the most valuable hotspots for nature conservation, efforts are being made to implement and expand sustainable agriculture. A study of the salt pans in 2014 revealed that the management of the national park has successfully prevented some of these necessary habitats for flora and fauna from degradation (Schindler et al., 2016). The reinstatement of grazing to reduce reed growth at the edges of Lake Neusiedl is an essential element of nature conservation in the Seewinkel region (Korner et al., 2008). In the 1960s, extensive grazing of the grassland areas in

Seewinkel was stopped as it was no longer economically profitable. An attempt at re-grazing with constant monitoring to restore and protect the existing pasture landscapes in the Seewinkel region on a long-term basis began in 1987. This led to the protection of red-listed species and the establishment of nature conservation in the area (Korner, et al., 1999). The establishment of the Neusiedler See-Seewinkel National Park in 1993 was also an important contribution to nature conservation in the Seewinkel region. The park, with its nearby wetlands and grasslands, serves as a protected area for many endangered animal and plant species. The national park's conservation management ensures that habitats for flora and fauna are restored by grazing, mowing, cutting reeds or even by damming drainage ditches (Neusiedler See - Seewinkel National Park, n.d.). The year-long monitoring program for the reintroduction of grazing in the Seewinkel region by Korner et al. (2008) is another example of the successful restoration of species-rich grasslands. In the course of this project, the reeds were successfully pushed back and a reduction in coverage improved the habitat conditions for rare plant species of salt grasslands and some bird species, among others (Korner et al., 2008). This can be confirmed by several studies (Milchunas et al., 1988; Olff and Richie, 1998; Schley and Leytem, 2004).

2.3 Impact of climate change on grassland management and biodiversity in the Seewinkel region

The impact of climate change on agriculture in Austria varies greatly from region to region. The cooler areas with more precipitation, such as the northern foothills of the Alps, will be characterized by higher yield potential due to warmer temperatures. In areas with lower precipitation north of the Danube and in the east and south-east of Austria, yield losses will be higher, as there will be an increase in heat waves and droughts (APCC, 2014). Due to their open landscape character, grassland areas do not have any protection from solar radiation and are exposed to the consequences of climate change (C. Liu & Van Meerbeek, 2024). Eastern Austria is especially vulnerable to changes in rainfall patterns. These changes lead to uncertain future water quality and availability (Schönhart et al., 2018). The number of hot days will increase in Austria in the coming years. Droughts will occur more frequently in regions that are already very dry, which will result in a large number of losses in the agricultural sector. In

Austria, more than 170 million euros in damage was caused by drought events in 2015 (Hochrainer-Stigler & Hanger-Kopp, 2017).

The decline of high-quality forage plants and the spread of inedible ones is also mentioned as a potential problem related to climate change. A mixture of livestock may be necessary (Bellocchi & Picon-Cochard, 2021b). The Seewinkel is among the driest agricultural areas in Austria and will be particularly affected by the distribution of precipitation due to its soils with low water retention capacity, an unfavourable climatic water balance and/or high summer temperature. Irrigation will be necessary for some crops (APCC, 2014; Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK), 2024).

2.4 Challenges and opportunities when implementing biodiversity-enhancing management practices in grassland areas

Sustainable grassland management measures are faced with the challenge of guaranteeing both the production of goods and the protection of grassland biodiversity. Pursuing the two goals simultaneously requires defining specific targets and management goals and thinking at landscape level (Shipley et al., 2024). The way biodiversity protection is implemented in grasslands varies by region as it reflects the interests of the various stakeholders. However, protection can lead to conflicts with other land uses, such as infrastructure expansion or developments in other agricultural sectors (Roe, 2023). However, in order to define specific targets and management goals, the challenges involved need to be clearly defined first.

One major barrier to the implementation of biodiversity-friendly practices is the need for a major change in business models for farmers. In some cases, low awareness of the benefits and profitability for farmers is also a barrier. Political changes are causing uncertainty in the implementation of biodiversity-enhancing management practices (European Environment Agency, 2024). Scheper et al. (2023) also described how policy instruments can be challenging. European initiatives addressing biodiversity-enhancing practices in grasslands should focus on both the quantity and quality of these landscapes. In this context, it is crucial to enhance the dialogue with both society and politicians. The benefits of grassland preservation and the importance of maintaining biodiversity need to be communicated clearly. Knowledge gaps about successful strategies and techniques also present a challenge. Integrating the

monitoring of restoration efforts during fieldwork offers an opportunity for improvement. In this situation, it is necessary to combine science and practice in the field to be successful at protecting the environment (Lyons et al., 2023).

Another challenge of implementing these practices is encouraging farmers to adopt them. While farmers are motivated by potential profit (Greiner et al., 2008), many already voluntarily engage in biodiversity-friendly practices (Scheper et al., 2023). However, economic constraints do play a role in their decision-making process (Bartkowski & Bartke, 2018). Without compensation for these practices, the protection of biodiversity on grasslands will be limited to farmers who are intrinsically motivated to implement them (Greiner et al., 2008). Subsidies for potential loss of income can increase willingness. Public payments, such as agri-environmental programs, and private payments, such as higher market prices, offer opportunities to do so (Scheper et al., 2023).

Climate change will further complicate the implementation of biodiversity-promoting measures in grasslands. The effects of climate change on biodiversity, including alterations to genes and ecosystems, will hinder the achievement of implementation strategies for sustainable practices (IPBES, 2019). According to Mackay et al. (2019), a lack of knowledge about certain characteristics of novel climate risks constitutes an additional challenge. Necessary adaptation measures require an understanding of resource requirements, which can lead to investment concerns without sufficient knowledge. The implementation of these measures is a topic of discussion among various stakeholders. Communities most exposed to climate change usually lack the capacity to implement adaptation measures, so supporting them is essential. This illustrates the importance of social and economic considerations in investments (Mackay et al., 2019).

To solve these challenges, collaboration is needed to develop new marketing opportunities. It is necessary to implement the practices on a large scale in order to maintain agricultural production. This also requires valuable political support to enable long-term implementation (European Environment Agency, 2024).

3. Methodology

The thesis is founded on semi-structured interviews with farmers from the Seewinkel region. Section 3.1 presents the model that was implemented for the data collection and provides the basis for the analysis. The area in which the data collection occurred is presented in the subchapter 3.2. Subchapter 3.3 discusses the underlying basis of qualitative data collection. Subchapter 3.4 provides an overview of semi-structured interviews, presents the design of the interview guide and the survey questions, details the selection of interviewees, and outlines the subsequent processes of conducting and transcribing the interviews. The chapter concludes with a description of the qualitative content analysis (subchapter 3.5).

3.1 Research Hypothesis

The conceptual model of Sŭskevičs et al. (2023) was used as the foundation for the development of the interview guide. Together with several papers on behavioural theories, it also served as the underlying source for the empirical data analysis. This paper has provided an overview of the socio-ecological system as it is interconnected by various components and influenced by interactions between them. It describes the relationships between agricultural use, biodiversity and ecosystem services, the integrated stakeholders and the drivers that influence this system. In using this model, the dynamics of the system can be analysed (Sŭskevičs et al., 2023). Following the paper by Sŭskevičs, the model defined here consists of (i) drivers, which can have biophysical or socio-economic origins, (ii) the agricultural use dimension, which includes land use and environmental impacts, and (iii) farmers, as the main stakeholders of these landscapes. In this study, the driver categories selected were i) social, ii) cultural, iii) economic, iv) technology, v) environment, and vi) policies. The perceived challenges and opportunities of farmers are added to the model as part of this work. These additional factors relate to how farmers perceive and evaluate external influences and internal conditions. The main focus will be on the issue of biological diversity. Figure 1 represents the theoretical model schematically.

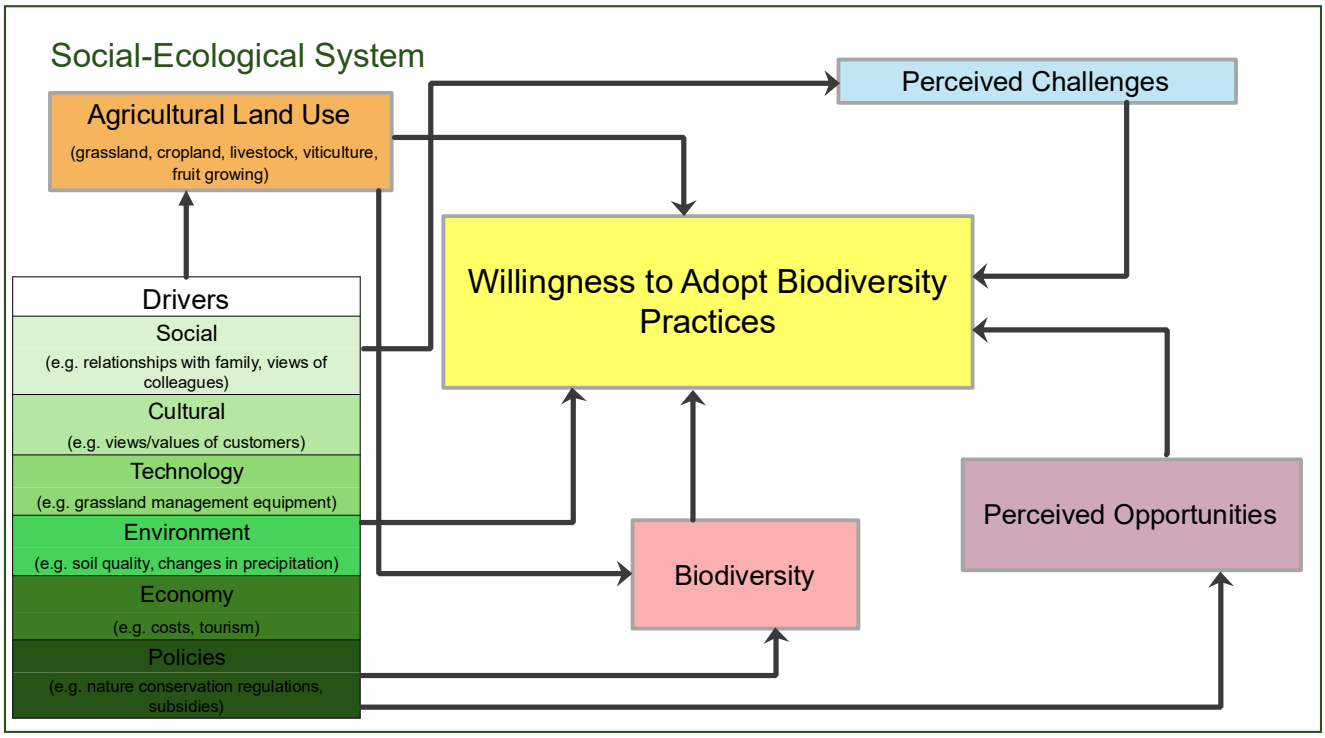

Figure 1 - Social-ecological system with its elements and interactions

Biophysical and socio-economic drivers influence farmers and thus put direct and indirect pressures on agricultural land use and biodiversity. They can also have an impact on the opportunities and challenges of establishing biodiversity-enhancing practices on grasslands. The social driver addresses the interaction of farmers with other subjects, while considering social norms. The focus is on the social environment, both colleagues and family. It is therefore possible that farmers are being influenced to adopt certain practices on their farms (Dessart et al., 2019). The development of agricultural technology has given and continues to provide farmers with the opportunity to transform their agricultural land. The exchange of technical information with other farmers is essential (Brandt et al., 1999). Environmental drivers such as climate change also present challenges for farmers. Almost all countries in Europe are expected to be affected by climate change in the future. Extreme weather events are expected to occur more frequently, and ecosystems will have difficulties in adapting. In particular the water availability will be a problem in the Seewinkel region (IPCC, 2007). Knowledge of farmers' behaviour and attitudes towards environmental change is essential for a better understanding of possible approaches to establishing sustainable agriculture (Bartkowski et al., 2022). Economic considerations are also an important driver in this context and are closely linked to the drivers already mentioned. Farmers are often under pressure to maintain their farms and are involved in a constant

decision-making process. Adopting more sustainable, biodiversity-enhancing farming practices often involves long-term commitments and large investments for farmers (Dessart et al., 2019). The policy framework for farmers to implement sustainable management practices has a central role in understanding farmers' behaviour in relation to biodiversity. The agricultural sector is highly regulated in the European Union and forms the basis of national laws and regulations. In 2013, the Common Agricultural Policy (CAP) was reformed, introducing subsidies for farmers tied to requirements to enhance biodiversity, such as maintaining permanent grassland, improving water management and diversifying crops (European Commission, 2022; Serebrennikov et al., 2020). The program thus had the potential to influence farmers' decision-making processes and, in so doing, the management of these areas (Tindale et al., 2020). While these policy frameworks influence how farms operate, there are also economic considerations created by policy. Consumers' desire for and willingness to pay for sustainability provides an opportunity for policy to highlight the economic benefits of biodiversity-enhancing practices. In doing so, farmers can generate the income they depend on (Läpple & Van Rensburg, 2011). The global market for agricultural products is highly competitive and results in price pressure (Grüneis et al., 2018). This forces farmers to constantly optimize their processes. The cultural driver, which describes the influence of consumers and residents of the regions, can thus shape policy and thus the general framework and, consequently, the farmers. The desire to enhance biodiversity, to cooperate with local farmers, and the desire for grassland products in any form can thus change priorities (Grüneis et al., 2018; Tindale et al., 2020).

The above-mentioned drivers have a significant influence on the farmers' decision to implement biodiversity-promoting measures in grassland (Grüneis et al., 2018; Sŭskevičs et al., 2023; Marra et al., 2003b; Klebl et al., 2023). These results were the foundation for the design of the interview questions (see 3.4.1).

Activities to increase biodiversity in grassland areas also benefit the environment in general. Extensively managed grasslands are crucial due to their high biodiversity and the contribution of some ecosystem services such as carbon storage and erosion control (Bengtsson et al., 2019). In the context of Sŭskevičs model, the interviews were designed to explore how farmers in the Seewinkel region perceived these benefits, what significance they had for their business, and what challenges they encountered. The literature suggests that farmers face the challenge of balancing economic

pressures with increasing demands for sustainability (Van der Ploeg et al., 2019). Together with the specific conditions of the Seewinkel region with its distinctive flora and fauna (Grosina & Szabö, 1990), it was necessary to consider the perspectives of the local farmers.

3.2 Topography and ecology of the Seewinkel region

The Seewinkel, a semi-arid region in eastern Austria, covers an area of approximately 45,100 ha (Karner et al., 2019). Located on the eastern part of Lake Neusiedl, this plain is one of the most species-rich regions in Austria. One of the reasons for this is its geographical location. This area is part of the Hungarian lowlands and is bordered by mountain ridges to the west and open to the east. Many species migrating from Central Asia are halted in their distribution here (Mazek-Fialla, 1936). The region Neusiedlersee-Seewinkel is limited by the Parndorfer Platte to the north, the Leithagebirge to the northwest and the Ruster Hügelland to the southwest (Fischer, 2004, as cited in Steingruber, 2013).

Agricultural production dominates the area (Karner et al., 2019). In the past, the area was used for extensive cattle grazing, resulting in a range of landscape types (Kohler et al., 1994). For a long time, the region was kept open by the grazing of various animals such as horses, goats and geese, which allowed the development of very diverse habitats from a natural conservation point of view (Korner et al., 2008, Steingruber, 2013) but the loss of habitat has accelerated dramatically in recent years (Kohler et al., 1994). Semi-terrestrial marshes, salt marshes and dry grasslands characterize the landscape today (Kohler et al., 1994).

In the middle of the 20th century there was a change in agriculture. Livestock farming almost completely vanished and arable farming and viticulture began to predominate in the area (Korner et al., 2008, Albert et al., 2016). Extensively used pastures have become less frequent, and the reed belt has expanded. Löffler (1982) illustrated the spread of reeds at the end of the 19th century. Lake Neusiedl is the largest closed reed belt in Central Europe, covering about 180 km². Due to its high growth rate, the reed was able to spread in this way (Löffler, 1982). Korner et al. (2008) came to a similar conclusion. A comparison of aerial photographs clearly showed that the decline in livestock farming has allowed reed beds at the edges of salt lakes to increase by about 60% (Korner et al., 2008). This has led to a fragmentation of the previously contiguous

grassland (Krachler, 1993). But it is these salt lakes that are a characteristic of the region. Geologically, it is an important inland salt area for Europe and is considered the largest salt pan in Austria (Löffler, 1982). Like Lake Neusiedl, they are fed by precipitation. On the one hand, they were partly used as grazing grounds, on the other hand, many areas could not be used due to their marshland nature (Dick et al. 1994, Hubacek et al., 1997/1997b). Large-scale drainage in the 20th century lowered the water table in water-saturated soils. Withdrawals exceeded the rate of recharge, resulting in groundwater depletion (Herzig et al., 2002). As a result, the saline lakes with an open water surface were drained and could be cultivated. By 1993, the 6,310 ha of rangeland had been reduced to 815 ha. Simultaneously the intensive cultivation of the resulting land with the help of pesticides and artificial fertilizers led to a deterioration of the lake's water quality (Dick et al. 1994, Hubacek et al., 1997/1997b). The proximity of the cultivated areas to the water bodies resulted in increased nutrient inputs to these reserves (Herzig et al., 2002). However, this also increased the interest of numerous conservationists in protecting this biodiversity hotspot. As early as the mid-1930s, the Austrian League for Nature Conservation leased the first areas around Lake Neusiedl. In addition, the first Burgenland Nature Conservation Act was drafted in 1926. It was only through the efforts of the Nature Conservation Association, due to the increasing pressure of land use, that more attention was given to nature conservation in the region. The National Park Act was passed in 1992 and the Neusiedler See - Seewinkel National Park was established in 1993. Recognized by the International Union for Conservation of Nature (IUCN), it was the first cross-border national park in Austria, together with the Fertö-Hanság Nemzeti Park in Hungary, which was established in 1991 (Herzig, 1991; Nationalpark Neusiedler See – Seewinkel, n. d.; Rechnungshof Österreich, 2020).

3.3 Research Design

The research questions and the topics mentioned above were to be answered by collecting data through qualitative interviews with farmers in the Seewinkel region. The communication between the researcher and the participants is seen as part of the knowledge gathered. This is in contrast to quantitative research where it is seen as an intervening variable (Flick, 2009).

There is no consensus in the academic literature as to what constitutes a qualitative study (Snape & Spencer, 2003). However, according to Snape & Spencer (2003), there are some elements that are commonly acknowledged to be part of this type of research. These include the narrow selection of samples based on appropriately chosen criteria or the suitable choice of data collection, which often involves close contact between the researcher and the participants in order to make the data collection interactive. The data generated in this way concentrate on the participants' understanding of the topic being discussed. In contrast to quantitative methods, where the focus is on both numerical data and statistical elements, qualitative techniques can provide a more detailed description of social issues. Qualitative studies help to illustrate things in a natural setting using interviews, visuals or even recordings. In doing so, they can be interpreted based on the individual meanings of these things for humans (Denzin & Lincoln, 2011). According to Mruck and Mey (2005), there are three necessary principles that must be considered in the context of qualitative research. According to the strangeness postulate, no common prior understanding should be assumed between the participants and the researcher during qualitative data collection. The Openness Principle states that the researcher should approach the work as openly as possible and with as little structure as possible, thus gradually exploring the desired area of research. In addition, the methods should be specifically adapted to the research topic. The principle of communication makes it evident that the interaction between researcher and participant is an important part of the process. Experiences and information are easily exchanged through adequate communication and should always be reflected upon for deeper understanding (Mruck and Mey, 2005).

Qualitative data can be generated using a wide range of methods. Discussions in small groups, semi-structured interviews or analyses of texts and documents, e.g. media reports or diaries, are just a few examples of potential methods (Hammarberg et al., 2016).

3.4 Semi structured interviews

Interviews provide the opportunity to illustrate the opinions of individuals. It is presumed that the perspectives of the chosen individuals hold significance and that it is essential to capture them. They are interviewed to analyse their stories and experiences (Patton, 2015).

Qualitative interviews represent a group of methods that differ in their degree of structuring and standardization. In highly structured interviews, the interviewer guides the interview process and provides a concrete direction for the interview. If the interview is less structured, the interviewee is given more space to tell his or her own story (Mey & Mruck, 2011). According to Renner und Jacob (2020) the degree of standardization and structuring that should be selected depends strongly on the aims of the interview (Renner & Jacob, 2020).

Semi-structured interviews are conducted according to an interview guideline, which contains pre-formulated questions on the topics to be researched. This creates a certain structure that enables comparisons and evaluations between several interviews. Individuality is possible because additional questions or newly formulated questions can be added during the interview. The guideline thus consists of main questions and optional additional questions (Renner & Jacob, 2020). The purpose of semi-structured interviews is to obtain specific topics from a few key informants (Hammarberg et al., 2016). Semi-structured interviews allow the researcher to focus on the interview but still maintain the flexibility to explore emerging ideas in the interview that may deepen the understanding of the research topic (Adeoye-Olatunde & Olenik, 2021).

In this context, the design of the guide plays a crucial role. Making the questions understandable ensures valid answers (Renner & Jacob, 2020a).

3.4.1 Design of the interview guide

The process of designing the interview guide was a crucial step in ensuring that the research targeted the main goals and research questions effectively. As explained in chapter 3.1, the interview questions were based on findings from previous studies. The guide formed the basis for the semi-structured interviews. The interview guideline was pre-tested with five persons. This feedback allowed identifying e.g. too complex or unclear questions. The interview guideline was subsequently revised and refined to incorporate this feedback.

The guideline consisted of thematic blocks, key questions and possible in-depth questions on the topics of biodiversity, biodiversity enhancing practices and environmental effects. It was intended to provide a narrative prompt that allowed the

interviewees to share their experiences and perspectives. This type of structure allowed the interview process to be flexible and the blocks to be shifted during the interview. This meant that relevant statements could be addressed as they became apparent during the interview. The full interview guideline can be found in the appendix.

In the first section, the thematic blocks addressed the changes that farmers have observed in grasslands over the past 20 years. This section was designed as an opening to further questions. In particular, observed changes in management and biodiversity on the land were addressed. This block also asked whether the participants currently managed nature conservation areas, and whether they had noticed any changes compared to their other fields. The second thematic block focused on the drivers of possible changes in grasslands. The attention here was mainly directed to changes in the extent of the land, the type of management, and the condition and quality of the land. First, participants were given the opportunity to name possible drivers themselves. This was followed by in-depth questions about specific drivers. Economic, social, cultural, technical, political and environmental drivers were selected for the interviews. One in-depth question was focused on climate. The interviewees were asked about their views on possible climate changes and their impact on grasslands. The selected factors were also used to ask farmers about the impact of the drivers specifically on biodiversity, and whether these changes have an influence on their management measures. Interviewees were also questioned about the farmers' role in these changes. This section concluded with a question about management practices that contribute to the conservation of biodiversity while maintaining the profitability of the farm. The third and final thematic block of the interview guideline focused on the future of grassland areas. Farmers were asked how they expected their grassland to develop over the next 20 years. In particular, they were asked to comment on changes in the size of their land, the type of management and the yields. They were also questioned about the possible role of nature conservation areas and developments in biodiversity. The drivers discussed earlier were also addressed in this block. The farmers were invited to explain which of these drivers pose the greatest challenges and risks for the maintenance and expansion of their grassland areas, the extensive management of their grassland areas, the compliance with requirements for nature conservation areas and the expansion of these areas, and measures to protect biodiversity. Finally, farmers were asked how politics, the economy and/or the society can provide support to cope with challenges and strengthen opportunities. They were

encouraged to name specific measures that they thought would be of value. A self-completion questionnaire was provided at the end of each interview. This questionnaire is presented in the next chapter.

3.4.2 Design of the survey questions

The purpose of creating a block containing survey questions was to supplement the data from the interviews. It allowed the researcher to collect quantitative data in addition to the qualitative data and thus obtain an even broader data basis. The survey block was designed as Likert-scale questions about the farmers' perceptions on biodiversity, social factors and production orientation. Questions on biodiversity explored the personal importance of the farmers for this topic. Questions on social factors dealt with the interviewees' attitudes towards their colleagues and possible points of criticism. Most questions were asked on the topic of the production orientation. This made it possible to capture farmer's views on things like traditions or subsidies for implementing sustainable practices. Demographic questions, such as the age of the interviewees or the size of their farm, were also included. The survey block was distributed as a paper survey at the end of each interview to be filled in immediately. For the online interviews, the survey questions were sent by email and returned by the interviewees by email as well.

3.4.3 Selection of interviewees

In this thesis, the focus was on gaining an understanding of the diversity of farming methods and experiences of farmers in the Seewinkel region in relation to nature conservation and their potential involvement in it. A total of 20 interviews were initially planned. During the preparation and subsequent conduct of the interviews, it became clear that the number of interviews would remain at 13 due to difficulties in recruitment and also due to sufficient data collection. A total of 13 interviews were conducted, with 4 female and 9 male participants. All participants live and work in the Seewinkel region. To ensure as much diversity as possible, efforts were made to represent different types of farming. The first step was to identify key farmers who were well known in the region. This included the management of the Neusiedler See - Seewinkel National Park. Key farmers were identified through internet research and through lists of previous studies and were also recruited through recommendations from other interview participants

Figure 2 illustrates the distribution of production types practiced by the farmers interviewed. Some farmers practice more than one type of farming. These data were collected by a questionnaire completed by the participants at the end of the interview. The fact that two farmers did not complete the questionnaire, two did not provide any information and some farmers practice more than one type of farming leads to these inconsistencies in the results. Among the interviewees were three wine producers, five farmers with cropland, two owners of mere grassland and biodiversity areas, four livestock farmers and three fruit cultivators.

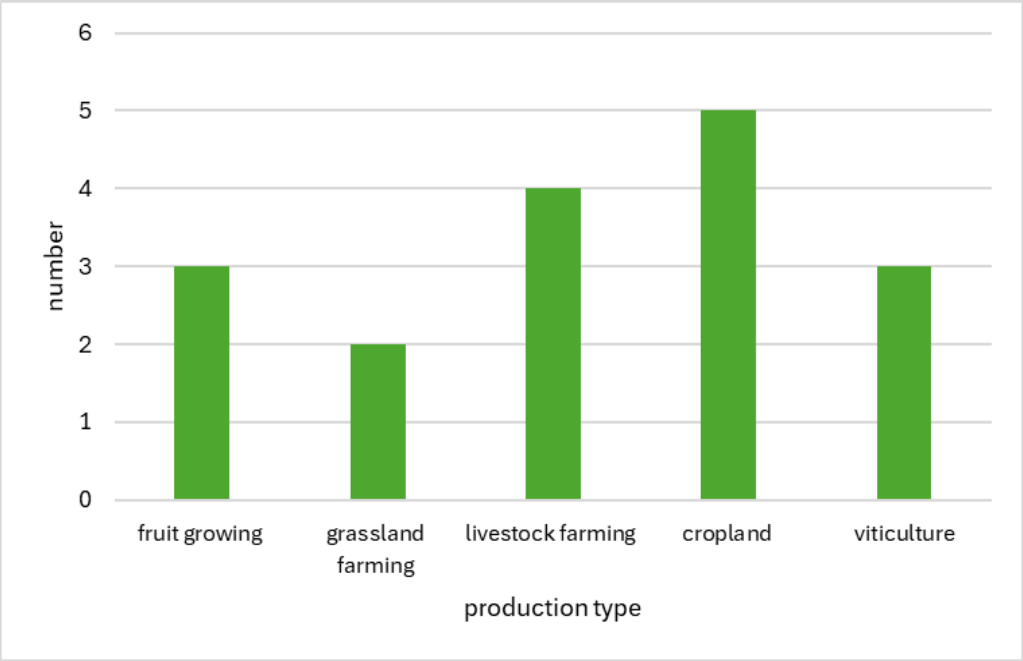

Figure 2 - Categories of interviewed farmers

The educational backgrounds of the participants also differed as can be seen in Figure 3. Two participants had been educated as skilled workers in agriculture, one participant had been educated as a master craftsman in agriculture, and none had graduated from a school specializing in agriculture and forestry. Four of the participants had completed an education at a technical college or university with a focus on agriculture. One participant had a pedagogical education, and two participants stated that they had completed a university education without a focus on agriculture.

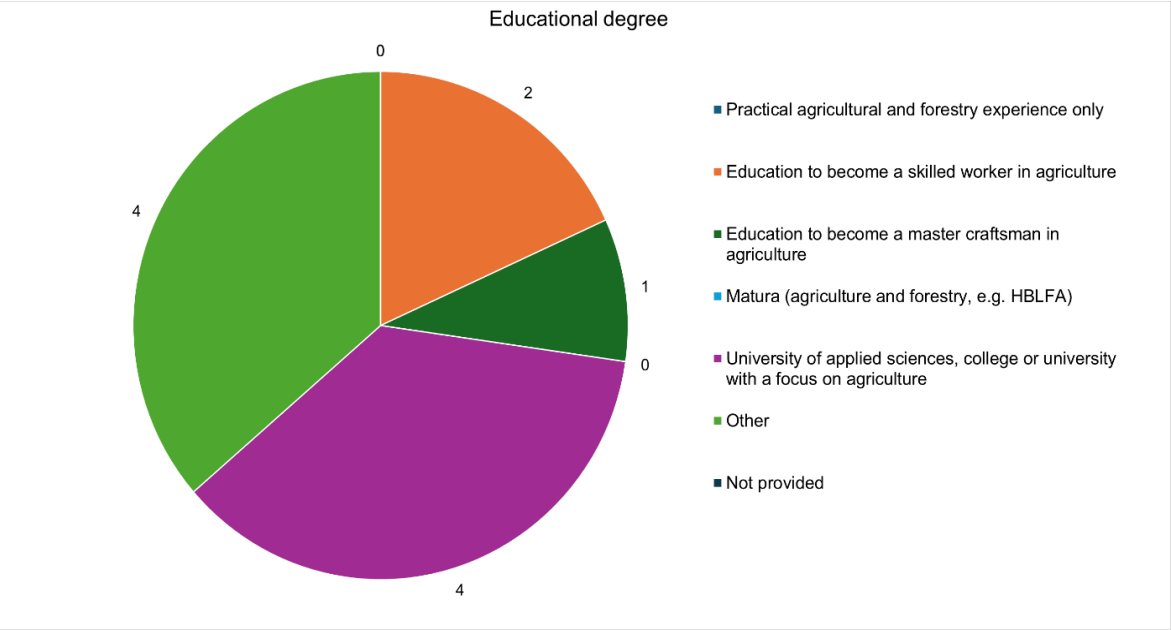

Figure 3 - Educational backgrounds of interviewees

3.4.4 Conducting interviews

At the beginning of the fieldwork, potential interviewees were contacted via email. It aided in identifying individuals who were willing to contribute their own experiences and insights. Following this initial contact, a telephone conversation was arranged to explain the aims of the study and to schedule suitable times for the interviews. There was an average of 7 to 10 days between the initial contact and the actual interviews. The Interviews were performed in a mixture of various formats, including online interviews, telephone calls and on-site meetings between April and July 2024. All interviews were recorded and then transcribed for analysis. Throughout the entire process, interviewees were informed that their participation was voluntary and that their anonymity would be preserved. They were assured that they could withdraw from the interview at any point without any consequences. The recordings were not shared with third parties, so no conclusions could be drawn about the individual farms. Once the analysis was concluded, all recordings were deleted. The duration of the interviews varied significantly, ranging from 20 minutes to 90 minutes, allowing in-depth discussions on various topics related to agriculture, especially grassland, in the Seewinkel region. Some of the interviews were interrupted by family members. The interview was then stopped briefly so as not to confuse the participant. During the interviews, the structure of the guidelines was slightly adapted to the specific interview.

When relevant points were mentioned by the farmers, in some cases the topic blocks were shifted, and additional questions were asked to gain a better understanding. In most cases, further discussion took place after the interviews. Some farmers offered the interviewer the opportunity to tour the farm afterwards in order to gain a better insight into the farmers' work processes. After the 13th interview, the data collection phase was stopped as no new insights were gained.

3.4.5 Transcription of the interviews

Once the individual interviews were completed, the transcription process began. The transcription was done word-for-word. To ensure comprehensibility and readability, strong language and dialect were translated to standard German. Filler words such as “yes”, “um” and “ok” were also omitted. The interviews were transcribed in chronological order and numbered from ID 1 to ID 13.

3.5 Qualitative content analysis

The central part of this step is to divide the text into segments when interpreting the transcripts. Parts of the text are assigned to the categories that have been developed beforehand. This can be done in two ways - deductive and inductive coding. Deductive coding is defined as the process of using categories that have already been applied in the literature and theoretical models. The text passages are thus assigned to existing categories. Inductive coding is characterized by a more flexible approach. Here the categories are created through the interpretation of the transcripts; there are no predefined categories. This allows very specific categories to emerge (Mayring, 2014). Both approaches were combined in this study. This avoided the risk of overlooking relevant knowledge from previous studies and at the same time allowed an open mind for new findings. This avoided the risk of overlooking relevant findings from previous studies, while remaining open to new insights. A combined approach ensured that the participants' experiences were perceived and valued as significant, while at the same time allowing for theory-based research (Proudfoot, 2022).

The transcripts were then entered into the Atlas.ti program. This program is used for computer-assisted text interpretation and evaluation of qualitative data by coding, segmenting and linking the individual responses of the interviewees. This allows unstructured data sets to be organized and models to be created. By using codes,

certain text passages can be found again and again (Muhr, 1994). To provide insight into how the transcribed interviews were converted into an analysable sample, the process is outlined in the following. In a first step, possible categories were developed for the individual statements. The transcripts were read through multiple times and responses that appeared relevant were underlined. In the analysis, attention focused on which statements fitted into which categories. Statements often did not fit into existing categories, so new ones were developed and old ones eliminated. When providing answers to the research questions, the researcher had to determine which categories provided the most significant findings for the study. In addition to the main categories, subcategories were defined on the basis of some interlaced interview questions in order to ensure easier categorization in the interpretation. This software made it possible to determine similarities and differences. These results made it possible to answer the research questions.

4. Results

This section describes the outcomes of the interviews conducted and provides an insight into the perspectives of the farmers interviewed on sustainable agricultural practices.

First, the farmers described the changes, both positive and negative, that they have observed in their daily farming activities. The underlying drivers of these developments are then described in order to gain an understanding of the causes of the observed changes. Third, farmers' perceptions of biodiversity in grasslands are presented. Fourth, existing challenges and potential opportunities of these changes from the farmers' perspective are described in order to gain an insight into the difficulties faced by practicing farmers and the potential opportunities associated with them. The chapter concludes with the results of the survey block.

4.1 Observed changes

Over the last 20 years, the working conditions of grassland farmers have changed in several ways. A change in land management has been mentioned. In principle, less time is spent on management, because there are fewer cuts and a continuous ground cover on the fields. This means that less time has to be invested. In addition, the use

of the land has changed, with the farmers interviewed seeing an improvement in the quality of the land and an increase in the total amount of grassland. Livestock grazing also regained importance for the farmers. However, these changes are mentioned both negatively and positively. Some participants see less overall grassland area and less grazing. For some interviewees there has been no noticeable change in the areas over the last 20 years. Overall, a very mixed picture emerges. Some farmers clearly see positive changes, while others have not noticed any or only negative changes. The individual positive and negative changes are explained in more detail in the respective subchapters.

4.1.1 Positive changes

The interviewees described some positive changes for farmers in the area of grassland management. One positive effect, which was mentioned frequently, reduced working time needed to manage the land. The reduced working time is related to management changes, like fewer cuts or keeping a continuous ground cover. For example, Interviewee no. 11 said: *"I haven't mowed the grass for two years now, only once very late in the year. I just rotate the grass. I make sure that I always have a ground cover. Rotated grass makes a nice mat and is good at retaining water."*

Several farmers mentioned that the utilization and thus the quality of the grassland had changed in some ways. Here is how Interviewee no. 3 expressed his opinion on the improvement of the quality within the areas: "*The quality has probably improved a little. (…) Yes, adapted to the soil conditions. If the soil is dry, I can't make multiple cultivations there. (...) If there is good soil, (…) then you have adapted grassland management."*

Grazing was highlighted in the interviews as a positive change in grassland management. In their observations, experts described how an increasing number of farmers are showing interest in reintegrating grazing into the daily work of their farms. Interviewee no. 6 noted: *"What you do notice is that many farmers also want to go back to keeping cattle, even if they are just wine farmers or vegetable producers or whatever. Because they think that's part of this closed cycle economy. And that many want to take these animals out to graze again. I've had a few farms myself that have started again or just started in the last few years. Keeping ruminants, especially cattle, and*

then letting them graze on the land and actively incorporating them into the crop rotation."

The topic of biodiversity was also often highlighted in relation to changes in grassland. The results of the observed changes in biodiversity are presented in Chapter 4.3.

4.1.2 Negative changes

In the process of the interviews, it became evident that the majority of the interviewed farmers had observed rather negative changes in grassland areas. In their opinion, the qualitative characteristics of these areas have changed, and the available area has declined in general. The decline of grassland in the Seewinkel area was summarized by interviewee 3 as follows: "*Quantitatively: They [Grassland areas] have become somewhat fewer in Burgenland, depending on which time period you look at. (...) The quantity has become a little less, perhaps briefly summarized like this."*

In particular, grazing was mentioned in relation to negative changes in grasslands. According to interviewee no. 7, grazing was much more common in the past because more grassland was used for grazing: *"There used to be a lot more. I believe that there used to be more grassland areas than were then farmed and used for grazing because there were more animals. That is an issue."* Interviewee 5. directly linked the decrease of grassland areas to grazing. Grassland is the basis for grazing animals. Grazing is decreasing because there are fewer farmers in this area, especially in the Seewinkel: *"On the one hand, in the direction that they have become less, because grassland is forage land for livestock farmers and animal husbandry is approaching zero, in Seewinkel actually approaching zero, apart from the free-roaming Angus cattle and the Hungarian cattle. Grassland can be seen as a basis for feeding animals, I see a direct correlation."* Interviewee no. 12 explained the decline in grazing, and therefore the decline in grasslands, with the change in the utilization of hay. He explained that most of the hay is transported to other farmers and that only a small amount is actually left in the local areas for use: *"There used to be more [farmers] who used straw, hay for their personal use. Today, there are practically only us in the village who have cattle. A lot of straw and hay is transported and sold elsewhere."*

Another negative change mentioned by interviewee no. 7 is the expansion of rural areas. He sees this expansion as a negative change in grassland areas. He said in

this context: *“In this direction, I think it [grassland] has already changed. There is less grassland and much more traditional agriculture. I do believe that. Of course, a large amount of grassland has disappeared due to the expansion of villages, which is not at all necessary. That doesn't have much to do with agriculture in general, but I notice it in many other towns. The town centers are empty and there is further development in the direction of nature. That doesn't fit at all. That's a big issue. Vienna has to grow, but I think there has to be a limit for small communities and this should be clearly maintained. The bottom line is that far too much grassland is being used up.”* The interviewee sees the cultivation of crops such as corn, which is heavily irrigated, as traditional agriculture. For him, agriculture is becoming more extreme and grassland rarer. When asked about possible negative changes to the grassland areas, the opinion was also expressed that neither the size nor the condition of the grassland areas had changed. Interviewee no. 13 summed it up with the following words *"No more, no less. (...) I've been doing this organizationally for about 10 years, (...) and nothing has really changed for our areas that are part of it".*

4.2 Observed drivers

The interviewees were asked which factors they perceive as drivers for the described changes. The interviewees were first asked in general about the drivers. Political and economic factors were the most frequently mentioned drivers here, while social and cultural drivers were not addressed by any of the interviewees. Afterwards, the interviewees were asked about the role of each individual driver category. The drivers, mentioned most often, are presented first. In general, perceptions on the role of certain drivers varied, which is indicated with pro and contra quotes in each subsection.

4.2.1 Economic driver

All interviewees agreed that profitability plays a role in agricultural decisions. Some farmers emphasized that their agricultural land is their source of income and that they therefore have to ensure the profitability of the farm first and foremost. In addition, some interviewees noted that the financial conditions, and thus also the subsidies, are a decisive aid to their decisions. One farmer noted that for him there is a link between profitability and subsidies. If the subsidies for sustainable agriculture or nature conservation areas were not sufficient to maintain the farm and financial difficulties

arose, many farmers would be forced to reconsider their participation in agri-environmental programs or to abandon them altogether, he stressed. In addition, one participant pointed out that discussions about conservation often neglect the fact that it is a farmer's source of survival. If there is more money to be gained from leaving land uncultivated than the potential management costs, farmers would choose to do so, he claimed.

Overall, there was a consensus among the interviewees that economic circumstances influence farmers' decisions on grassland management measures. The importance of the political driver for farmers is presented in the next chapter, especially the effect of politics on economic considerations, which was repeatedly mentioned when asked about the economic driver.

All the statements mentioned in the text are documented in Table 1, along with the respective quotations.

Table 1 - Impressions of influential drivers: Economic driver

Pro Quote
I think it's mainly economic considerations. (...) It has to make sense for the farmers, that's quite clear. (ID 3)
I think so. Absolutely. It's called agriculture, it's always about money, the farmers have to generate a income. If other opportunities arise for these areas, then it can certainly happen that the outcome is not favorable for the grassland. (ID 6)
Certainly. With the changes that I can influence. I won't manage a nature conservation area if it means that I will suffer massive economic losses, especially if we are talking about a larger scale. (ID 4)
Agricultural land, as the word implies, is a usable agricultural area. This means that the farmer utilizes it for business purposes, not primarily for nature conservation reasons. (...) This is his income to get by in life. He lives from it. He has to be economically successful. That is often forgotten in discussions. (ID 5)
It's all a matter of money. If we're given so much money for leaving things lying around and having measures in place to cover my operating costs. It has to be financially viable for us and I have to be able to earn a little something. (ID 9)

4.2.2 Political driver

Most participants agreed that policy is the major driver of change in grassland areas. In general, the politicians who are in charge are primarily responsible for the changes in grasslands and the protection of these areas, says one farmer. As soon as there is a shift in leadership, the topic of nature conservation and land management is usually treated differently. The different political parties have varying views on the protection and expansion of grassland areas, which can lead to differences in political approaches and financial support. In particular, several farmers highlighted the subsidy system and agri-environmental programs, in the case of Austria the ÖPUL program. One farmer described financial subsidies as an incentive for grassland management. For him, a financial compensation is an important means to maintain sustainable agriculture. In his opinion, farmers might leave grassland unmanaged and no longer cultivate it if these subsidies were stopped. Another farmer emphasized the central responsibility of policy. Although farms are involved in the policies, it is the politicians who ultimately decide, he noted. He also stressed the importance of the subsidies, especially the ÖPUL measures, as they constitute the strongest incentives.

At the same time, many farmers described how they did not feel free to decide about their business. One farmer mentioned that he was indirectly forced to participate in the programs. The policy sets the framework in such a way that they have no choice but to participate. He reported frustration in the agricultural community as the requirements for their farms increase and the subsidies decrease. Every step of the process has to be documented, which is too much work for many farmers. Some farms are questioning whether they should continue to participate in these programs at all. This was supported by another farmer who mentioned the increasing bureaucracy. It is an additional burden on top of the daily field work. One farmer explained that he could not survive without the subsidies because he could not get a fair price for his work.

Only one farmer expressed some scepticism about the role of policy in grassland change. For him, policy and subsidies are only a central player for farms that have only grassland without livestock. However, these farms have leased their land or converted it to arable land when it was still possible.

All the statements mentioned in the text are documented in Table 2, along with the respective quotations.

Table 2 - Impressions of influential drivers: Political driver

Pro Quote	Contra Quote
Politics does have a big impact. You notice this again and again when there is a change and other people come in, often from the same political party. There is a shift in political positions, and they then have a different approach to grassland and nature conservation. You notice that. (ID 9)	I hardly think so, because the level of subsidies for grassland, especially in nature conservation, is very high. The level of subsidies for normal grassland areas in the normal ÖPUL is low if you are a pure grassland farm without livestock. Most of these farms without livestock no longer have any grassland. They have either leased them out or converted them into arable land, as was still possible. (ID 10)
I think it is more attractive to farm them [their fields] as grassland if you are compensated for it. I believe that this [subsidies] is an attractive measure. If it [subsidies] didn't exist, we would probably let it [grassland areas] grow as it [grassland areas] grows and not look at it. (ID 13)	
I think to a large extent, because the politicians are responsible for the environmental programs. You can collaborate and experts are invited, but ultimately the politicians decide how it turns out. A significant part of the responsibility lies there. That it is the way it is. (ID 3)	
There are some financial subsidies, but do they actually have a sum or a subsidy amount that can cover the costs and is also attractive enough? (...) At the end of the day, it's a financial question. That's where politics has the greatest influence. (ID 4)	
Because society rightly demands it and politicians implement it, agricultural policy is almost 100% EU-operated, communitized in the EU. This also applies to rural development. Austria has ÖPUL. There are subsidies so that farmers do what they did 50 years ago anyway, because they tended animals. It is controlled. Farmers are not completely free to make their own decisions. (ID 5)	
These subsidies are regulated by politics. Most of it originates from the EU. There is sometimes a lot of resentment because the requirements are becoming ever more stringent and the subsidies lower. If you compare this with the last few years, you have to document it precisely and keep a diary of when which animal is where on the fields. That takes a lot of thought. (...) These requirements that are being imposed by politicians are increasing. More and more difficult to implement. The documentation and the paperwork is insane, it's a lot. You need your own secretary or an office worker to manage it alongside the day-to-day business. (ID 6)	
Indirectly, this is being imposed on us. Politicians have established the framework conditions that allow subsidies to keep other prices so low. You can see the connections. If we didn't receive any subsidies at all, we would have to be paid a price that would allow us to survive. (ID 9)	

4.2.3 Environmental driver

The majority of farmers see the environmental driver as an important influence on grassland change. Changes in precipitation were frequently mentioned by the participants, as a change in water availability has a direct impact on grassland management. One farmer reported that rising temperatures have led to an increase in parasites in Austria that were previously only found in milder regions of Spain. Due to this increased parasite pressure, more pesticides have to be applied. In general, the drought in the Seewinkel region plays an essential role, as another farmer pointed out. There is less hay available for livestock because the quantity and quality of the hay has been affected by the lack of rain. In addition, one farmer mentioned increased evaporation. More frequent and intense heat waves are causing more water to evaporate from the soil, which is also affecting farmers' water management. They irrigate much more to counteract the drought. For this farmer, humans are part of the problem. They also interfere with the water cycle by extracting and using more groundwater, which contributes to changes in the grasslands in addition to evaporation. Another farmer emphasized that he sees a change in the perception of the environment between different generations. His father was never concerned about environmental change, while he is increasingly interested in climate change. He sees this as a generational issue.

However, there are also some critical views on the issue of climate change and the extent to which it influences changes in grassland. One farmer is certain that he has not noticed any significant changes in the regional climate and considers the discussion about environmental drivers to some extent hysterical. For him, weather extremes are part of his daily work, and he does not perceive them as real changes. Another farmer mentioned that he had not noticed any significant changes on his land. He reported that his crop yields were stable and that the grassland areas had remained constant in size despite the frequent droughts, as the Seewinkel is located in an arid region anyway and such conditions are not of particular concern.

All the statements mentioned in the text are documented in Table 3, along with the respective quotations.

Table 3 - Impressions of influential drivers: Environmental driver

Pro Quote	Contra Quote
Of course. Absolutely, yes. We use a lot of pesticides because we have a lot of parasites. In the last ten to fifteen years, we've had parasites that only existed in southern Spain 20 years ago. Due to the climate change, the annual temperature is right for these animals. Everything is becoming much more difficult. (ID 11)	I haven't noticed any climate changes, no big ones yet, and if you look at the records in a long period of time, the hysteria about the climate is total nonsense. Burgenland has an arid climate. (...) All this climate populism is a disaster. There are years like this and years like that, but we've had everything in the last 20 years. You can't reconcile that. (ID 8)
In grassland, he gets a lot less hay when it's dry. That makes a big difference. The water used to remain in the fields in early spring. That hasn't been the case for a long time. This year is an exception; it has rained a lot. That makes a big difference to the quantity and quality of the hay. (ID 12)	Not really, because we are a arid region and our grassland areas are currently relatively stable and yields are also stable, despite the drought of recent years. (ID 10)
Evaporation is higher, that's the first thing, no question about it. The rest is also an effect of the water balance, I think. We have definitely achieved the one and a half degree target. We won't achieve the goal of not going beyond that, because we're already there. A lot of things overlap. (...) A lot of the changes are home-made. If the wetlands change, then it's because the water balance is not in order in the first place. And the water balance is not only out of order because more evaporates, because you have a longer evaporation period, but also because we intervene directly, because we divert water and extract groundwater for the irrigation-intensive crops mentioned. (ID 2)	
For me, yes, but certainly not for my father. He probably doesn't care. I think it's honestly a generational thing. I think my father's and grandparents' generation honestly wouldn't care. If they wanted to farm it [grassland] themselves, then it would be important to them. My father, who didn't farm it and never will, probably wouldn't care about the environment. (ID 13)	

4.2.4 Technical driver

Most participants perceived technology as a driver of change in grassland. Some farmers emphasized that more modern equipment, such as more efficient mowers, allows them to manage the fields faster and more efficiently. This means that larger areas of farmland can be cultivated in less time with less effort. Modern technology has also provided a number of options, according to one farmer. In his opinion, grassland mowers have changed. They have become larger and stronger, so that nowadays you can cut the grassland at any time you wish. For one participant, more modern machinery does play a role in the changes, but he did not explain exactly how or why he thought this was the case. Another farmer specifically mentioned the hay and straw

trucks as an example. The trucks could process and transport more material than individual small farmers. The more powerful machines were mentioned by some farmers in relation to biodiversity, as they have a stronger impact on nature. The results of the interviews on this topic are discussed in more detail in the chapter 4.3. With regard to livestock farming in particular, one farmer mentioned modern technology to support the management of grazing cattle. Otherwise, he sees technology as a subordinate driver, especially in grassland. In contrast, in arable farming, for example with GPS-controlled tractors, he sees the technology as an important driver.

In comparison, many farmers described how they do not see technology as having a major influence on changes in grassland. One farmer pointed out that his equipment had not changed in the last 20 years. Furthermore, one farmer made it clear that although there is more talk about technology, there is little added value from the purchase of this new technology.

All the statements mentioned in the text are documented in Table 4, along with the respective quotations.

Table 4 - Impressions of influential drivers: Technical driver

Pro Quote	Contra Quote
Technology has influenced this to the extent that everything has become more efficient, so that a farm can cultivate much more land. Where animals are used, technology is secondary, because I have to bring the animals to the field and then they graze. There is also technology that helps a little. Even if I'm just mowing or chopping, technology has made progress there. (ID 3)	Our machines have not really changed in the last 20 years. We have always used the same technology. Some of the same machines, even for 20 years. (ID 8)
Yes, definitely. When I compare the equipment that comes to collect the hay and straw. What they can load, and process is much more than what my husband can manage. (ID 12)	There is more conversation. You dispose of your old machine and earn three times as much a day; then it's a big issue because it brings in more money further down the line. Supposedly, because you have to buy the equipment. (...) It's not worth it. You have to think whether it makes sense to cultivate more. (ID 7)
Certainly. If someone is using a nine-meter mower, it certainly makes impacts or cuts (...). Of course, you drive faster with larger machines with a greater width. (ID 9)	
Mechanization and technology have altered the way we cut. Agitators, cutter bars, these are finger mowers, they were outdated at some point. Today it is possible to cut grassland at any time and for any reason. (ID 5)	
In grassland, I would say this plays a rather subordinate role. The farming methods there are more traditional. What has perhaps changed is that there are now smart fences. (ID 6)	

4.2.5 Social driver

Some of the interviewed farmers see the social aspect as a driver for changes in grassland. In this context, it became clear that the opinions of colleagues are generally more important than those of family members. One participant emphasized that colleagues sometimes have to agree with decisions. In addition, it was noted several times by the interviewees that larger farms have more influence and weight in decision-making processes than smaller farms due to their financial situation. The active exchange between farmers in the region was another aspect mentioned by some interviewees. Discussions with each other are part of the decision-making process, for example when adopting new farming methods. The exchange of information about new ideas is an important part of the agricultural community in the Seewinkel region. Instead, farm inheritance was frequently mentioned by the interviewees as a social issue in this context. Finding a suitable successor for the farm has become increasingly difficult in recent years. It has become more challenging for the current generation to find a partner who shares their interest in farming, as some priorities have changed, such as planning more vacations than managing the agricultural business: *"It can also go the other way. Another problem in agriculture is the issue of farm inheritance. It is becoming more difficult to get the next generation interested today or even to find a partner who would share it with you. If the partner comes from a different background, this can also lead to certain branches of the business being abandoned, for example animal farming, because he or she would rather go on vacation five times a year. "* (ID 6)

Another point mentioned by one interviewee is that the active exchange between colleagues tends to focus on larger topics. For example, there are discussions about conventional versus organic farming.

In contrast, some interviewees argued that social relations play a subordinate role. In this context, it was emphasized that comparisons among each other or envy are not drivers within this community. Although many interviewees considered the social driver to be relevant, they were unable to give specific examples of how it had influenced their daily work or decision-making processes in the actual practice.

All the statements mentioned in the text are documented in Table 5, along with the respective quotations.

Table 5 - Impressions of influential drivers: Social driver

Pro Quote	Contra Quote
I think it does have a lot of influence. I think so. It's very rural here. Everyone knows everyone. If everyone has a very negative view of it, I think that's going to discourage them from doing it. (ID 13)	I don't think factors like " he has this, and I want that" play an important role. (ID 2)
What other colleagues say certainly carries more weight than what your own family might say. I think that's generally a bit of a farmer's problem. It needs to go over well with the others. (ID 6)	In principle, yes, but I can't imagine a case where it would influence another farmer. If everyone does it, then it certainly influences them. It's hard to imagine a measurable advantage for one person. I don't think it's measurable. Farmers certainly don't often think that far ahead. (...) I don't think it's the environment. I don't see the connection with social factors. Nobody is interested in agriculture, except for agriculture. (ID 7)
When I look at us, our influence on others. One would wish for more. I think smaller farms do [have influence]. The influence of those who have nothing left in their hearts and only look at profit is much greater. The other farmers see how much money their colleagues are earning and want the same. You shouldn't underestimate that. (ID 12)	
I think it does have a lot of influence. I think so. It's very rural here. Everyone knows everyone. If everyone has a very negative view of it, I think that's going to discourage them from doing it. (ID 13)	
Absolutely. Larger farmers, colleagues, some of whom are younger than me, push each other. Changed soils, the better, the nicer it is. (ID 11)	
I think that it always plays a role. But they are open to new techniques, I think, to new methods. You try it out. The environment then tells you whether it's good or bad. You talk; you exchange ideas. I supervise a farmer who started with cattle and grazing. His neighbor has also had cattle for years, but only ever kept them indoors and is suddenly interested in grazing because he has seen the other farmer do it. (ID 6)	
It's more about larger issues such as conventional farming or organic farming. There is an exchange of opinions between these groups of colleagues, I would say. (ID 5)	

4.2.6 Cultural driver

The cultural driver addresses the views and values of the population and the extent to which these can influence changes in grassland.

Many farmers believe that public perceptions can play an important role. As public interest in nature conservation, animal welfare and sustainable practices has increased

in recent years, farmers are being rewarded financially for adopting such measures. These changes are often delayed. The younger generation in particular is more aware of how their consumption patterns affect the environment, according to several interviewees. Some farmers make a distinction between the individual generations. Older generations showed less interest in conservation. Among the younger population, for example, interest in animal welfare has increased. Some participants pointed out that society's growing interest in changes in grassland management provides an incentive for farmers to become more sustainable, if they are rewarded accordingly.

However, critical voices were also expressed during the interviews. The discussions revealed tensions and resentment among some farmers. According to one interviewee, past generations are partly to blame for today's conditions. Many farmers also stated that the general public has little knowledge of actual farming practices, how things work on the farm, or the challenges farmers are confronted with.

All the statements mentioned in the text are documented in Table 6, along with the respective quotations.

Table 6 - Impressions of influential drivers: Cultural driver

Pro Quote	Contra Quote
Oh yes, that's for sure. The general trend in society at the moment is towards animal welfare, if you summarize this under the term or towards keeping animals as species appropriate as possible/grazing. (ID 6)	No, I don't think so. (ID 10)
I would say that the general opinion of the population is very technically reflected, because you can also see that you receive money for this general interest. Then it is in the interests of the farmer. There is always a delay, but there is a general interest in society as a whole. Then there is money. (ID 1)	What the population thinks is what the media writes, which in some cases is not true at all, and that the population is already very far away from agricultural practice. This romanticism, this sunshine agriculture, no longer exists. It's really all a disaster. (ID 8)
You might have to differentiate between generations. The old generation was more in favour of production and stems from a different era. It is important to produce food and secure food supplies. Now that we live in abundance, so to speak, the younger generation, your generation, is perhaps more aware, more aware of nature conservation, and this is perhaps more important to them than to the older generation, so I would differentiate. (ID 3)	Many people in our society are 'pseudo-conservationists'. You can't say that out loud. It's their fault that we are where we are. The industry of the past. Of course, nobody knew what would happen in the next 50 years, as I can see from my parents' generation. (ID 7)

4.3 Biodiversity

The topic of biodiversity was addressed in the interviews. Farmers were questioned on whether they had observed changes in biodiversity and which drivers they believed were significant contributors to these changes. Many farmers reported changes in grasslands, with some experiencing a drastic decrease in biodiversity.

Some interviewees mentioned environmental changes, especially climate change, as a driver of changes in biodiversity. One farmer emphasized the impact of extreme heat waves and periods of drought with limited water availability. He said that he could only judge based on his own experience as a farmer. He concluded his response by saying that nature reacts strongly to extreme weather events. Another interviewee reported that, when planting trees, he chooses species accustomed to extreme heat waves, including species that would previously only have survived near the equator. He noted that he plans many years in advance. Another driver for many farmers in terms of biodiversity change is farmland management. One farmer described how changes in water use and land cultivation had affected biodiversity. Grazing also contributes to this change. In his opinion, grazing encourages some species while restricting others. Another interviewee noted that mowing times often coincide with the breeding times of some species, harming the fauna. One farmer also mentioned mechanization and its impact on biodiversity.

In this context, some farmers expressed their lack of knowledge about the area's flora and fauna. They reported that they lacked the knowledge necessary to assess changes in grassland biodiversity. Due to their limitations, biologists should address this topic: *“That's really difficult to say. I don't think I can answer that. (...) That should be done by professionals.”* (ID 7)

As part of measures to promote biodiversity, some farmers reported a variety of methods to increase biodiversity on their grassland. Several farmers mentioned grazing as a successful measure to increase biodiversity. One interviewee described a grazing project in their region that was accompanied by nature conservationists. According to the experts, an improvement in biodiversity was observed on the surveyed areas after grazing as well as a reduction in invasive reed species. Another farmer stated that he had stopped using pesticides and changed his fertilization

methods. He noticed positive changes in his soil biology as the soil had a better storage capacity.

However, there were also some farmers who had not noticed any changes in grassland. In this context, one farmer stated that, although there was generally less diversity, it was least apparent in the Seewinkel region. *"It's often said that biodiversity is declining everywhere. But I believe that this applies least of all to our region"* (ID 6).

All the statements mentioned in the text are documented in Table 7, along with the respective quotations.

Table 7 - Quotes from the interviews on the topic on biodiversity

Perceived biodiversity changes in general	Environmental drivers of changes	Other drivers of changes	Undertaken measures to promote biodiversity
We keep hearing that the diversity of species has declined. This is particularly due to the fact that there is often little cover, but the cover may not be available at the wrong time. The management times also often result in overlaps with the natural cycle of the animals, meaning that the mowing time then coincides with the breeding season of ground-nesting birds, for example. And then many clutches of eggs and many offspring are destroyed. (ID 4)	It is clear that the environment has an influence. I had a 10-year dry period in my grassland. During this time, almost no flooded areas developed. Now they are present. The scene is probably different. I can already see that diversity has changed, that we have these extreme dry periods. Different plants develop more strongly in each period. That will certainly have an influence. I only see it as a practitioner. I see what I feel. Nature reacts very strongly to capricious weather. (ID 9)	Well, the water management. Quite extreme. The forms of cultivation, how it is managed. If I can't maintain grazing, that has an impact on the flora. Grazing benefits certain species, neglects certain species, even scrub encroachment on grassland, for example, is neglected on properly grazed areas. (ID 1)	It can only ever be a sum of factors that massively influences something like this. Before I became an organic farmer, I was probably more of an organic farmer than many certified organic farmers. The change in crop protection, change in fertilization, tillage, not using glyphosate, building up soil life and soil storage capacity. These are many factors. These are many measures that we have taken. I can't say whether some measures. (ID 11)
If you follow the opinion, so to speak, then biodiversity has decreased dramatically in general. (ID 5)	Heat, the climate. You shouldn't plant many more trees. You want to have a tree for 30 years, not just 10 years. We will have more plants that have grown towards the equator for decades. (ID 7)	Certainly, the mechanization of the agricultural sector. (ID 10)	Of course, there is more biodiversity. I can't give a specific example, I can only talk about an area where we started a grazing project several years ago, along the reed belt. An area there was designated as a pasture where our cattle graze. This was accompanied by nature conservation experts (…) and the representative from the Nature Conservation Association was delighted with what had happened, including the biodiversity of the plants. He particularly mentioned the plants, that a lot has happened there and that we have been able to push back the reed belt through grazing, to push back this invasive occurrence of reeds. (ID 1)

4.4 Future opportunities and challenges

4.4.1 Challenges

Many of the farmers consider climate change to be a significant challenge. One interviewee explained that climate change will force many of his colleagues, especially those with smaller properties, to quit farming. In this context, he also mentioned the importance of irrigation and water availability. It is becoming increasingly difficult to irrigate, as evidenced by the state of Lake Neusiedl. Another farmer sees the drought resulting from climate change as a major challenge. He believes that extreme weather events such as rainfall and droughts are becoming more frequent in the Seewinkel region due to climate change. He is convinced that it is impossible to predict how these events will unfold and that conserving water resources is therefore necessary. This is the only way to survive in times when water is scarce. It is important to note that irrigation is especially important in crop and fruit cultivation. It plays a subordinate role in grassland management. Another challenge for many participants is ensuring the economic viability of their farms. For one farmer, more of his colleagues are striving for economic success and maximizing profits. Crops with high added value result in a lack of consideration for crop rotation in order to remain economically successful. Another farmer mentioned that his colleagues are uncertain about the profitability of grassland. Rising feeding costs and high fuel prices could reduce the long-term profitability of food production, as food prices are not expected to rise accordingly. Politics also have an important effect on many farmers. Some interviewees criticized the increasing regulations and restrictions in the agri-environmental programmes. One farmer expressed the fear that many farmers would no longer participate if there were to be further restrictions. Another farmer noted that politics interfered too much in agriculture. He explained that although the programs were voluntary, many farmers would not be able to guarantee the maintenance of their farms without the subsidies. He sees a close link here between the political requirements and the profitability of farms. This would primarily affect arable farmers, as in his opinion they would be the most affected by regulations. Import and export trade was also mentioned by one farmer in connection with politics. Depending on how the international markets develop, politics will also influence national agricultural production. All the statements mentioned in the text are documented in Table 8, along with the respective quotations.

Table 8 - Key Statements on future challenges

Climate Change	Economic troubles	Politics
The climatic changes will probably put an end to some [farmers] who might otherwise have lasted another five years. I could well imagine that happening to the smaller farms. Irrigation is getting more and more difficult every year. This year looks quite good. The last few years the lake has been between barely there and gone. I think that will be one of the biggest challenges. The water and the climate. (ID 13)	Money will be the biggest challenge. It's similar to what happens in Seewinkel, where seed corn is grown, which is good business for farmers. It's highly lucrative, so that in six or seven years there is no crop rotation, but only crops with high added value are cultivated, in this case corn for many years. This is not a good development. (ID 11)	The biggest challenge is when politics intervenes in the economy or agriculture. There are many who have an opinion and have to enforce it. (...) Agriculture is not a free economic sector. It's a misconception that everyone voluntarily participates in subsidies. I participate voluntarily, but I have the option to stop participating. I need this subsidy to maintain my contribution margin. If I don't take advantage of this subsidy and just do standard farming, I won't be able to make a profit. (ID 9)
Climate will be the biggest issue because it will become more difficult. You have to adapt to the future climate to an extreme degree. Grassland will be important here; they store water and cover the soil. Every crop will suffer more than grassland areas. (ID 7)	The biggest challenge regarding the preservation of grasslands will be ensuring the economic viability of the grasslands. (ID 10)	Regulations for grassland conservation and development are tightening. Arable farmers will be hit the hardest. (ID 5)
But it is clear that extreme events will increase. If they increase, it means that we will have heavy precipitation occurrences. Regardless of whether it happens in winter or summer or at all. Perhaps there will be a year that is humid and then a series of dry years, perhaps even extremely dry years. We don't know that. But logically, if I know that it will be distributed very unevenly and that the amplitude can fluctuate even more than it has been normal in the region for centuries. Then it is clear that I have to make sure that I have water when there is none left. The motto of keeping every drop of water in the region for as long as possible applies all the more in view of climate change. (ID 2)	If this is no longer economically viable (...)and the operating costs will increase. Feeding costs and diesel expenses are rising, but food prices are not keeping pace. In some cases, careful calculations are necessary to determine economic viability. If these developments continue, the outcome will be shocking. After all, agriculture is the basis of life for humanity. What will happen if, at some point, no food is produced because it is no longer economically viable for farmers? (ID 6).	As far as food imports and exports are concerned. I think a lot of it will also be about international events. To see what else is being imported, how our own production is changing, how market values are changing. And that will also have a decisive influence on management. (ID 4)

4.4.2 Opportunities

The interviewees identified a number of opportunities to stimulate positive developments in the area of grassland. Many farmers mentioned raising awareness as an important way to cope with future challenges regarding grassland. Another farmer emphasized in this context that farmers do not have enough motivation. They are often seen as polluters and animal abusers. Improving their image would motivate them to work more sustainably and with greater commitment, thus counteracting some of the above-mentioned challenges. One farmer reported that many people are unaware of the complexity of agricultural practices and nature conservation measures, particularly in grasslands. Although there is a lot of talk about it, the public often does not realize the work that goes into it. However, one interviewee also mentioned the importance of suitable financial subsidies for areas that are no longer suitable for use due to nature conservation measures.

In order to make consumers aware of the importance of grassland, better education is needed. Many farmers mentioned that a more educated population would be better prepared to face the challenges they described. A population that is conscious of the environment tends to buy more from local producers and pay more attention to sustainable production methods. One farmer emphasized that this would promote regional agriculture and benefit grassland areas as well. Another farmer also considered raising awareness in society a key approach. A well-informed population could better understand and support the necessity of measures such as water conservation. This would create social pressure on politicians to establish suitable conditions for the future. Another farmer also mentioned politics as an important aspect of this issue. One farmer emphasized that farmers want to apply the knowledge they have acquired through their experience. They do not want to be restricted by unsuitable framework conditions, and they want to use their knowledge to overcome challenges. Many participants believed that fewer products should be imported. One farmer said that only products produced too little or not at all in Austria should be imported. This could also increase regional business and provide financial subsidies for farms to be more sustainable. One farmer mentioned controlling water consumption as a possible strategy for addressing environmental challenges. He predicted positive improvements to grasslands if farmers could manage the available water resources efficiently and in an environmentally friendly approach.

According to many farmers, a combination of raising public awareness, efficient measures specifically to tackle climate change and political actions are essential opportunities for overcoming challenges in grassland areas.

All the statements mentioned in the text are documented in Table 9, along with the respective quotations.

Table 9 - Key Statements on Opportunities

Opportunities
Society should have a stronger opinion that grassland areas are valuable if they serve nature conservation purposes. This is important. Some grassland areas, even in Burgenland, are irrelevant from the perspective of species conservation because they have no value. The farmer cannot use the yield from grassland unless changes in agriculture continue in a way that provides more funding. They need subsidies so that the grassland is not just grassland, but nature conservation land. Then it would actually be in their interest. (...) I cannot ask a farmer to take an area out of use. We know that these ecological services for agriculture and society are generally not compensated. These services must be increasingly recognized so that they will be more widely accepted in society. That is the key. ID 5
I think it would benefit farmers if the media didn't always portray them as polluters and animal abusers. Most of the time, it's due to excessive demands, family issues, illness, or other circumstances. It's difficult and demotivating. Sometimes you feel like you're not important enough. I don't want to offend anyone, but it's still like that. People want food that's produced locally, preferably certified organic, and in harmony with nature. But if you can buy meat for three euros at the supermarket, that's what people will choose. ID 6
Import less. You don't need wheat from Ukraine. Promote with purpose, not just because it seems like a good idea. (...) Without a binding contract, it's like a bazaar. With a contract, you get a guaranteed amount. Demand decides. We should focus more on our own country. We should only import products that are in short supply here. We shouldn't produce 100 percent turkey meat ourselves, export it, and then buy it packaged. ID 7
It is probably everywhere. If we succeed in achieving a balanced water supply, I believe a positive development of the grasslands is possible. I also believe that we could communicate the value of grasslands and these fields on a larger scale, especially in terms of climate change. ID 2
I want farmers to be able to use their skills and responsibilities in the field again. I don't want to be regulated by a date. I want to be able to apply my knowledge myself again. I don't want to have to adapt my knowledge to a date or any rules. ID 1

4.5 Self-completion questionnaire

As part of the interviews, the 13 participants were given survey questions at the end to obtain additional quantitative data on the drivers influencing farming decision-making. In the end, eleven completed surveys could be analysed, as two participants did not complete the survey. The survey consisted of three thematic blocks, which each contained several questions to be answered on a Five-point Likert scale. The survey concluded with demographic questions about the person being interviewed, for example to find out about the level of education and age groups of farmers. Figure 4 illustrates how participants graded the individual questions on the topic of biodiversity, depending on whether they strongly agreed or strongly disagreed. The survey findings indicate that the majority of interviewees recognize the importance of global biodiversity and that it is very relevant to them. “I strongly agree” was selected by 9 participants. Local and regional biodiversity also matters to the individuals questioned. The existing biodiversity directly on their farm is also very valuable to the farmers. In an interview, one farmer made this clear: *"We have many valuable cultivated areas, just as they used to be. We simply take some out of active use and designate them for nature conservation."* (ID 4)

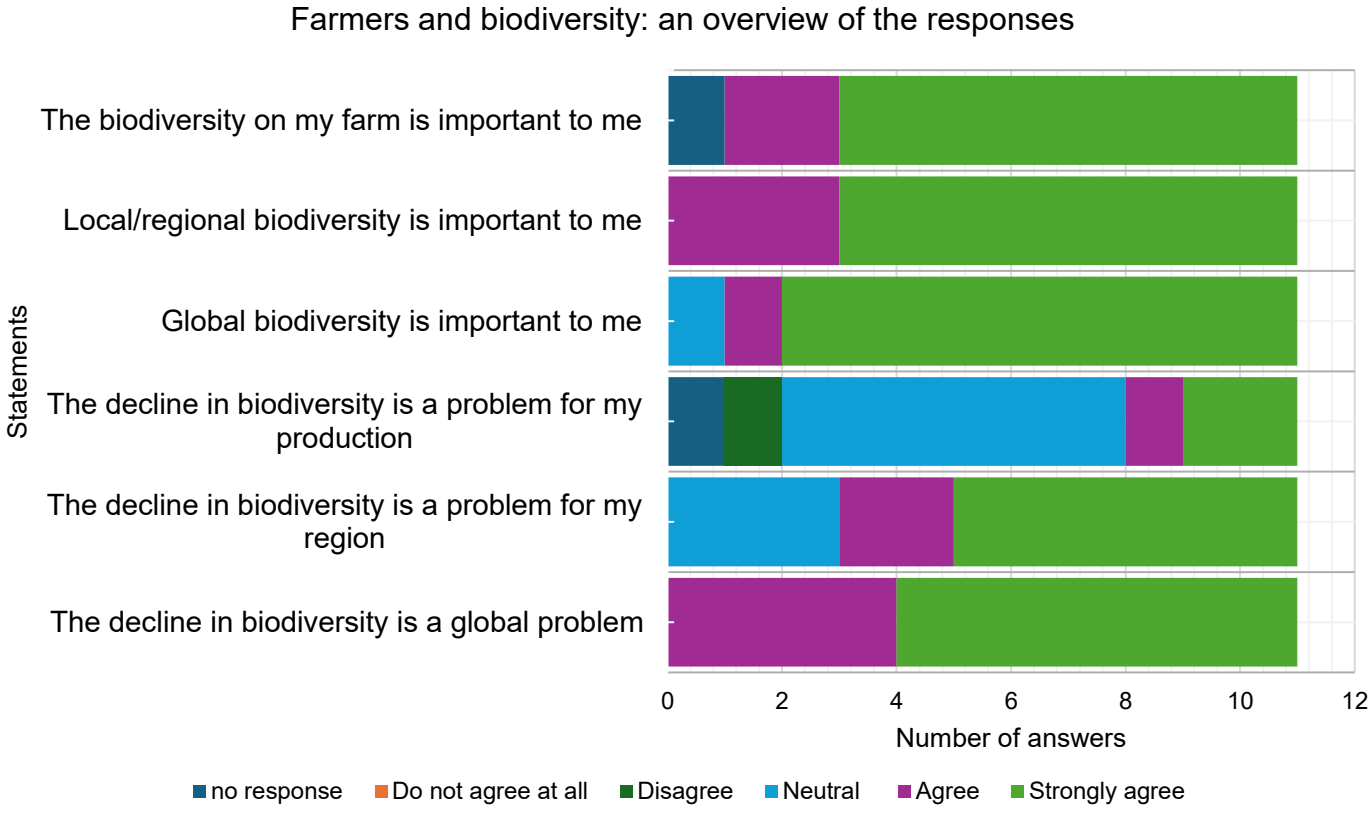

Figure 4 - Attitudes regarding biodiversity among farmers

The results for the statement “The decline in biodiversity is a problem for my production” indicate that the majority of interviewees selected a neutral answer. Farmers did not express any strong agreement or disagreement regarding this statement.

Figure 5 displays the distribution of responses to the social driver. A total of 11 farmers selected answer options ranging from full agreement to full disagreement for this question. The figure contains the distribution of frequencies for each question.

Question 1 ("If other farmers in my area implement measures to conserve biodiversity, I want to implement such measures on my farm, too") was confirmed during the interviews by some farmers. One farmer stated that colleagues exchange information about management measures with each other: *"Absolutely. Larger farmers push each other, some of whom are younger than me. The better the soil, the better it is."* (ID 11)

Question 2 in particular, *“If other farmers in my area have higher incomes than me, that bothers me”*, was negated by the majority of interviewees. In contrast, most farmers agreed with question 3 *“I want to operate my farm in a more environmentally friendly than other farmers in my area”.* Income also appears to be less significant among farmers, as the incidence of answers to question 4 indicates.

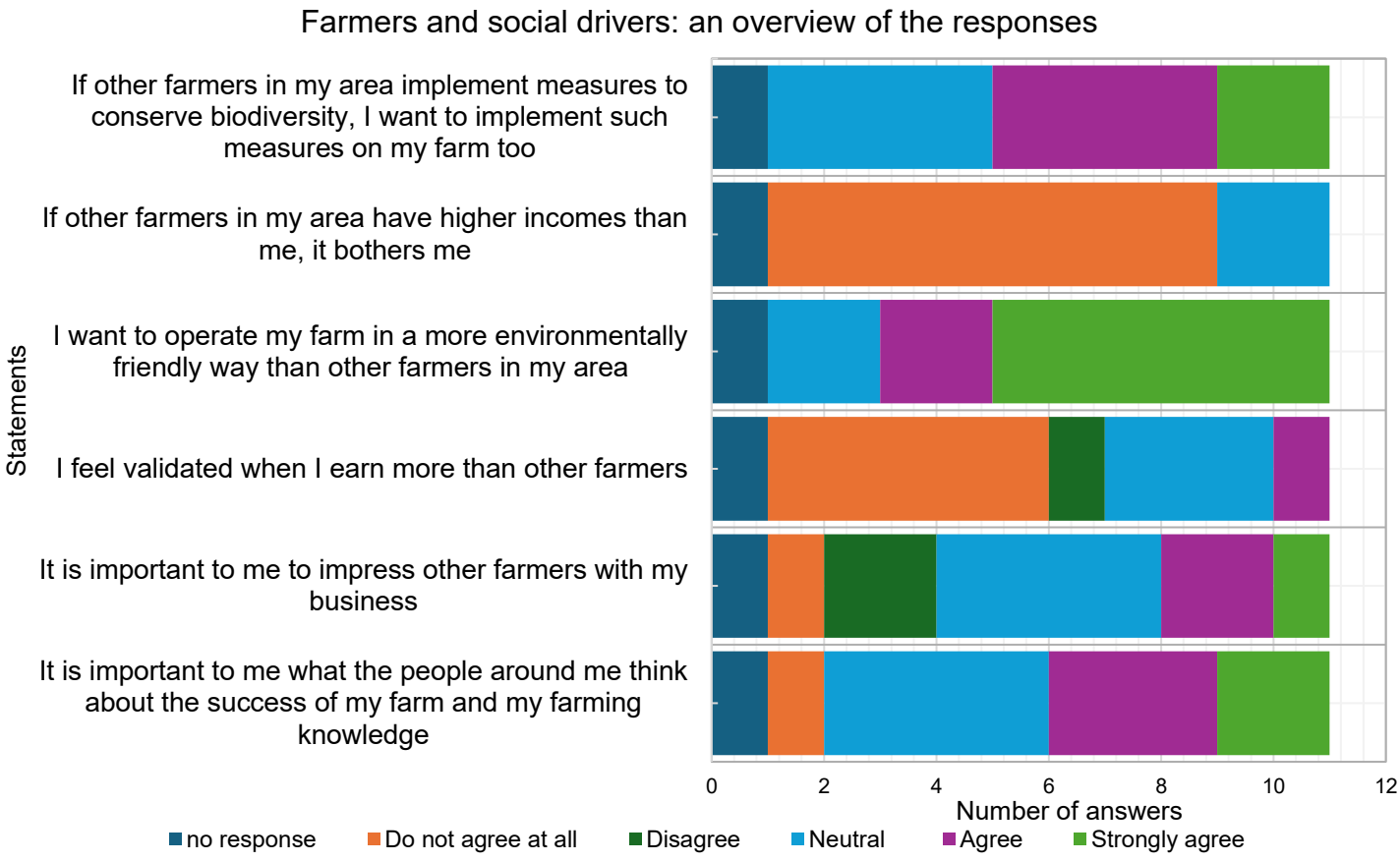

Figure 5 - Farmers' responses on social drivers

In the third section, the farmers were primarily asked questions on the topic of production orientation, which they then responded to. Figure 6 displays the distribution of responses to questions on production orientation. Best farming practices and the prevention of future challenges are particularly relevant to farmers in this context. The topic of sustainability and biodiversity is also relevant to farmers in the context of production orientation. Ten farmers strongly agreed with the statement, "Contributing to a healthy environment." Nine participants also strongly agreed with the statement, "Preventing future problems." In contrast, the farmers had a neutral attitude toward the question about traditions. Most of the responses were categorized as "Neutral." The interviewees considered biodiversity to be of particular significance: eight farmers selected "Strongly agree" in response to the statement "Maintaining a high level of biodiversity in my fields." Long-term soil fertility was another high priority for the participants (e.g., "Long-term increase in soil fertility on my agricultural land"). In contrast, they provided contrasting responses to the question, "Ensuring the highest crop yield." Three farmers chose "Disagree", while four participants agreed with the statement ("Agree").

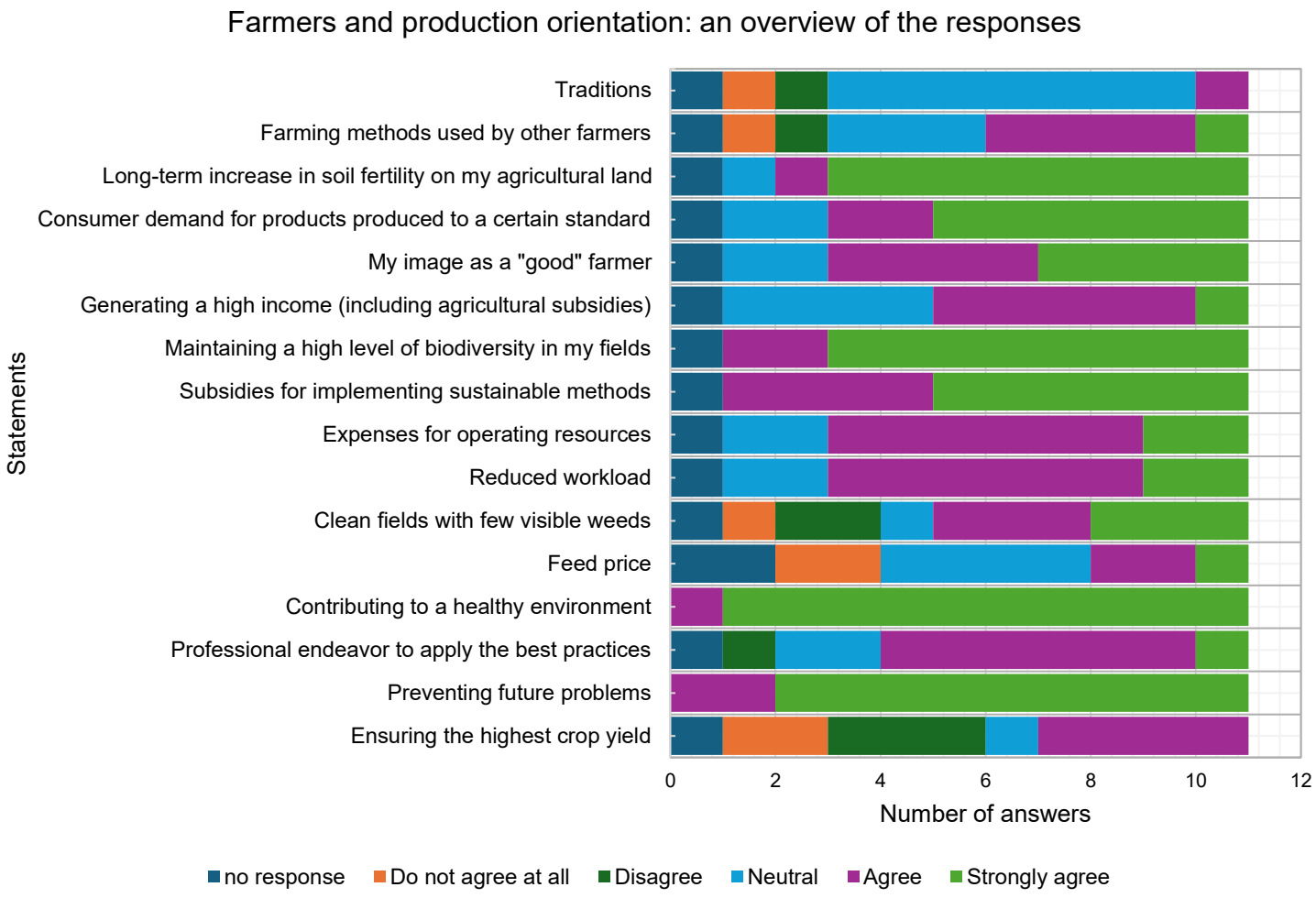

Figure 6 - Farmers on production orientation: results of the questionnaire

5. Discussion

The interviews conducted in the Seewinkel region indicate that most farmers have observed a decline in grassland areas. Many have reported a decrease in extensive grasslands in recent years. These observations are consistent with numerous studies that have documented a decline in grassland areas across Europe. A 2017 report by the European Environment Agency recorded a decline in grassland areas since the 1990s. Urban sprawl and changes in infrastructure are seen as the main contributors to this decline (Europäische Umweltagentur, 2017). Urbanization across Europe has reduced the size of many forms of landscape. Liu et al. (2020) documented that approximately 70 percent of agricultural land, followed by grassland at 12 percent, has been converted to urban areas since 1992.The study by Seto et al. (2012) provides similar results. According to this paper, land and therefore diversity are decreasing in order to accommodate the growing world population. The 2023 statistics recorded an increase in population in municipalities in urban areas. For example, the population of the district of Neusiedl am See grew by 10.5% between 2013 and 2023 (Statistik Austria, 2023). In this context, it should be noted that the majority of this increase occurred mainly in Parndorf and Neusiedl. (Statistik Burgenland, 2025).

Participants also reported a decrease in the quality of grazing and hay in the remaining areas. These observations are consistent with studies of the Seewinkel region. In recent years, there has been a general decline in livestock farming in Europe, especially in Austria (Popescu et al., 2022). Due to irregular precipitation and associated droughts, little feed could be obtained for livestock farming (Achs, 2021). Consequently, it is no longer economically viable for many farmers. A decrease in traditional grazing threatens grassland areas with increased scrub encroachment and potential reforestation (Zulka et al, 2022). Many interviewees also mentioned the economic challenges of managing grasslands. They reported rising costs and falling yields. These perceptions align with the conclusions of studies that explored the economic aspects of grassland management. According to King (2010), the limited profitability of these areas and agricultural policy have led to the abandonment of grassland. A study by the Federal Environment Agency et al. (2019) revealed similar outcomes. Many farmers consider the cultivation of

grassland unprofitable, which often leads to the abandonment of these areas (Umweltbundesamt et al.,, 2019).

A similar picture was revealed throughout the literature. Both the subjective observations of interviewed farmers and the scientific data show a decline in grassland areas in the Seewinkel region. This is in contradiction to the targets of the European Union, as the intention should be to preserve rural areas and natural landscapes (CAP At A Glance, 2024b). Consequently, there has been a decline not only in potential grazing land but also in niche habitats in these agricultural areas (Europäische Umweltagentur, 2017). This is confirmed in a report by Metera et al. (2010). Expansion of grazing has been shown to increase diversity in grasslands.

During the interviews, various drivers were identified as explanations for the changes observed by farmers in grassland areas. The economic driver was at the centre of this discussion. One participant expressed how important subsidies are for farmers to be able to operate economically. This can also be confirmed by the statement of one participant, who affirmed that he would only implement nature conservation measures if he did not suffer any economic damage. Participants reported that economic variables primarily influence the changes observed. This is confirmed when examining relevant literature. Farmers face many financial risks, such as the cost of implementing new technologies, ensuring their yield, and participating in agri-environmental programs that promote environmentally friendly practices (Dessart et al., 2019). Bernini and Galli (2024) described how financial subsidies from environmental agriculture programs influence farmers' decisions. They demonstrate that economic security plays a pivotal role in farmers' decision-making processes. If there is little profit for the farmers, it is all the more difficult to do additional work for nature conservation. You have to maintain your farm and at the same time invest money to promote such nature conservation activities (Ahnström, 2009). The farmers' statements align with the current state of research. Maintaining the farm and, consequently, the grassland areas is the top priority for those who were surveyed. Most farmers believed that politics significantly influence changes in grassland management. Consequently, politics are an instrumental driver of change in grasslands. Framework conditions change, particularly when there are leadership changes at the governmental or regional level, as those involved have different approaches to protecting grassland areas. Therefore, it is an influential driver when it comes to changes in grassland areas. Subsidy programs, such as ÖPUL, contribute to positive changes in

grasslands. Politicians primarily develop and promote these subsidy programs. Subsidies provide financial support for farmers and are implemented through EU agricultural policy in each country. The ÖPUL program offers financial subsidies for environmentally friendly management practices. These subsidies are an important source of income for farmers (Bundesanstalt für Bergbauernfragen et al., 1999). Without these subsidies, many farmers would be unable to continue managing their farms because the products they sell do not generate enough income for them to survive. They have to rely on these payments and thus have to follow agricultural policy and its decisions, giving up some of their freedom of personal choice. The literature also mentions compliance with regulations and increasing agricultural bureaucracy as important issues for farmers in discussions about agricultural policy (Baurenhas, 2021). A great deal of new paperwork has been imposed on farmers as a result of political requirements. In some cases, farmers are being asked to adopt new patterns of environmental management behaviour and thus to question themselves (Ahnström, 2009). This frustration can also be detected in the interviews. If there is little profit for the farmers, it is even more difficult to do additional work for nature conservation. You have to maintain your farm and at the same time invest money to promote such nature conservation activities (Ahnström, 2009). This can also be confirmed by the statement of one participant, who affirmed that he would only implement nature conservation measures if he did not suffer any economic damage.

In the generally arid region of Seewinkel, farmers repeatedly mentioned climate as a key driver of change in grassland management practices. They identified irregular precipitation and limited water availability as major challenges. It has been reported that the quantity and quality of hay have been negatively affected by decreasing rainfall in recent years. Climatological data from Burgenland confirm this; 11% more precipitation was recorded in 2024 than the long-term average. The lowest amounts were measured in Seewinkel, where only 591 mm of precipitation fell. Additionally, sunshine duration has increased by 18% since the 1980s in Neusiedl am See (Orlik et al., 2025). The effects of climate change include changes in precipitation and temperature, as well as an increase in evapotranspiration. These changes alter the growing season, influencing water management, particularly in cropland and fruit cultivation. Water demand and availability are changing (Bundesministerium für Landwirtschaft, Regionen und Tourismus, 2021). One farmer emphasized that he had to extract more water to counteract the drought. As with the numerous drainage measures previously carried out on the salt pans in

Seewinkel, increasing groundwater extraction for irrigation is now also resulting in a lower groundwater level. Forecasts of climate change in the Seewinkel region predict rainy winters and very dry summers and autumns. For example, in future autumn periods, precipitation in the region is expected to decrease by 25 %. This will increase evaporation, which is also intensified by strong winds. These conditions will further reduce the water level through additional withdrawals from Lake Neusiedl (Zimmermann-Timm & Teubner, 2021).

In connection with rising temperatures, an increase in parasites in Austria was mentioned. One interviewee noted that parasites that were previously only found in warmer regions are now being encountered in the Seewinkel area. This has forced them to use more pesticides to control the problem. Studies confirm these observations by Seewinkel farmers. Morgan and Wall (2009) reported that warmer temperatures enable certain parasite species to spread geographically. Climate change is also expected to lead to an increased abundance and extended duration of these parasites in the coming years, as warmer temperatures allow them to complete their reproductive cycle more frequently. Many parasites are limited in their development by cold temperatures. Climate change can alter this (Cammell & Knight, 1992). To counteract this, an increased use of pesticides is expected and has already been observed in the form of higher doses and more frequent use (Delcour et al., 2014).

Climate change and its potential consequences are important topics of discussions among farmers in the Seewinkel region. While some farmers view climate change as a significant driver of changes in grassland areas, others are very critical of this idea. One farmer who was surveyed noted that changes in the weather are natural and that there is a great deal of hysteria among the population. He sees no changes and does not believe they are connected to climate change. This scepticism is common among Austrian farmers. Other studies of Seewinkel farmers also revealed scepticism about climate change and its effects. For many farmers, droughts are a defining characteristic of the Seewinkel region (Achs 2021). In their research, Mitter et al. (2019) referred to them as "climate change fatalists." These farmers expressed negative views on climate change and blamed consumers and governments for the issue. They view the future as extremely challenging for farmers.

The role of modern technologies, for example more efficient mowers, should also be included in the context of possible drivers influencing grassland management. The

majority of participants agreed on the technological developments but see varying degrees of importance of these developments when it comes to changes in grassland. The technological development is seen by many participants as an influencing driver, especially when it comes to increasing efficiency and optimizing mowing. Modern machines make it possible to manage their land faster and more efficiently. More technologically advanced mowing tools can mow more area in less time, which is particularly valuable for hay and straw production. These tractors can transport more hay and straw than would be possible for individual small farmers. Since the 1960s, technological advances have improved the herbage quality (Hopkins & Wilkins, 2006). But one of the most significant developments in agricultural technology is precision technology. GPS-controlled tractors allow farmers to work their fields more efficiently, conserve resources, and operate more sustainably. These tractors can reduce the required time, pesticides, and fertilizers, resulting in a more sustainable economy (Abdul-Rahaman et al., 2020; Rock, 2023). Due to the increase in food production with limited resources, modernization is unavoidable (Khan et al., 2021). However, as the increasing expenses, which have also been caused by mechanization, have to be covered, many farmers are shifting away from grassland management and towards more profitable alternatives. Adapted production strategies are necessary to avoid possible uncertainties in the supply of the farm and society (Helbling, 2021). However, it became clear in the interviews that the use of advanced technology has not yet been implemented across all farms. According to Kroupová et al. (2024), the main reason for this is investment costs, which pose a particular challenge for small and medium-sized farms. It was also noted that more cost-efficient solutions are required to achieve widespread adoption of technological advancements. Politicians can ease the financial challenges to facilitate the introduction of advanced agricultural equipment. This can be seen from the interviews and confirmed with the support of the study by Ahnström (2009). Due to their age, old machines are typically not in optimal condition for efficiently mowing grassland. It will be necessary to find a balance between progress and economy.

Following technological developments, the social element emerged as another significant driver of changes in grassland areas in the Seewinkel. Farmers primarily receive encouragement for their decision-making processes from two sources: Family and/or colleagues. Family members are primarily involved in land purchases, and farmers seek colleagues' opinions and ideas through regular discussion groups (Hayden et al., 2021).

During the interviews, it became evident that most farmers acknowledge the influence of social structures on their decision-making processes. The study by Niranjan et al. (2022) confirms that, in principle, farmers value the opinions of their colleagues more than those of their family members. The self-completion questionnaire administered at the end of the interviews confirmed that colleagues' activities influence the decisions of the farmers. During the interviews they described that especially small-scale farmers do not establish new technologies until some of their competitors or colleagues use these new methods on their respective farms, as they would rather avoid the risks. Vanslembrouck et al. (2002) summarized that farmers are influenced by their neighbours' actions. They are more likely to participate in agri-environmental programs if their neighbours and colleagues are already doing something similar. The self-completion questionnaire also showed that the majority of farmers do not consider their colleagues' income to be of importance, but they would prefer to work in a more environmentally friendly way than their colleagues. Additionally, farmers emphasized that larger farms have greater influence due to their more stable financial resources, particularly in the context of social connections. Their views often carry more weight in the farming community. Existing studies suggest that farm size is crucial when promoting sustainable practices (Ren et al., 2019).

The problem of farm succession was emphasized in the social context. It is a significant challenge for many farmers because it is becoming increasingly difficult to find someone to take over their farm. Many of the interviewees agreed that a partner or children with similar interests are needed to ensure farm succession. In the Western world in particular, family-based farm succession is still an important aspect of agriculture. A farm succession is not a single event, but rather a process that should be planned over a long period of time to best prepare the successor. Taking over the management of a farm is often seen as a way to renew the family farm and counteract the increasing age of practicing farmers (Lobley et al., 2010). The aging of farmers and the difficulty of ensuring farm succession are seen as challenges to implementing changes in management practices (Jin et al., 2024; Fischer & Burton, 2014). As farmers age, they become less willing to implement new management practices and become more apprehensive about potential risks (Gómez-Limón et al., 2003). However, politicians can address this issue by supporting new practices. Additionally, farm succession can be an important tool for politicians as it can influence farmers' behaviour (Lobley et al., 2010). To motivate a young generation of

potential farmers, Unay-Gailhard and Brennen (2022) recommend politicians to intervene with measures, such as digital career communication. Jin et al. (2024) also suggest interactive consultations and financial support to motivate young people.

The influence of cultural values and the population's perceptions on agricultural practices in grassland management was also discussed in the interviews. Participants felt that society's perceptions, particularly regarding environmental protection, animal welfare, and sustainable practices, influence changes in management. This view aligns with studies researching the impact of social perceptions on agricultural practices. In modern societies, environmental awareness and the concept of sustainability are becoming increasingly important as the economy develops (Inglehart, 1977). Bussler et al. (2024) summarized that the higher social classes live less sustainably and that more attention should be paid to the increasing sustainability competence of more economically disadvantaged classes, for example in the areas of agroecology or sustainable resource management, as this is usually their source of income and therefore, they are environmentally conscious (Davey, 2009). In particular, the younger generation is showing an increased interest in the environment. According to the participating farmers, this interest is leading the younger generation to consume more consciously, as well as to promote and demand sustainable agriculture. However, existing studies present a different view. While age certainly correlates with environmentally conscious behaviour, this correlation is more evident in the older generation. For instance, Shen and Saijo's (2008) study found that older generations particularly support environmentally conscious behaviour, which they attribute to parents' care for their children. In a survey of young Danish students, Benn (2004) found that students of all ages hope technological progress will solve environmental problems. Cantillo et al. (2025) came to a similar conclusion. Their results described an increase in pro-environmental behaviour, particularly among Baby Boomers (born between 1946 and 1964) and Generation X (born between 1965 and 1980). To stimulate the interest of younger generations, more efforts must be made, such as through social media. This is one approach to ensuring that reliable information about the environment is communicated.

At the same time, some farmers expressed frustration regarding social expectations. Some interviewees expressed frustration about the public's lack of understanding of the challenges farmers encounter daily. These findings align with those of Wheeler et al. (2021), who described that farmers often feel the general public underestimates their

profession and the pressures they experience. Farmers also often feel pressured by the media. They are often considered responsible for climate change or animal cruelty. This sentiment was also evident in the interviews. The increasing specialization and mechanization of agriculture is changing society's perception. People lack knowledge of farmers' production practices (Berkes et al., 2021). Migration from rural areas to urban centres has also distanced farmers from the non-agricultural population (Stevens et al., 2018; Regan & Kenny, 2022). Now, consumers only have access to information about agriculture via supermarkets, food retailers (Morgan et al., 2017), the media, and advertising. This provides a romanticized view of agriculture (Riley & Robertson, 2021) that can be problematic when confronted with the reality of agricultural practices (Hötzel et al., 2017). A multitude of social media channels can improve communication between farmers and consumers, thereby improving the debate on agricultural practices (Regan & Kenny, 2022). However, numerous studies also demonstrate that the public generally has a positive view of agriculture and recognizes its role in providing goods (Howley et al., 2013; Shortall, 2006). These contradictory data demonstrate that the public's perception is multifaceted and influenced by elements such as media consumption, education, and personal experiences. This highlights the importance of fostering dialogue among the parties to better integrate sustainability (Regan & Kenny, 2022).

The self-completion questionnaire showed that most participants considered global, regional, and local biodiversity vital, including for their own farms. The interviews with farmers regarding changes in diversity and their drivers suggested that many participants perceived drastic changes, such as a decrease in biodiversity of flora and fauna. They see climate change as the most important driver of these changes. They have particularly observed heat waves and drought in recent years, which aligns with the findings of the APCC (2014). This study shows that increasing droughts and heat waves will reduce yield potential in areas of Austria with less precipitation, such as the eastern regions. Prolonged dry periods can also reduce soil fertility and the water storage capacity of the soil. For permanent grassland to thrive, it's essential to ensure optimal precipitation distribution, leading to healthy growth and maximized biomass production. Sufficient and regular precipitation is needed during the summer months to ensure a high-yield crop. However, climate change is likely to drastically reduce this potential, resulting in significant regional differences. Soil properties and production techniques, such as fertilization and cutting frequency, also impact growth (APCC, 2014). The management of the region's land was

also mentioned in the interviews. Some farmers said that using fertilizers, increased water demand, and how they manage the land cause changes in biodiversity. For example, grazing significantly influences the species that inhabit the land. Cao et al. (2023) came to the same conclusion. In their meta-analysis, they found that grazing affects plant biomass development, with the above-ground parts of plants reacting more sensitively than the below-ground parts. They also said that, excluding climate types and grazing patterns, only excessive grazing impacts biodiversity.

The self-completion questionnaire shows that farmers consider the conservation of biodiversity on their land to be an important issue. During the interviews, the farmers were asked about the measures they were taking to protect biodiversity. For instance, one farmer mentioned planting only trees accustomed to warmer temperatures, thus taking action in the context of climate change. Cultivating drought- or heat-resistant species is one of the agricultural adaptation measures (APCC, 2014). Mixed grazing is also considered a measure that increases biodiversity. It has been shown to increase plant diversity and the abundance of herbivorous insects (Su et al., 2023). In their study, mixed grazing weakened soil nematode richness, but soil nitrogen and nematode abundance remained the same. The study also emphasized the influence of cattle compared to sheep in the context of mixed grazing for sustainable grassland management (Su et al., 2023). One participant also discussed the change to less intensive, biodiversity-friendly management. According to the study by Fekete et al. (2024), reducing mowing frequency and avoiding chemicals improves grassland quality. Improving irrigation technology, soil-conserving agricultural practices, and monitoring systems should also have a positive effect (APCC, 2014) and can be beneficial. Many farmers expressed uncertainty about their knowledge of flora and fauna in the interviews, emphasizing the need for experts in this area. According to Petermann and Buzhdygan (2021), low- to moderate-intensity grazing and mowing are the most effective methods for increasing biodiversity and carbon sequestration. The interviews also mentioned the removal of invasive species, which is consistent with the Petermann and Buzhdygan (2021) study. In conclusion, more guidance for farmers and additional research are necessary to develop sustainable strategies for protecting and enhancing biodiversity in grassland areas.

By discussing the possible drivers in the interviews, the challenges and opportunities for farmers and society became clear. The self-completion questionnaire showed that most participants are aware of the challenges and want to prevent them and contribute to a

healthy environment. The discussions revealed the biggest challenges for farmers. These include climate change as well as economic challenges. Farmers view climate change as one of the greatest challenges to the future of agriculture. Small scale farms, in particular, could be forced to give up their farms as a result. They have fewer reserves and opportunities to rebuild their businesses after extreme weather events. They experience the effects of droughts, floods, and water stress on their livestock and crops more quickly, forcing them to give up their farms (International Fund for Agricultural Development [IFAD], 2014). Extreme weather events pose a challenge to farmers because they limit the amount of available water. One interviewee sees this as a particular challenge in the Seewinkel region. Efficient irrigation systems combined with crop rotation led to the best results in adapting agriculture and reducing groundwater extraction in the Seewinkel region (Cotera et al., 2023; Sahu et al., 2022). In addition to the challenges posed by climate, farmers also highlighted economic challenges. In this context, the farm's viability was mentioned. Many farmers expressed concerns about potential profits, particularly from grassland areas. The economic value of grassland and its products is often unclear. Above all, it is economically profitable through animal nutrition, energy production, and land leasing. In addition to monetary benefits, there are also non-marketable products, such as soil and environmental protection (Nábrádi, 2007). Farmers are also facing higher expenses due to increased production costs. Rising energy costs have also impacted the price of fuel and fertilizer, causing problems for farmers in recent years (McBride, 2012).

The participants also consider politics to be an additional challenge in the years ahead. Many farmers find the growing list of regulations and restrictions within agri-environmental programs disruptive. Some fear that political intervention will increase in the coming years, which they believe could affect farmers' economic existence, as the regulations could affect their competitiveness in national and international markets. At the beginning of 2024, there were protests from farmers across Europe calling for a change in the direction of European agricultural policy, particularly regarding the recent revision of the Common Agricultural Policy (2023-2027 CAP) (Mennig, 2024). This demand was accompanied by several issues that concerned farmers. The discussion included farm prices, environmental regulations, and imports that do not meet EU standards (Matthews, 2024). Farmers are confronted with EU-wide and national regulations (Vik, 2020), yet they ultimately earn insufficient profit (Kröner et al., 2025). Measures were subsequently adopted at short notice to stop the protests. For instance, some environmental initiatives

were eased and import restrictions were imposed on products from countries including Ukraine. Additionally, a strategic dialogue was initiated among stakeholders to discuss the future of agriculture (Mennig, 2024; European Commission, 2025).

The interviews showed that many farmers view increased social awareness as an important opportunity to better face future challenges. In this context, improving the image of agriculture was a key issue. Some interviewees said they often feel stigmatized as polluters and animal abusers, which diminishes their motivation to farm sustainably. Healthier practices are often not financially compensated, for example, through higher prices. Social, political, and public framework conditions make it difficult for farmers to invest in healthier practices because subsidies often cannot offset the risk of investing in more sustainable practices. Increasing the population's knowledge gives them the opportunity to advocate for farmers and make better decisions as consumers (Levay et al., 2019). The research of Van Bussel et al. (2022) shows that consumers lack key knowledge, particularly regarding the sustainability of food. Currently, consumers prioritize price, taste, and personal health over the sustainability of production. The population knows little about farmers' practices or the environmental and economic effects of agriculture (Levay et al., 2019). Studies emphasize the importance of communication between the public and the agricultural community to educate people about the problems farmers face and to raise awareness of their practices (Riley & Robertson, 2021b; Rodak, 2015; Regan & Kenny, 2022b). According to a report by the OECD (2019), educating the population is a valuable tool for improving the environmental performance of the agricultural sector at low cost. However, when it comes to education, farmers also need to be involved. One approach is to inform them of the long-term consequences of their current practices and introduce them to possible resource-saving methods (Levay et al., 2019). According to some interviewees, another approach is for farmers to exert political influence themselves. Several interviewees expressed a willingness to contribute their practical knowledge to the political decision-making process. Farmers' daily experiences in the field are unique. However, they are rarely given the opportunity to incorporate this knowledge into the decision-making process for political framework conditions. Insights from farmers can significantly impact the design of research and policy (Levay et al., 2019). The interviewees also described strengthening regional agriculture as a way of supporting farmers. Many people only consider importing goods necessary for products that are unavailable or limited in Austria. They believe this

strengthens regional agriculture. The study by Tay et al. (2024) said that, from an ecological point of view, supporting regional agriculture reduces the carbon footprint of transportation and promotes sustainable practices, such as avoiding chemicals. It also creates a fair system in which local farmers receive support and consumers have access to fresher products.

The interviews showed that farmers have many strategies for managing changes in grassland. Examples include bringing agricultural expertise into political decision-making, supporting regional products, raising social awareness, using resources efficiently, and providing better financial support. Long-term profitability and sustainability in the agricultural sector can be achieved by combining sustainable practices, innovations, and consumer interests (Costea et al., 2023).

6. Conclusions and Outlook

The insights of the farmers gained in the interviews made it clear that there is a complex picture of perceptions of changes in grassland. A multitude of changes have been observed, both positive and negative. These changes include time management improvements, alterations in agricultural practices, and a decrease in grassland areas due to the expansion of urban areas. These changes can be attributed to a combination of external drivers, such as policy, environmental concerns, and economic dynamics, as well as internal drivers, including farmers' perspectives, attitudes, and the influence of peers on their practices. The most pressing concern for farmers is the future of grassland under a changing climate. Political conditions and economic concerns will also affect farmers' daily activities in the future. These developments will create both challenges and opportunities for the agricultural community. It is essential to educate the population as well as provide necessary assistance to farmers. Improving and expanding the dialogue between the agricultural community, politicians, economic experts, and scientists is also vital to finding new solutions to these challenges. The framework conditions require adjustment to balance economic, ecological, and social aspects. More resource-efficient technologies can help farmers withstand climate change. It is therefore imperative to consider the aforementioned influencing drivers, both internal and external, in their full complexity and to incorporate them into decision-making processes.

In conclusion, it must be acknowledged that further studies on the possible long-term effects of the drivers are necessary in order to gain a more comprehensive, long-term overview of the challenges and thus develop sustainable strategies.

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8. Appendix

Abstract German

Die Grünlandbewirtschaftung im Seewinkel steht vor einer Vielzahl von Herausforderungen, zu denen sowohl soziologische als auch wirtschaftliche Faktoren gehören. Es sind Veränderungen bei den Erträgen und der biologischen Vielfalt zu beobachten. Ziel dieses Papiers ist es, die Ansichten und Vorschläge der örtlichen Landwirte darüber darzustellen, wie eine nachhaltige Bewirtschaftung in der Region Seewinkel im Einklang mit den wirtschaftlichen Interessen erreicht werden kann. Dazu wurden die folgenden Forschungsfragen gestellt: *Welche sozialen, politischen, wirtschaftlichen, ökologischen, technischen und kulturellen Faktoren beeinflussen die Bereitschaft der Landwirte, biodiversitätsfördernde Maßnahmen auf dem Grünland durchzuführen und die Grünlandflächen im Seewinkel auszuweiten? Welche Herausforderungen und Chancen sehen die Landwirte für den Erhalt oder die Ausweitung der extensiven Grünlandbewirtschaftung sowie der Grünlandflächen im Seewinkel?*
Zur Beantwortung dieser Fragen wurde eine qualitative Studie mit halbstrukturierten Interviews mit Landwirten aus dem Seewinkel durchgeführt. Die Aussagen der Landwirte wurden anschließend kodiert und ausgewertet. Die Ergebnisse zeigen, dass die Meinung der Landwirte in der Gesellschaft ein besonders einflussreicher Faktor ist. Auch die politischen Rahmenbedingungen gelten bei den Landwirten als entscheidender Einflussfaktor. Angesichts des fortschreitenden Klimawandels kann der Erhalt von Grünlandflächen und deren Wirtschaftlichkeit nur durch eine bessere Zusammenarbeit der relevanten Akteure gemeistert werden. Eine bessere Einbindung der Landwirte wird für zukünftige Initiativen empfohlen.

Schlüsselworte: Grünlandmanagement, Naturschutz, Klimawandel, Seewinkel, Agrarpolitik, Landwirt

Semi-structured interview guide

Befragter:

Forschungsfragen:

- Wie wirken sich soziologische, ökonomische und biophysikalische Faktoren auf die Bereitschaft der Landwirt*innen im Seewinkel aus, extensive Grünlandflächen zu erhalten bzw. zu erweitern?
- Welchen Herausforderungen begegnen Landwirt*innen im Seewinkel bei dem Erhalt und der Erweiterung von extensivem Grünland und der Umsetzung von Naturschutzauflagen?
- Welche Möglichkeiten sehen Landwirt*innen im Seewinkel in den kommenden 20 Jahren für den Erhalt bzw. der Ausweitung von Grünlandflächen?

Einstieg:

- Begrüßung des Gesprächspartners
- Kurzer Umriss des Themas, das beim Interview behandelt werden soll
- Beschreibung des Ablaufs des bevorstehenden Interviews
- Datenschutzvereinbarung für den Schutz der persönlichen Daten

Einstiegsfragen

Frage (Erzählaufforderung)	Notizen
Inwiefern haben sich Ihre Ansicht nach Ihre Grünlandflächen in den vergangenen 20 Jahren verändert? (Optional bei jüngeren Landwirt*innen: Wie haben sich Ihrer Meinung nach als junge/r Landwirt*in, der bereits seit seiner Kindheit durch Erzählungen Einblicke in die Bewirtschaftung des Hofes erhalten hat, Ihre Grünlandflächen in den vergangenen 20 Jahren verändert?	
Wie hat sich Ihre Bewirtschaftung dieser Flächen in diesem Zeitraum verändert?	
Inwieweit haben Sie Veränderung bezüglich der Artenvielfalt auf Ihren Grünlandflächen in den letzten 20 Jahren beobachtet?	
Haben Sie auch Naturschutzflächen?	
Wenn ja: Inwieweit haben Sie Veränderungen bezüglich der Artenvielfalt und dem Zustand Ihrer Naturschutzflächen (z.B. bezüglich Ertrag) im Vergleich zu Ihren anderen Flächen in den letzten 20 Jahren beobachtet?	

Treiber/Faktoren

Frage (Erzählaufforderung)	Notizen
Welche Faktoren haben Ihrer Ansicht nach die Veränderungen in Ihren Grünlandflächen beeinflusst, also in Bezug auf das Flächenausmaß, Ihrer Art der Bewirtschaftung und den Zustand/der Qualität (zB Ertrag) der Flächen?	
Vertiefungsfrage zu Faktoren: Wie haben die folgenden Faktoren diese Veränderungen in Ihren Grünlandflächen beeinflusst? Checkliste (jeden Punkt abfragen) o wirtschaftlich (Beispiel: Nachfrage, Bewirtschaftungskosten, (Natur)tourismus) o sozial (Beispiel: Beziehungen mit Familie, Ansichten oder Bewirtschaftungspraktiken von Kollegen) o kulturell (Ansichten/Werte der Kunden/ allgemeinen Bevölkerung) o technische Faktoren (zB Maschinen zur Grünlandbewirtschaftung) o politisch (Beispiel: Förderhöhen/auflagen, Naturschutzauflagen) o Umwelt (Luft, Wasser, Boden/Bodenqualität)	
Vertiefungsfrage zu Klima: Inwieweit haben Veränderungen im Klima (Temperatur- und Niederschlagsveränderungen) die Veränderungen Ihrer Grünlandflächen beeinflusst?	
Welche Faktoren haben Ihrer Ansicht nach die Veränderungen der biologischen Vielfalt beeinflusst?	
Inwieweit haben die Veränderungen der biologischen Vielfalt die Art und Weise wie Sie die Grünlandflächen bewirtschaften beeinflusst?	
Was ist Ihrer Ansicht nach Ihre Rolle als Landwirt*in bei den Veränderungen der biologischen Vielfalt?	
Welche Bewirtschaftungsmaßnahmen sind aus Ihrer Sicht am geeignetsten, um die biologische Vielfalt auf Ihren Grünlandflächen zu erhalten/erhöhen und gleichzeitig die Wirtschaftlichkeit Ihres Betriebes aufrecht zu erhalten?	

Zukunftsaussichten

Frage (Erzählaufforderung)	Notizen
Welche Entwicklungen erwarten Sie für Ihre Grünlandflächen in den nächsten 20 Jahren?	
Wie denken Sie werden sich die Grünlandflächen in Bezug auf die Größe, die Bewirtschaftungsart und die Erträge verändern? Inwiefern werden hier Naturschutzflächen bzw. die Entwicklungen der biologischen Vielfalt eine Rolle spielen?	
Welche der zuvor genannten Faktoren (oder zusätzliche/neue Faktoren) stellen Ihrer Ansicht nach die größten Herausforderungen und Risiken dar im Hinblick auf (Checkliste, jeden Punkt abfragen) a) den Erhalt/Ausweitung Ihrer Grünlandflächen? b) die extensive Bewirtschaftung Ihrer Grünlandflächen? c) der Einhaltung von Auflagen für Naturschutzflächen/ Ausweitung Ihrer Naturschutzflächen und Maßnahmen zum Schutz der biologischen Vielfalt?	
Wie könnte die Politik, die Wirtschaft oder die soziale Gemeinschaft Sie unterstützen, um die Herausforderungen zu dämpfen und Chancen zu fördern? Welche konkreten Maßnahmen fallen Ihnen dazu ein?	

Ausblick:

- Information über das weitere Vorgehen geben
- Verabschiedung von Befragten

Self-completion questionnaire

Befragter: Fragebogen Nr.:

Persönliche Einstellung: Biodiversität

	Stimme überhaupt nicht zu	Stimme nicht zu	Neutral	Stimme zu	Stimme sehr zu
Der Rückgang der biologischen Vielfalt ist weltweit ein Problem	○	○	○	○	○
Der Rückgang der biologischen Vielfalt ist ein Problem für meine Region	○	○	○	○	○
Der Rückgang der biologischen Vielfalt ist ein Problem für meine Produktion	○	○	○	○	○
Die globale biologische Vielfalt ist für mich wichtig	○	○	○	○	○
Lokale/regionale biologische Vielfalt ist wichtig für mich	○	○	○	○	○
Die biologische Vielfalt auf meinem Betrieb ist wichtig für mich	○	○	○	○	○

Persönliche Einstellung: soziale Faktoren

	Stimme überhaupt nicht zu	Stimme nicht zu	Neutral	Stimme zu	Stimme sehr zu
Es ist mir wichtig, was die Menschen um mich herum über den Erfolg meines Betriebs und meine landwirtschaftlichen Fähigkeiten denken	○	○	○	○	○
Es ist mir wichtig, andere Landwirt*innen mit meinem Betrieb zu beeindrucken	○	○	○	○	○
Ich fühle mich bestätigt, wenn ich mehr verdiene als andere Landwirt*innen	○	○	○	○	○
Ich möchte auf meinem Hof umweltfreundlicher produzieren als andere Landwirt*innen in meiner Umgebung	○	○	○	○	○
Wenn andere Landwirt*innen in meiner Umgebung mehr verdienen als ich, stört mich das	○	○	○	○	○

Wenn andere Landwirt*innen in meiner Umgebung Maßnahmen zur Erhaltung der biologischen Vielfalt durchführen, möchte ich solche Maßnahmen auch auf meinem Betrieb durchführen	◯	◯	◯	◯	◯

Persönliche Einstellung: Produktionsorientierung

Wie wichtig sind die folgenden Kriterien für Ihre Entscheidungsfindung? Bitte wählen Sie die zutreffende Antwort für jeden Punkt aus:

	Gar nicht wichtig	**Nicht wichtig**	**Neutral**	**Wichtig**	**Sehr wichtig**
Sicherstellung des höchsten Ernteertrags	◯	◯	◯	◯	◯
Vorbeugung künftiger Probleme	◯	◯	◯	◯	◯
Professionelles Bestreben, die besten Praktiken anzuwenden	◯	◯	◯	◯	◯
Beitrag zu einer gesunden Umwelt	◯	◯	◯	◯	◯
Preis des Futters	◯	◯	◯	◯	◯
Saubere Felder, (wenig Unkraut sichtbar)	◯	◯	◯	◯	◯
Verringerung meiner Arbeitsbelastung	◯	◯	◯	◯	◯
Kosten für Betriebsmittel	◯	◯	◯	◯	◯
Subventionen für die Umsetzung nachhaltiger Methoden	◯	◯	◯	◯	◯
Erhaltung einer hohen Artenvielfalt auf meinen Feldern	◯	◯	◯	◯	◯
Erzielung eines hohen Einkommens (einschließlich landwirtschaftlicher Förderungen)	◯	◯	◯	◯	◯
Mein Image als "guter" Landwirt / "gute" Landwirtin	◯	◯	◯	◯	◯
Nachfrage der Verbraucher nach Produkten, die mit einem bestimmten Standard produziert werden	◯	◯	◯	◯	◯

Langfristige Steigerung der Bodenfruchtbarkeit auf meinen landwirtschaftlichen Flächen	◯	◯	◯	◯	◯
Bewirtschaftungsmethoden anderer Landwirt*innen	◯	◯	◯	◯	◯
Traditionen	◯	◯	◯	◯	◯

Angaben zur Person:

a) Mit welchem Geschlecht identifizieren Sie sich:

o weiblich
o männlich
o divers

b) Wie alt sind Sie?

o 18-25 Jahre
o 26-35 Jahre
o 36-45 Jahre
o 46-55 Jahre
o 56-65 Jahre
o 66 Jahre oder älter

c) Was ist Ihre höchste landwirtschaftliche Berufsausbildung?

o Ausschließlich praktische land- und forstwirtschaftliche Erfahrung
o Ausbildung zu Facharbeiter*in in der Landwirtschaft
o Ausbildung zu Meister*in in der Landwirtschaft
o Matura (Land- und Forstwirtschaft, zB HBLFA)
o Fachhochschule, Hochschule oder Universität mit landwirtschaftlichem Studienschwerpunkt

o Andere:

d) Wie groß ist Ihr Betrieb in Hektar (Alle landwirtschaftlichen Flächen: Ackerland, Grünland, etc. ohne Wald)

e) Art der landwirtschaftlichen Produktion (z.B. Ackerbau, Viehzucht, Gemüseanbau, Weinbau)

f) Wie hoch ist die Zahl der in Ihrem Betrieb beschäftigten Personen in Vollzeitäquivalenten? (einschließlich mitarbeitender Familienangehöriger)

g) Sind Sie im Haupterwerb oder im Nebenerwerb mit Ihrem Betrieb tätig?