The Dynamics and Couses of Changes in Meadow and Natural Pasture Area in Klaipeda County

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Abstract

The comparative investigation utilized data from the Land Fund of the Republic of Lithuania spanning the years 2003 to 2023. In 2023, these areas in Klaipeda County encompassed 41,050.04 ha, accounting for 7.86 percent of the county's area. Over the period from 2003 to 2023, there was a decline of 141.05 ha or 0.34 percent in the overall area of meadows and natural pastures.

After analyzing alterations in the meadows and natural pasture areas within the municipalities of Klaipeda County, it was found that, over the span of two decades, the scrutinized areas expanded in four of the seven municipalities. Conversely, the remaining three experienced a decrease in their respective areas. Skuodas municipality experienced the most substantial decrease (1860,79 ha or 34.76 percent). In Silute municipality, the analyzed area decreased by 3,515.93 ha or 15.58 percent.

The largest expansion was identified in the municipalities of Klaipeda city (754.28 ha or 159.02 percent) and Klaipeda district (4,620.13 ha or 73.37 percent).

Key words: *Meadows and natural pasture, biodiversity, area change, causes of land change*

Anotacija

Lyginamajai analizei atlikti, remtasi Lietuvos žemės fondo 2003–2023 metų duomenimis. 2023 metais Klaipėdos apskrityje pievos ir natūralios ganyklos užėmė 41050,04 ha plotą ir sudarė 7,86 proc. nuo viso apskrities ploto. Nuo 2003 iki 2023 metų, pievų ir natūralių ganyklų plotas sumažėjo 141,05 ha arba 0,34 proc.

Nagrinėjant plotų kaitos duomenis savivaldybėse, nustatyta, kad 2003–2023 m. pievų ir natūralių ganyklų plotai didėjo keturiose iš septynių Klaipėdos apskrities savivaldybių. Trijose – minėti plotai mažėjo. Skuodo rajone pievų ir natūralių ganyklų plotas sumažėjo 1860,79 ha arba 34,76 proc., Šilutės savivaldybėje – 3515,93 ha arba 15,58 proc.

Didžiausia analizuojamų plotų plėtra vyko Klaipėdos miesto (754,28 ha arba 159,02 proc. ir Klaipėdos rajono (4620,13 ha arba 73,37 proc.) savivaldybėse.

Reikšminiai žodžiai: *pievos ir natūralios ganyklos, biologinė įvairovė, plotų kaita, plotų kaitos priežastys.*

Introduction

Researchers have reached a unanimous agreement that meadows are ecosystems consisting of one or more communities of non-woody plants, which rely on surface water and/or shallow groundwater. While some woody vegetation may be present, it is not the prevailing component (Goehring, 2023).

Grasslands stand out as the most species-rich habitats globally when considered on a smaller scale. Within a limited area of an expansive meadow, it's possible to encounter 50 to even 100 distinct plant species. The abundance of diverse flowers contributes to an increased variety of butterfly species. Traditional meadows also serve as an excellent habitat for numerous ground-nesting birds like whinchats and corncrakes. Minor alterations in management practices, such as changes in fertilization, can impact not only the subterranean ecosystem but also the biodiversity above the ground. Presently, we observe both an intensification of agricultural activities in favored regions and the abandonment of farming in less favorable ones.

Meadows exhibit significant heterogeneity as a habitat category, with variations influenced by factors such as elevation, mowing frequency, fertilization, substrate composition, exposure to sunlight, slope inclination, climate conditions, and the historical patterns of land use (Biodiversity Monitoring, 2023).

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Semi-natural meadows and pastures exhibit a high degree of species richness, hosting a diverse array of plant species, including many that are nationally rare and scarce, often exclusive to these specific habitats. Both semi-natural and agriculturally managed grasslands, whether semi-improved or improved, serve as essential habitats for a variety of invertebrates, birds, bats, and amphibians that are of conservation concern. This concern may arise from global threats or declining population numbers. When these grasslands are adjacent to moorlands, they become particularly valuable as feeding areas for birds that nest in the open, unenclosed land (Backsall, Manley, *et al*. 2001).

The international significance of specific plant and animal species found in meadows and pastures is acknowledged through their inclusion in the Habitats and Species Directive (1992).

Meadows assume a crucial role in mitigating the impacts of climate change-induced extreme conditions, such as megafires and intense heat. Functioning like natural sponges, meadows have the capacity to absorb and store water from precipitation and snow, gradually releasing freshwater during the summer and fall seasons. Robust meadows serve as effective barriers against wildfires, acting as fuel breaks, and contribute to maintaining lower water temperatures, thereby fostering healthier fisheries (Feather River…, 2024).

Meadows and pastures offer valuable advantages by serving as effective measures against erosion, safeguarding water resources, and supporting biodiversity. Additionally, these areas contribute to the preservation of medicinal plants and wild vegetables, further highlighting their multifaceted ecological importance (Koyuncu, Avci, 2021).

Meadows and grasslands stand out as crucial natural resources, representing cost-effective production sources that fulfill our requirements for animal nutrition. These areas not only meet the need for roughage, enabling animals to achieve high yields, but also play a vital role in sustaining agriculture and animal husbandry (Çalık, 2020).

The combination of intense mowing and grazing, along with practices like fertilization, drainage, and reseeding, can exert a significant and negative impact on grassland biodiversity across various trophic levels (Bucher, Andres, *et al*., 2016).

Semi-natural grasslands, such as hay meadows and pastures, have held considerable significance in European agriculture for millennia. However, over the past century, changes in land use, particularly agricultural intensification or abandonment, have led to a substantial decrease in the extent of these grasslands and an increase in their fragmentation. As a consequence, various types of semi-natural grasslands are now classified as red-listed habitats in the European Union (Bele, Svalheim, *et al.*, 2024).

The management of grasslands and pastures for biodiversity conservation presents dilemmas for applied ecologists. Excessive management runs the risk of causing land degradation and biodiversity loss, while insufficient management may result in the transition from grassland to woodland, leading to the loss of crucial grassland habitats. Striking the right balance becomes crucial in addressing these challenges (Bucher, Andres, *et al.*, 2016).

The intensive use of land for recreational, agricultural, and logistical purposes results in its transformation and degradation.

The subject of this article is the meadows and natural pasture areas in Klaipeda County.

The aim of this article is to investigate and understand the dynamics and causes behind the changes occurring in meadow and natural pasture areas in Klaipeda County.

Research Methodology

The research for this article employed various methods, including both theoretical and practical, to achieve its objectives. The theoretical part was prepared based on scientists' publications and conducted research. In the theoretical part, the importance of preserving meadows and natural pastures is revealed.

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A comparative approach was utilized to assess changes in meadows and natural pasture areas in Klaipeda County and its seven municipalities between years of 2003 and 2023.

The resulting alterations are presented in terms of both hectares and percentages, using data from the Land Fund of the Republic of Lithuania (Nacionaline..., 2003–2023).

To identify factors contributing to the decline in meadow and natural pasture areas, analytical and logical analysis methods were applied.

In order to augment the overall comprehensiveness of the study, a graphical method was incorporated as well. The inclusion of graphical representations not only aids in presenting the data in a more accessible manner but also adds a visual dimension to the analysis, fostering a deeper understanding of the observed trends.

The Results of the Study and Their Discussion

The present situation. As of 2023, based on the data from The National Land Service under the Ministry of Agriculture (2023), meadows and natural pastures in Klaipeda County occupied 41,050.04 ha, representing 7.86 percent of the county's total land area.

It should be noted that in the Republic of Lithuania, meadows and natural pastures constituted 5.55 percent of the total land area in 2023.

Examining the data in terms of hectares reveals that in 2023, the most extensive expanses of meadows and natural pastures were observed in Silute district (19,053.18 ha) and Klaipeda district (10,917.07 ha) municipalities. Conversely, the smallest areas were identified in Neringa municipality (22.08 ha) (Table 1).

Analyzing the data in percentages reveals that the majority of meadows and natural pastures are found in the municipalities of Palanga (19.32 percent) and Klaipeda (12.54 percent), with the least in the town of Neringa (0.16 percent).

Table 1. Meadows and natural pasture areas in ha and percent in municipalities of Klaipeda County in 2023
1 lentelė. *Klaipėdos apskrities pievų ir natūralių ganyklų plotai hektarais ir procentais, 2023 m.*

Municipalities of Klaipeda County	Meadow and nature pasture area in ha	Meadow and nature pasture area in percent
Klaipeda	1,228.59	12.54
Klaipeda district	10,917.07	8.25
Kretinga district	4,807.98	4.86
Neringa	22.08	0.16
Palanga	1,528.33	19.32
Silute district	19,053.18	11.32
Skuodas district	3,492.81	3.83

Source: compiled by authors (Nacionaline…, 2003–2023)
Šaltinis: sudaryta autorių (Nacionaline…, 2003–2023)

Alterations in the meadows and natural pastures in Klaipeda County between 2003 and 2023 (Fig.1). In 2003, the combined area of meadows and natural pastures in Klaipeda County amounted to 41,050.04 ha. Between 2003 and 2023, the total area of meadows and natural pastures decreased by 141.05 ha, equivalent to a reduction of 0.34 percent.

The largest decrease in the area of meadows and natural pastures was identified in 2008. When comparing 2003 to 2018, the area decreased by 9,058.11 ha or 21.99 percent.

The main causes for the decrease in the area of meadows and natural pastures include:

1. The expansion of urban areas leads to the conversion of natural landscapes into residential and industrial zones;

2. Modern farming practices, including large-scale monoculture and intensive farming, reduce the available space for natural grazing;

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3. Shifting land use patterns, such as deforestation or changes for other purposes, contribute to the decline in meadow and pasture areas;

4. Government policies and economic considerations influence land use decisions, affecting the preservation of meadow and pasture areas.

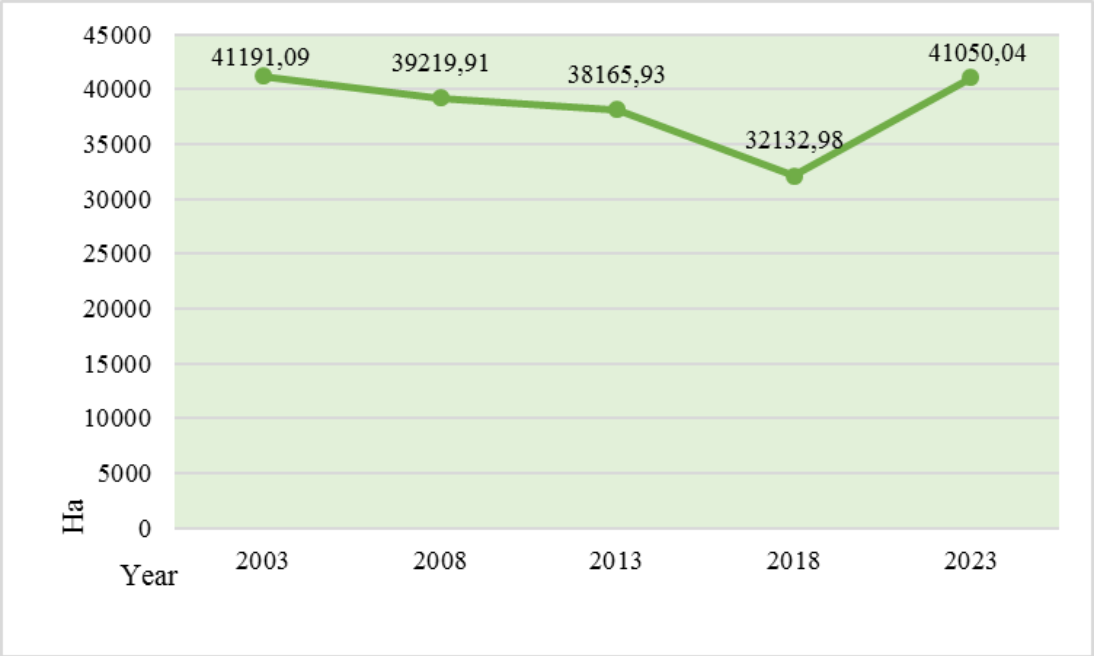

Fig. 1. Change in the area of meadows and natural pastures in Klaipeda County from 2003 to 2023, measured in hectares

***1 pav**. Klaipėdos apskrities pievų ir natūralių ganyklų kaita hektarais nuo 2003 iki 2023 metų*

Source: compiled by authors (Nacionaline…, 2003–2023)

Šaltinis: sudaryta autorių (Nacionaline…, 2003–2023)

In the image presented above, it is evident that since 2018, the analyzed areas have started to increase again. Over the five-year period, the area of meadows and natural pastures has grown by 8,917.06 hectares, or 27.75 percent.

Several factors could influence the increase in the area of meadows and natural pastures in Klaipeda County. Some common influences include:

1. Implementation of conservation programs and policies that prioritize the protection and expansion of natural habitats;

2. Adoption of sustainable land management practices that promote the preservation and regeneration of meadows and pastures;

3. Support from European Union initiatives and subsidies for the conservation and restoration of natural landscapes.

4. Increased awareness and education about the importance of preserving natural ecosystems, leading to more responsible land use practices.

It is worth examining the changes in the areas of meadows and natural pastures in the municipalities of Klaipeda County.

Upon examining the changes in the areas of meadows and natural pastures in the municipalities of Klaipeda County, it was determined that, over the twenty-year period, the analyzed area increased in four out of the seven municipalities. In the remaining three, the area decreased (Fig. 2).

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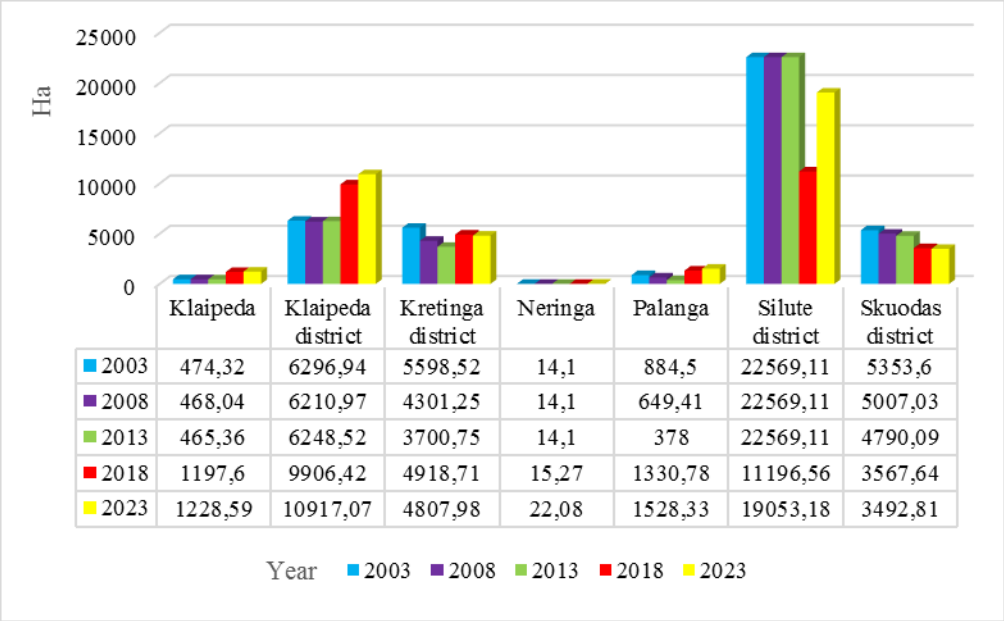

	Klaipeda	Klaipeda district	Kretinga district	Neringa	Palanga	Silute district	Skuodas district
2003	474,32	6296,94	5598,52	14,1	884,5	22569,11	5353,6
2008	468,04	6210,97	4301,25	14,1	649,41	22569,11	5007,03
2013	465,36	6248,52	3700,75	14,1	378	22569,11	4790,09
2018	1197,6	9906,42	4918,71	15,27	1330,78	11196,56	3567,64
2023	1228,59	10917,07	4807,98	22,08	1528,33	19053,18	3492,81

Fig. 2. Changes in the area of meadows and natural pastures in hectares across the municipalities of Klaipeda County from 2003 to 2023

2 pav. *Klaipėdos apskrities savivaldybių pievų ir natūralių ganyklų kaita hektarais nuo 2003 iki 2023 metų*

Source: compiled by authors (Nacionaline…, 2003–2023)

Šaltinis: sudaryta autorių (Nacionaline…, 2003–2023)

Thus, following a twenty-year analysis of the alteration in meadows and natural pasture areas, it was established that Skuodas municipality experienced the most substantial decrease (1860,79 ha or 34.76 percent). In Silute municipality, the analyzed area decreased by 3,515.93 ha or 15.58 percent (Table 2).

Table 2. Changes in the area of meadows and natural pastures, measured in hectares and percentage, in municipalities from 2003 to 2023

2 lentelė. *Pievų ir natūralių ganyklų kaita savivaldybėse 2003-2023 m., hektarais ir procentais*

Municipalities of Klaipeda county	Meadow and nature pasture area change in hectares	Meadow and nature pasture area change in percent
Klaipeda	+ 754.28	+ 159.02
Klaipeda district	+ 4,620.13	+ 73.37
Kretinga district	- 790.54	- 14.12
Neringa	+ 7.98	+ 56.60
Palanga	+ 643.83	+ 72.79
Silute district	- 3,515.93	- 15.58
Skuodas district	- 1,860.79	- 34.76

Source: compiled by authors (Nacionaline…, 2003–2023)

Šaltinis: sudaryta autorių (Nacionaline…, 2003–2023)

As mentioned, from 2003 to 2023, the areas of meadows and natural pastures increased in four municipalities of Klaipeda County. The largest expansion was identified in the municipalities of Klaipeda city (754.28 ha or 159.02 percent) and Klaipeda district (4,620.13 ha or 73.37 percent).

In the municipalities of Klaipeda County where meadows and natural pastures have been converted into other land uses, they will need to be restored. When reporting crop areas in 2024, farmers who plowed over 0.5 hectares of perennial meadows between 2020 and 2022 are required to declare the restoration of these meadows.

Conserving meadows and natural pastures is crucial for several reasons:

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1. These areas often support a diverse range of plant and animal species. Meadows and natural pastures can serve as habitats for various plants, insects, birds, and other wildlife. Preserving these ecosystems helps maintain biodiversity and supports the overall health of the environment;

2. Meadows and pastures contribute to essential ecosystem services. They play a role in water purification, soil retention, and carbon sequestration. These services are vital for sustaining life and maintaining the health of ecosystems;

3. These areas can be important for sustainable agriculture. Meadows and pastures provide grazing land for livestock, supporting the agricultural industry. Sustainable land management practices can ensure the long-term productivity of these areas;

4. Meadows and natural pastures can contribute to climate resilience by acting as buffers against extreme weather events, preventing soil erosion, and supporting water regulation. These functions become increasingly important in the face of climate change.

Overall, the conservation of meadows and natural pastures is essential for maintaining ecological balance, preserving cultural heritage, supporting sustainable agriculture, and ensuring the well-being of both the environment and human communities.

Conclusions

1. In 2023, meadows and natural pastures in Klaipeda County occupied 41,050.04 ha, representing 7.86 percent of the county's total land area. The most extensive expanses of meadows and natural pastures were observed in Silute district (19,053.18 ha) and Klaipeda district (10,917.07 ha) municipalities, the smallest areas were identified in Neringa municipality (22.08 ha). Analyzing the data in percentages reveals that the majority of meadows and natural pastures are found in the municipalities of Palanga (19.32 percent) and Klaipeda (12.54 percent), with the least in the town of Neringa (0.16 percent).

2. Between 2003 and 2023, the total area of meadows and natural pastures in Klaipeda County decreased by 141.05 ha, equivalent to a reduction of 0.34 percent. The largest decrease in the area of meadows and natural pastures was identified in 2008. When comparing 2003 to 2018, the area decreased by 9,058.11 ha or 21.99 percent. In 2018-2023, the area of meadows and natural pastures has grown by 8,917.06 hectares, or 27.75 percent.

3. During the period 2003 and 2023, Skuodas municipality experienced the most substantial decrease (1860,79 ha or 34.76 percent). In Silute municipality, the analyzed area decreased by 3,515.93 ha or 15.58 percent. From 2003 to 2023, the areas of meadows and natural pastures increased in four municipalities of Klaipeda County. The largest expansion was identified in the municipalities of Klaipeda city (754.28 ha or 159.02 percent) and Klaipeda district (4,620.13 ha or 73.37 percent).

4. The main causes for the decrease in the area of meadows and natural pastures include: urbanization, agricultural intensification, land use changes, climate change and etc.

5. In essence, the preservation of meadows and natural pastures is not only an ecological imperative but also crucial for maintaining biodiversity, supporting ecosystem services, and fostering sustainable land management practices.

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Klaipėdos apskrities pievų ir natūralių ganyklų plotų kaita ir priežastys

(Gauta 2024 m. kovo mėn.; atiduota spaudai 2024 m. kovo mėn.; prieiga internete nuo 2024 m. gegužės 10 d.)

Santrauka

Šio straipsnio objektas – Klaipėdos apskrities pievos ir natūralios ganyklos.

Straipsnio tikslas – atlikti Klaipėdos apskrities pievų ir natūralių ganyklų plotų kaitos ir priežasčių analizę.

Straipsnyje pateikiama 2003–2023 metų pievų ir natūralių ganyklų plotų lyginamoji analizė. Nagrinėjama plotų kaita hektarais ir procentais tiek Klaipėdos apskrityje, tiek joje esančiose savivaldybėse.

Atlikus analizę, nustatyta, kad 2023 metais Klaipėdos apskrityje pievos ir natūralios ganyklos užėmė 41050,04 ha plotą ir sudarė 7,86 proc. nuo viso apskrities ploto. Daugiausiai šių plotų plyti Šilutės (19053,18 ha) ir Klaipėdos (10917,07 ha) rajonų savivaldybėse. Tačiau mažiausias plotas nustatytas Neringos savivaldybėje – 22,08 ha arba 0,16 proc. savivaldybės ploto.

Atlikus Klaipėdos apskrities pievų ir natūralių ganyklų 2003–2023 metų plotų kaitos analizę, matyti, kad per 20 metų laikotarpį minėtų žemės ūkio naudmenų plotas sumažėjo 141,05 ha arba 0,34 proc. Tačiau lyginat 2003 ir 2018 metus, plotas mažėjo net 9058,11 ha arba 21,99 proc.

Nagrinėjant plotų kaitos duomenis savivaldybėse, nustatyta, kad 2003–2023 m. pievų ir natūralių ganyklų plotai didėjo keturiose iš septynių Klaipėdos apskrities savivaldybių. Trijose – minėti plotai mažėjo. Skuodo rajone pievų ir natūralių ganyklų plotas sumažėjo 1860,79 ha arba 34,76 proc., Šilutės savivaldybėje – 3515,93 ha arba 15,58 proc.

Didžiausia analizuojamų plotų plėtra vyko Klaipėdos miesto (754,28 ha arba 159,02 proc. ir Klaipėdos rajono (4620,13 ha arba 73,37 proc.) savivaldybėse.

Straipsnyje įvardintos šios pievų ir natūralių ganyklų plotų mažėjimo priežastys: sparti urbanizacija, intensyvus žemės ūkio naudojimas, žemės ūkio naudmenų keitimas į kitas naudmenas, klimato kaita ir kt.

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