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HOW FOREST MANAGEMENT PRACTICES AFFECT THE AMOUNT OF CARBON STORED IN THE FOREST

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Abstract

This research investigates the forest backdrop and nutrient enrichment methods as critical indicators of stress on ecosystem health, adversely impacting all terrestrial areas and dynamic ecosystems. The systems approach to forest ecosystems indicates that overall carbon sequestration is influenced by climate change effects. The rise in biomass levels in forest regions is, however, mitigated by forest management practices. A detailed dictionary of information on methods to improve carbon dioxide collection from forest sources is compiled using statistical data analysis provided by Agridata, Eurostat, and Tempo. Furthermore, we highlighted the role of lowland forests in protecting agricultural and forestry crop areas from climatic fluctuations.

***Key words**: agricultural systems, forest regions, environment, carbon sequestration.*

INTRODUCTION

The ability to mitigate evening impact gas emissions was established through the cultivation of forested regions. The forest constitutes a complex ecological system that harbors numerous plant and animal species, stabilizes the soil to combat erosion and landslides, mitigates pollution, and serves as a renewable source of timber when managed coherently and responsibly. It plays a crucial role in the generation of two-thirds of oxygen and the absorption of CO_2 from the atmosphere, while also serving a recreational function through its healing benefits.

The forest generates the wood resources essential for human society, although its benefits extend beyond this singular feature. It signifies a renewable source of various products (game fauna, fish from mountainous waters, aquaculture, ponds, forest floor resources, raw materials for the pharmaceutical industry, forest fruits, seeds, medicinal and aromatic plants, resin, edible fungi, ornamental trees, and shrubs) as well as substantial and immeasurable financial advantages for human society.

According to Tilman et al. (2001), agriculture is the principal factor contributing to global environmental change. Nonetheless, agriculture and forestry can be assessed by modeling the growth of their respective areas, as forested regions contribute to soil preservation, which is advantageous for agricultural output. This study aims to examine the interdependence of forest management and environmental requirements in agricultural systems by evaluating the contribution of forest lands under climate change, as discussed by Popescu (2022) regarding the benefits of forest shelterbelts.

Forest and grassland systems serve as carbon sinks due to their capacity to sequester substantial quantities of carbon through vegetation over prolonged durations. A carbon sequestration corridor in the soil can only be established by devising a way for agriculture and forestry systems that minimizes soil stress. This will encompass forestry systems and agricultural producers in elucidating the rationale for deceleration. Agriculture's occupation of more than two-fifths of the EU's territory illustrates its direct and indirect impact on environmental and forest systems. Nonetheless, the manner in which each system influences the spatial layout of the environment is most effectively illustrated by the reciprocal reinforcement between agriculture and climate change. Agricultural systems encompass forested areas, particularly grasslands and embankments, as observed by Mazza (2007). The construction of agricultural and forestry

systems enhances soil carbon, which is fundamental to climate stability (Nancu et al., 2022).
The implementation of forest regeneration plans contributes to the effort to reduce greenhouse gases by introducing degraded, agriculturally unsuitable land into the productive circuit through afforestation and constructing protective forest buffers, thereby achieving the goals of enhancing the forest resource base and expanding forested areas. The interrelationship between carbon sequestration and climate change has prompted the necessity to identify innovative agricultural conservation approaches, as articulated by Popescu et al. (2021).
The conclusion is that the interdependence of agricultural ecosystems is significantly influenced by their geographic context, and our focus on forest conservation areas indicates that biospheric equilibrium can be sustained with the regular implementation of modern methodologies. Utilization of pest control products to enhance soil qualities, enabling nature to withstand challenges and threats posed by climate change, with subsidies playing a part in supporting this ecosystem balance mechanism.
According to Popescu (2019), the methodologies for calculating climate change must be reevaluated, with the Sphor index representing a preliminary measure for simplifying study within a different framework. We cannot perpetually assess the impacts of climate change solely as fixed sources when they are considered globally in their whole. Evaluating the risks that impact biodiversity and the resilience of natural capital, as well as the sustainability of agricultural ecosystems, can be conducted independently based on the ecosystem yield conservation process and the unique characteristics of agricultural management strategies.

MATERIALS AND METHODS

Methods aimed at a comprehensive literature review were employed to complete the responses to the assessment questions and perform an initial contextual analysis. Numerous expert assessments about forests, climate change, biodiversity, and other relevant topics found in the literature were utilized as terms of reference, commencing with data on farms and agricultural goods in Romania. Besides examining the national context, the literature review offers the most relevant findings and valuable standards for advancing the analysis at the worldwide level analysis of the specialized literature. The specialized literature investigation included Romania's National Strategy on Climate Change 2013-2020 and its Rural Development Strategy 2014-2020.
The strategic directions for sustainable development and the primary criteria for selecting the included literature were: accessibility, relevance to the evaluation topic, and citation of sources with high scientific credibility (scientific articles, evaluations, public policy documents). The investigation's results indicated potential substantial discrepancies among different data sources about the definitions employed and the accuracy of the values reported by each database.
Concerning the rising stock, supplementary data from official statistics and scientific publications frequently facilitates the assessment and resolution of primary differences among diverse databases through appropriate factor adjustment. A comprehensive investigation of potential differences is often impeded by the lack of detailed information and statistics regarding growth. Initially, we identified specific statistical data obtained from databases that necessitated further analysis. Due to the inadequacy of sources for the substantial quantity of databases obtained from Eurostat, we examined the specific period of 2020-2023 as outlined in Table 1.

RESULTS AND DISCUSSIONS

Between 2006 and 2015, the EU generated an annual total of 956 million tons of dry matter (excluding pastures), with 54% produced economically as grains, fruits, roots, tubers, etc., which are the primary reasons for crop cultivation (Garcia-Condado et al., 2017). In 2022, the EU generated 270.9 million tons of cereals, a decrease of 26.7 million tons compared to 2021. Drought conditions in numerous regions of the European Union adversely impacted the yield of various crops, including grain maize (decreased by 27.4%), sunflowers (decreased by 10.1%), and olives for olive oil (decreased by 38.1%). Above-ground biomass, including wastes and by-products like as leaves and stems, constitutes 46% of total biomass and may possess economic value. The residues and by-products are crucial for ecosystem services such as erosion prevention and the maintenance of soil organic carbon levels, with key statistics on crop output under standard moisture conditions included in Table 1.

Table 1. Crop production in EU standard humidity [apro_cpsh1$defaultview] Area (cultivation/harvested/production) (1000 ha)

TIME	2020	2021	2022	2023
Belgium	304.34	310.20	323.07	326.10
Bulgaria	1,966.04	1,956.33	1,900.65	:
Czechia	1,344.88	1,345.84	1,386.01	1,316.23
Denmark	1,367.00	1,359.70	1,307.10	1,234.53
Germany	6,074.90	6,063.50	6,112.50	6,091.30
Estonia	370.12	367.12	361.82	352.15
Ireland	265.63	274.66	285.66	268.91
Greece	739.88	770.90	773.27	564.92
Spain	6,069.24	6,034.58	5,832.99	5,453.27
France	8,926.69	9,325.70	9,005.01	8,767.12
Croatia	535.76	519.78	519.28	531.30
Italy	3,011.73	2,978.39	3,010.64	3,061.16
Cyprus	26.52	26.15	24.58	23.40
Latvia	750.00	767.80	774.90	:
Lithuania	1,382.43	1,356.51	1,335.72	1,338.39
Luxembourg	25.48	26.30	27.74	26.72
Hungary	2,337.65	2,361.64	2,247.10	2,408.61
Netherlands	172.27	169.73	185.40	189.07
Austria	764.87	747.46	754.95	742.45
Poland	7,466.68	7,451.27	7,196.91	7,188.21
Portugal	215.83	209.24	198.17	185.61
Romania	5,341.51	5,356.95	5,189.93	5,239.78
Slovenia	101.50	102.05	103.55	105.94
Slovakia	747.32	717.70	711.49	696.95
Finland	951.50	953.82	952.25	918.18
Sweden	993.34	983.34	953.47	950.87
Iceland	2.80	2.60	3.16	3.16
Norway	280.22	283.50	:	:

Sources:
https://ec.europa.eu/eurostat/databrowser/product/page/APRO_CPSH1

An estimated 18,600 Mt of dry matter, or 68% of the entire above-ground woody biomass of the EU-27's forests (excluding the UK post-Brexit), was attributed to stem wood; the remaining 32% comprised branches, stumps, and tops, collectively termed miscellaneous wood components.

The natural and semi-natural ecosystems comprising about half of Romania's territory provide a substantial biodiversity resource, encompassing a total of 3,004,396 hectares of forested land. The geographical division into development regions results in the independent treatment of each area, encompassing the prohibition of non-selective pesticides, the restoration of ecosystems degraded by overuse, and the conservation and enhancement of biological diversity through the mitigation of adverse effects and the rehabilitation of damaged ecosystems and habitats.

Preserving biological diversity, establishing protective shelterbelts, and restoring shrubs are critical challenges necessitating modifications to the management plan based on the local geographic context.

The implementation of alternative agricultural methods to mitigate deforestation, soil erosion, greenhouse gas emissions, and biodiversity decline has become increasingly important.

Climate change has consistently impacted biodiversity, making it essential to implement management strategies to mitigate environmental hazards and restore the natural ecosystem. Research in the subject indicates the formation of enduring ecological imbalances and significant alterations in extensive geosystems, as evidenced by the scientific literature. Ecological literature contains numerous conceptual models and discussions regarding ecosystems that can exhibit different community states (e.g. Holling, 1973; Beisner et al., 2003; Suding et al., 2004).

The forest fund consists of representations categorized by ownership type, as shown in Table 2. The 2020 Report on the State of the Forests indicates that, as of December 31, 2020, the publicly owned forestry fund managed by the National Forestry Authority - Romsilva encompasses a total area of 3,128,367 hectares, according to statistical reports from the forestry departments.

Table 2. National Forest Fund for development regions, at the end of 2022/ha

Forms of ownership	2018	2019	2020	2021	2022
Forest bottom- total	6,583	6,592	6,04	6,607	6,457

Source: Data from the European Environment Agency.

In comparison to the status at the conclusion of 2019, there has been a reduction of 4,105 hectares in the extent of the state's publicly held forest fund.

Effective management of the forest fund requires, as illustrated in Table 3, among other factors, the significance of forest protection shelterbelts, which are arrangements of forest vegetation designed to shield against detrimental influences and/or enhance the climatic, economic, and sanitary conditions of the land. We highlighted the technological methods for managing these forest shelterbelts due to their positioning in climatic zones that partially exacerbate the vulnerability of the surrounding agricultural ecosystems.

Forest vegetation is a crucial environmental element that can be directly altered and effectively aids in preventing and resisting environmental degradation. The bioeconomy and the significant societal challenges it addresses are focused on biomass. The necessity to evaluate and comprehend the quantity of biomass that can be sustainably mobilized, its applications, the economic flows of biomass, and the equilibrium between the escalating demand for natural resources and environmental, economic, and social sustainability in Europe and globally arises from the increasing global demand for biomass. Improving the efficacy of agri-environmental policies by incrementally elevating the fundamental standards of agricultural operations and, where necessary, imposing limitations on farmers' ability to manage current risks and adapt to new ones, especially with climate change. In the midst of these conversations, global vulnerability is increasing.

Table 3. The area of the forest fund, by categories of use, in the period 2011-2020

Categories of use	2017	2018	2019	2020
The forest fund - total	*6565*	*6583*	*6592*	*6604*
Forest area	6406	6418	6427	6449
- Softwood	1924	1917	1915	1916
- Hardwood	4482	4501	4512	4533
Other lands (from the forest fund)	159	165	165	155

Source of data: Eurostat

Leveraging the capabilities of geographical ecosystems to enhance the existing biosphere, particularly agricultural land, necessitates the refinement of agricultural production methods to safeguard natural regions, protect ecosystem functions, and mitigate deforestation of vegetation beyond designated forest reserves. This is referred to as an environmental impact assessment. Davis et al. (2014) assert that merely quantifying land use emissions is insufficient; it is essential to attribute these emissions to specific activities and products. This correlation can be established by spatially and temporally distributing land use emissions, considering production and area, permanence policies, the timing and location of product consumption, and their effects on other nations. Additionally, certain studies provide estimates of emissions resulting from land conversions, indicating a minimum of 591 tons CO_2/ha for the conversion of tropical forests to arable land and a minimum of 260 tons CO_2/ha for the conversion of temperate forests to arable land (Overmars et al., 2011). The transformation of forested land to alternative uses is crucial to examine, as deforestation produces significant greenhouse gas emissions. The volume of wood mass harvested, by main species is presented in Table 4.

Table 4. The volume of wood mass harvested, by main species, in the period 2011-2020 thousand cubic meters - gross volume

The main species	2017	2018	2019	2020
The volume of wood harvested - total	*18316*	*19462*	*18904*	*19652*
Softwood	6531	7128	6962	8261
Beech tree	6212	6584	6431	6110
Oak tree	1788	2041	1927	1894
Various strong species	2228	2191	2163	2096
Various soft species	1557	1518	1421	1291

Source of data: Eurostat

Technical forestry standards for the establishment, maintenance, and management of forest protection curtains are crucial for maintaining the ecological balance fostered by best practices and their relationship with existing vegetation. Climate change has been a significant factor in the ecological reconstruction of ecosystems, including forest systems within the larger agricultural framework. The significance of agricultural ecosystems with substantial carbon stocks and carbon sequestration potential, particularly through locally suitable practices such as cultivating permanent pastures, preserving traditional agricultural methods, and eschewing chemical fertilizers and pesticides on valuable pastures, should not be underestimated, in our view.

Davis et al. (2014) assert that merely quantifying land use emissions is insufficient; it is essential to attribute these emissions to specific activities and products. This correlation can be established by spatially and temporally distributing land use emissions, considering production, area, permanence policies, consumption patterns, and their effects on other nations. The volume of wood mass harvested, in the main destinations, in the period 2011-2020 - thousands of cubic meters - gross volume as illustrated in Table 5.

Table 5. The volume of wood mass harvested, in the main destinations, in the period 2011-2020 - thousands of cubic meters - gross volume

Main destinations	2017	2018	2019	2020
The volume of wood harvested - total	18316	19462	18904	19652
- for certified legal entities	17460	18561	18055	18840
- for people who own forests	856	901	849	812

Source of data Eurostat

Buffer strips-grass areas adjacent to protection zones where the use of chemical and organic fertilizers is forbidden-require particular focus due to the susceptibility of fruit and vine crops, commonly cultivated in these regions, to heightened soil erosion and the associated risks of nutrient loss via runoff. The surface covered with cuttings, by types of treatments, in the period 2011-2020 as illustrated in Table 6.

Some studies provide estimates of emissions resulting from land conversions, indicating a minimum of 591 tons CO_2/ha for the conversion of tropical forests to arable land and a minimum of 260 tons CO_2/ha for the conversion of temperate forests to arable land (Overmars et al., 2011). The transformation of forested land to alternative land uses is crucial to examine, as deforestation produces significant greenhouse gas emissions.

Table 6. The surface covered with cuttings, by types of treatments, in the period 2011-2020

Types of cuts	2017	2018	2019	2020
The area covered with cuts - total	*177296*	*181561*	*190610*	*185339*
Regeneration cuts in the wood	70321	64507	74258	68724
- Successive cuts	2542	2044	1924	1835
- Progressive cuts	60620	54235	64022	59955
- Gardening cuts	3446	4793	4794	4161
- Razor cuts	3713	3435	3518	2773
Regeneration shelterbelts	3212	3573	4022	3499
Cuttings for replacements-restoration of poorly productive and degraded stands	728	867	576	872
Conservation cuts	103035	112614	111754	112244

Source of data: Eurostat

The primary objectives included the regeneration of forest as illustrated in Table 7, stands from which timber was extracted through the harvesting of main products, the afforestation of treeless lands with no other designated uses by forestry authorities, and the ecological restoration of lands impacted by various forms of degradation.

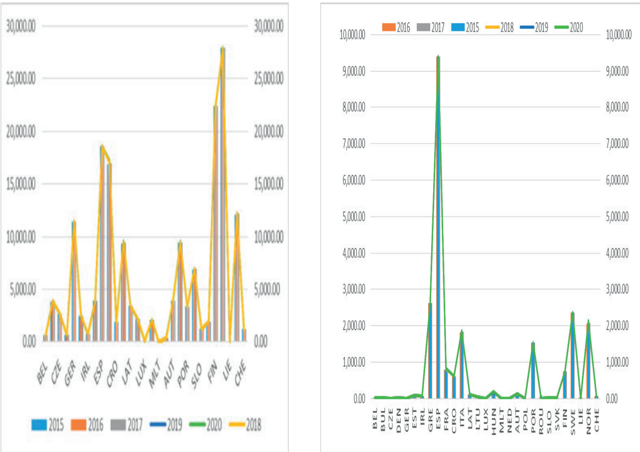
Table 7. Lists the regenerated surfaces for the years

Land categories	2018	2019	2020
Regenerations - total	*27043*	*24459*	*25189*
Natural regenerations	17972	16016	17162
- from the expanse of the forest	17970	16016	17162
- in lands taken over in the forest fund	2	-	-
- in lands outside the forest fund	-	-	-
Artificial regenerations	9071	8443	8027
- in the forest fund	9001	8242	7921
- in lands taken over in the forest fund	28	72	20
- in lands outside the forest fund	42	129	86

Source of data: Eurostat

In 2020, forest regeneration works were carried out on an area of 25,189 ha, registering a 3% increase compared to the previous year.

The categorization of environmental parameters that can be directly altered and that significantly aid in the prevention and mitigation of environmental deterioration is essential for the forthcoming management study focused on forest vegetation. Consequently, forest vegetation serves as an authentic biological barrier against all types of contaminants and severe climatic conditions. Figure 1 (a, b) depicts the progressive development of the forest fund in the EU and Romania.



(**a**) Change in forest area 2015-2028

(**b**) Area of wooded land Forest area in EU 2016-2020

Figure 1. Change in forest area 2015-2020
Source of data: Food and Agriculture Organization of the United Nations (FAO), Forest Europe (FE)

During the research, I illustrated in Figure 1(a) the graphical depiction of regenerated forest areas inside development regions to promote awareness of preserving natural forest habitats, hence sustaining the equilibrium of adjacent agricultural production zones. This evaluation of the environmental consequences of agricultural production methods for the conservation of natural habitats, the safeguarding of ecosystem services, and the deforestation beyond designated forest areas is of strategic importance. The regenerated surfaces, by land category, in the period 2011-2020 is illustrated in Table 8.

The annual forest regeneration efforts within the state forest fund have diminished from an average of 22,000 hectares per year during the period 1991-2005 to roughly 16,000 hectares per year in the decade 2006-2015, subsequent to the reestablishment of ownership rights over forest lands and the return of over 3.3 million hectares from state forest regions.

Table 8. The regenerated surfaces, by land category, in the period 2011-2020

Land categories	2018	2019	2020
Regenerations - total	*27043*	*24459*	*25189*
In the forest background	26971	24258	25083
- on surfaces with regeneration cuts	24764	22352	23065
- replacements and restorations of poorly productive trees	940	981	1288
- clearings and non-regenerated gaps	1258	911	723
- degraded lands from the forest fund	9	14	4
- protective forest curtains	-	-	3
In lands taken over in the forest fund	30	72	20
- degraded lands taken over	23	4	3
- protective forest curtains	7	68	17
In lands outside the forest fund	42	129	86
- field protection curtains	-	-	-
- anti-erosion forests	2	-	-
- degraded lands outside the forest fund	40	129	86

Source of data: Eurostat

Regeneration or enhancement initiatives are implemented for forest canopies that have deteriorated to the extent that they no longer fulfill their intended function. Utilizing treatments that promote natural regeneration may result in the destruction or damage of the seeded bed, with a maximum allowable impact of 8% of the seeded bed's surface area, as detailed in the handover report. The data evaluated in the study originates from statistical analyses within the forestry sector, aligned with the Forestry Code and the Council Resolution of 15/12/1998 concerning the EU Forestry Strategy, derived from the national forestry budget and/or forestry service provision. In the context of mesh creation or expansion, Parquet allows for a maximum of 12% in cases of permanent cutting or connection; nonetheless, it is crucial to emphasize the significant faults from the perspective of applied forestry scoring. To assess the modeling of forest stock evolution in systems affected by climate change and disasters outlined in the latest OECD reports (2021), we conducted a spatial analysis of data obtained from Eurostat about forest stock (Popescu, L. et al. 2021).

Consequently, the study of the Sphor index revealed that the margin of error has been small during the past decade. Although the volume of timber being harvested indicates an increase, there is a concern regarding the potential deterioration of the forest protection barrier. Given the challenges faced by climate change and its global consequences, it is essential to provide a diagram that delineates the risks linked to a sustainable agricultural sector. The analysis of contributions to the growing forestry sector has resulted in this conclusion.
The natural balance achieved through effective methods related to existing vegetation is significantly affected by the technical forestry standards governing the establishment, maintenance, and management of protective forest vegetation.
With the advancement of agricultural production systems, the strategic importance of environmental impact assessment, ecosystem function conservation, and deforestation of non-forest fund vegetation becomes evident. Figure 2 illustrates the graphical representation of regenerated forest areas by development regions, emphasizing the significance of preserving natural forest habitats and, consequently, the equilibrium of adjacent agricultural production zones.

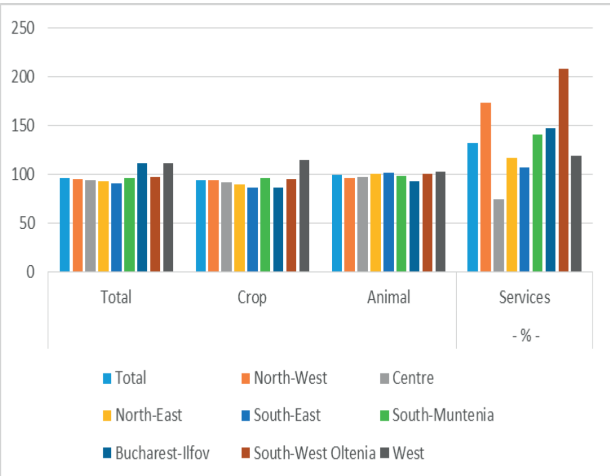


Figure 2. Agricultural production indices by development regions, in 2019

The National Inventory of Greenhouse Gas Emissions from Romania, or INEGES, reveals that the land use sector contributes approximately 17%, while forests account for almost 19% of the country's total yearly net emissions from other economic sectors.

The research demonstrates that implementing a management plan that considers the interdependence of productivity, soil quality, carbon sequestration, and the use of liquid or solid fertilizers exhibits a synergistic effect on climate change, with climate serving as a significant determinant. Recognizing the capacity of forests to diminish greenhouse gas emissions and alleviate climate change consequences necessitates establishing conducive conditions for GHG emission reduction and carbon sequestration in enduring forest ecosystem reservoirs. Alterations in land use also affect soil carbon levels.
The analysis of land use alterations, especially regarding sustainable growth in innovative agricultural practices such as organic farming, serves as indicators of enhanced climate effects in the region, despite the absence of cyclicality in significant consequences.
Assessing the health of forest ecosystems and the capacity to analyze symptoms caused by various agents that may compromise the ecoforestry system necessitates the identification and evaluation of potential causes, such as agricultural farms or crop clusters, as illustrated in Table 9.
An integrated methodology was employed to analyze the convergence of the agricultural economy and environmental circumstances. This entailed compiling a comprehensive inventory of all components contributing to greenhouse gas emissions from agriculture, emphasizing producing regions, farms, and livestock within developmental, production, and coverage geographical areas that correlate with environmental indices.
Consequently, one could assert that nature has offered other methods for mitigating certain factors, including the effects of climate change.
Romania's predominant economic sector remains agriculture and rural development, in relation to population and land utilization. Agriculture accounts for almost 15% of global greenhouse gas emissions and is very vulnerable to climate change.
The forestry sector's net annual CO_2 absorption from the atmosphere offsets 20% of the emissions from other national sectors. The forest sector in Romania serves as a crucial carbon reservoir and CO_2 sink, with the capacity to significantly mitigate the impact of

climate change. As a significant CO_2 sink, it provides various mitigation strategies, including the conservation and enhancement of existing carbon stores, the improvement of atmospheric CO_2 absorption rates, and the optimization of the sink's quality alongside the tangible and intangible benefits of land use if allocated to alternative purposes.

Table 9. Depending on the measure, the potential and cost of lowering GHG emissions

Sector/ Measures	Reduction cost, Euro/t CO_2 equiv., 2015-2050	Reduction potential, Green compared to BAU, kt CO_2 equiv./ year, 2050
Biomass	15.6	1702
Forestry		
Afforestation	120	5.000
Forest management for production	16	1059
Managing forests for protection	12	2079
Agriculture		
- no tillage	14.4	2171.9
Manure management	28.0	1200.0
Sector/Measures	Reduction cost, Euro/t CO_2 equiv., 2015-2050	Reduction potential, Green compared to BAU, kt CO_2 equiv./year, 2050
Biomass	15.6	1702
Forestry		
Afforestation	120	5.000
Forest management for production	16	1059
Managing forests for protection	12	2079
Agriculture		
- no tillage	14.4	2171.9
Manure management	28.0	1200.0

Source: https://ec.europa.eu/eurostat/documents/7870049/12943935/KS-FT-20-002-EN-

CONCLUSIONS

To maintain and enhance the provision of "ecosystem services" from forests during climate change, forest managers must adhere to the guidelines of forestry standards and management plans. Mitigating the susceptibility and exposure of forests to climate change is essential to diminish the vulnerability of forest ecosystems. Methodologically, we conducted a spatial analysis of the data theft from Eurostat concerning the forest fund to examine the simulation of forest fund evolution across all systems affected by climate change and disasters as outlined in the most recent OECD reports on this subject (2021). These objectives must be founded on robust, diversified forests that can inherently withstand the impacts of climate change.

The conclusion is that agricultural ecosystems are highly reliant on their geographic context, and the consistent application of advanced technologies can maintain the biosphere's equilibrium, as seen by our emphasis on forest protection areas. Implementing preemptive measures for pest protection is essential, as nature can independently endure threats and challenges, especially under climate change. Subsidies contribute to the preservation of this ecosystem-balancing process.

The concept of innovative agricultural systems designed to confront severe climate change, which effectively utilize natural capital and resources, enhance biodiversity and soil carbon levels, and fortify agriculture's resilience to environmental shifts, is regarded with negligible significance. Conversely, modifying some agricultural methods may facilitate the management of carbon reserves in soils.

To preserve and optimize this natural equilibrium over time, forestry and forests must not be regarded solely as a revenue source for logging without judicious consideration of their effective management requirements. It is essential to demonstrate that the forest economy may be classified as a productive mechanism balancing costs and the ecological function of the forest. These solutions must enhance the equilibrium of the natural ecosystem to ensure sustained benefits.

The anticipated effects may be amplified by the predictability of agricultural systems attained by integrated management. Moreover, we have shown that adhering to forest conservation mandates through authentic measures that protect ecorurality is a factor that facilitates carbon sequestration in the soil. This vision also directed us towards the goal of reducing greenhouse gas emissions from agriculture, as stipulated in the responsibilities of the Common Agricultural Policy.

In conclusion, it is essential to advocate for the implementation of innovative, sustainable agricultural practices that protect the environment, conserve biodiversity, and improve the quality of water, soil, and natural landscapes to preserve and enhance natural resources and habitats. We necessitate a pristine environment predicated on the judicious utilization of natural resources within the domains of rural development, agricultural economy, and economic ecology. We must enhance competitiveness by implementing industry best practices. Moreover, comprehending the financial and economic ramifications of sequestering carbon dioxide on a farm can be enhanced by the necessity to manage the effects of fertilizers and soil amendments applied in agriculture. The study's findings present several opportunities for the execution of agri-environmental policies and subsidies, as demonstrated by the comprehensive analysis of sustainable production techniques that emphasize social, environmental, and economic dimensions. In the context of agriculture, the economic pillar of sustainability is often the most prevalent.

Consequently, it may be inferred that agriculture is adversely affected by climate-vulnerable conditions and is predominantly reliant on a suitable working environment. To optimize our long-term advantages, we assert that the ecological function of the forest must be refined through appropriate solutions that harmonize the requirements of the natural environment. To mitigate the dangers linked to agricultural development near forested regions, conservation is necessary. Consequently, applied research is essential across multiple domains to innovate new practices and technologies for climate change adaptation and mitigation, as well as to enhance existing practices and technology in these fields.

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