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# **Assessment of the Integrated Challenges of Sustainable Agricultural Systems**

**Dumitru Nancu <sup>a</sup>, Lavinia Popescu <sup>a</sup> and Adela Sorinela Safta <sup>a\*</sup>**

<sup>a</sup> *Doctoral of Economic School, Bucharest University of Economic Studies, Romania.*

## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

The evolutionary impact of the interdependence of the progress of the common economic policy in response to climate change, the current study and empirically explores the general challenges closely related to the productivity costs of agricultural systems. The vision of the tiered approach of the new Common Agricultural Policy to the effects of climate change, based on development areas, provides an important volume of information on the allocated financial resources in terms of adaptation to environmental conditions. Also, the importance of forest areas in plain areas in terms of protecting agricultural and forestry crops from climate variables is highlighted in the research. The evolution of the agricultural systems industry has been one of the main research points in Europe and not only knowing that agriculture is both a cause of greenhouse gas emissions but also a need to regulate these emissions at the ground level. Methodological data were extracted from the databases of available data provided by Eurostat, Agridata, and Corine. Since deforestation is a consequence of projections of forestry practices in relation to carbon capture, the evolution of land surfaces through the conversion of forest areas is a priority, the role of forest regenerations analyzed by the impact of GHG emissions,. The research highlights that agriculture faces a complex challenge of climate change due to its vulnerabilities to its effects, its role as a major source of GHG emissions and its potential to remove carbon from the atmosphere.

*Keywords: Agricultural; sustainable; environment; climate change.*

## 1. INTRODUCTION

Climate change reform remains essential while supporting agriculture in response to decarbonisation targets, it is essential to research the evolution of sustainable productivity growth in agricultural systems with a view to reducing greenhouse gas (GHG) emissions from agriculture.

By 2021, the share of support allocated to stimulating the sustainable growth of productivity of the challenges facing agricultural systems to maintain agricultural emissions indicates growing concerns about achieving the goal of the Paris Agreement [1]. However, agricultural systems and biodiversity are burdened. of the economic systems of production to which they are linked, which leads to inconsistencies between them, although agriculture is estimated at 20% in terms of GHG growth '.

Assessing the decarbonisation levers of agriculture, the role of the forest area and forest management can create pro-cyclical effects. Beyond the responses of the common agricultural policy, there are challenges for the sustainable adaptation of agricultural systems to combat climate change.

Climate measures will represent 25% of EU funding sources in the future budget, assuming that in order to achieve the decarbonisation targets the main pawns will be concretized in the efforts to reach these forecasts through accountability and joint effort [2,3].

The Corine Land Cover database [4-6] shows significant changes in land use in Europe, which have an impact on the soil. Climate change exacerbates both greenhouse gas emissions from the soil and threats such as biodiversity decline and forest management. The consequences of the implementation of the agricultural policy measures contained in the CAP on carbon sequestration from agricultural sources are uncertain, not exactly confirmed precisely because of interference with other areas and socio-economic types producing pollution.

Maintaining and further improving the natural absorbents represented by soils, agricultural lands and coastal wetlands are essential (Henderson and Lankoski, 2021). Research also shows that carbon absorbers are just as important as reducing emissions [7].

As they also argue (Pugh et al., 2015; Pellerin et al., 2017; Leal et al., 2019), agricultural land is a major source of greenhouse gas (GHG) emissions and a major contributor to change. global climate change, in the context in which 20% of total GHGs are emitted from agricultural land [8-10].

The existence of natural environments, global climate and agricultural practices are closely interdependent due to the acute need to maintain soils as a mechanism for carbon storage. The relevance of this study is based on the importance of elements of good practice in the management of forest areas and forest curtains for the protection of natural habitat at the foot of development areas in Romania.

Their causes are multiple, but among the causes are also due to deforestation. From an economic point of view, for example, nitrogen pollution in the European Union has been estimated at between 70 and 320 billion euros per year.

When tropical forest is converted to arable land, for instance, a minimum of 591 tonne CO<sub>2</sub>/ha of emissions must be produced, and when temperate forest is converted to arable land, a minimum of 260 tonne CO<sub>2</sub>/ha must be produced [11].

When evaluating agricultural systems for their potential and viability to mitigate climate change, there are a number of additional crucial factors to take into account in addition to their ability to trap carbon from the soil.

There are other greenhouse gases (GHGs) that significantly contribute to climate change, even though carbon dioxide is the primary cause of anthropogenic climate change and has been the focus of mitigation efforts. Compared to carbon dioxide (CO<sub>2</sub>), these greenhouse gases have much higher radiative forcing and longer atmospheric residence periods. Although none of these gases can be absorbed directly from plants and stored in the soil in the same way as CO<sub>2</sub>, it is crucial to take their emissions into account when evaluating the potential for carbon sequestration of various useful agricultural products.

Against the background of these debates, the whole world is facing higher levels of vulnerability.

Our goal is to provide a visual representation of the dangers of a sustainable agricultural

economy in the context of climate change's demands, as well as its worldwide repercussions. From this viewpoint, we emphasize why it is vital to prioritize vulnerabilities in the agricultural sector, the link between costs and subsidies, and the use of agricultural management in mountainous and hilly areas to prioritize the protection of forest areas and meadows.

## 2. MATERIALS AND METHODS

In the most concise statistics, the evolutionary progression of the forest fund growth is in the first phase associated as a factor of the reforestation actions of the mountain pastures, but also a consequence of the introduction in the forest fund of those more degraded and undegraded lands. forested lands, which were introduced in the afforested plan through the applied methodological plan. From a methodological point of view, the amount of withdrawals from the forest fund was extracted directly from the databases reported by EUROSTAT available, as well as from the data reported by FAOSTAT. There is a lack of information on how irreparable losses have been calculated, including logging residues and other losses due to natural disruption.

Davis et al. (2014) considers that it is not enough to know the amount of land use emissions, but also requires the allocation of these emissions to activities and products and that this correlation can be achieved by distributing land use emissions in space and time taking into account the production and proxy area, permanence policies, space and time of consumption of products and their impact on other countries. Some studies provide estimates of emissions from land conversions which indicate, for example, a minimum of 591 tonnes of CO<sub>2</sub> / ha for the conversion of tropical forests to arable land and a minimum of 260 tonnes of CO<sub>2</sub> / ha for the transformation of temperate forest into arable land [12,13].

### 2.1 Development Areas in Romania

Forest management is a primary concern in forest management, having ecologically focused technical, organizational, and economic content. During the research period, artificial regenerations accounted for a smaller percentage of total regenerated area than natural regenerations and soil, providing care for immature crops and helping natural regeneration. Romanian forests offer tremendous potential for

multifunctional land use, functioning as a source of social amenities as well as environmental preservation, in addition to their economic relevance. More over half of Romania's forests (52%) are designated as having specific protection functions (soil, water, climate, wildlife conservation, and leisure), while the remaining forests serve both production and protection purposes.

Many observations on land usage demonstrate that agricultural management approaches, such as boosting soil performance using fertilizers, can help to offset large ecological imbalances. The presentation's main goal is to highlight the external obstacles that encumber the agricultural system in forest regions.

Romania has a significant biological variety, with natural and seminatural habitats accounting for about half of the country's surface area. The forests have a total area of 3,0043,946 hectares, accounting for 96.7 percent of the state-owned forest fund's entire area. Table 1 shows Forest land in Romania from 2015 to 2020, the forest background with primary trees, which is mostly found on the hill mountain plain. The forest land in Romania has registered a slight increase over the observed period. The total forest area in 2020 amounted to over 6.6 million hectares published by Statistical Research Department [14].

From conserving and increasing biological diversity by reducing negative impacts and rebuilding ecosystems and damaged habitats to banning the use of nonselective pesticides and rebuilding ecosystems degraded by over exploitation, each regional development area is addressed separately.

Some of the delicate concerns that cause the management plan to be adjusted according to the local geographical location include restoring shrubs and establishing protective curtains, as well as preventing the loss of biological variety. Alternative agricultural approaches for reducing greenhouse gas emissions, biodiversity loss, deforestation, and soil erosion have become increasingly important.

They include legal requirements for management, good agricultural practices of the land, and maintenance duties, all of which are in conformity with the regulations on cross compliance.

**Table 1. Forest land in Romania from 2015 to 2020**

<b>Characteristic</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
Forest land in thousand hectares	6,555	6,559	6,565	6,583	6,592	6,604

Source Eurostat (2020)

Cross-compliance rules are mandatory for farmers requesting direct payments, transitional national aid, beneficiaries of support, measures for afforestation and creation of forested areas, agri - environment and climate payments, support for conversion to organic farming, support for maintaining organic farming practices, payments for areas facing natural or other specific constraints, payments for forestry commitments.

The degradation of the environment, manifested in the last decades by radical modifications of the geosystems on large spaces, with the installation of some chronic ecological imbalances, requires the taking of urgent ecological reconstruction measures.

In 2018, public property represented 64.3% of the total area of the National Forest Fund, and private property represented 35.7%, being managed mostly by private forestry structures (95.6%). The distribution of the National Forest Fund in development regions and counties is uneven, depending on the physical-geographical conditions and the economic-social development of the area. Artificial regeneration 9071 ha in 2018 compared to 12508 in 2014, in plantations in number of 9008 softwoods were 5467ha, and deciduous 3541ha, decreasing compared to 2014, 5328 ha and 7127 ha while direct sowings were 63 ha in deciduous and softwood in equal proportion.

At the level of development regions, in 2018, 26.0% of the total regenerated area was achieved in the North-East region, 18.0% in the North-West region, 16.6% in the Center region, 11.9% in West region, 9.5% in the South-East region, 9.0% in the South-Muntenia region, 8.6% in the South-West Oltenia region, and 0.4% in the Bucharest-Ilfov region. Forest protection curtain - formations with forest vegetation located at a certain distance from each other or with an objective to protect it against the effects of harmful factors and / or for the climatic, economic, and aesthetic sanitary improvement of the land.

The degradation of the environment, manifested in the last decades by radical modifications of the geosystems in large spaces, with the installation

of some chronic ecological imbalances, requires the taking of urgent ecological reconstruction measures.EC [15-18].

An important environmental factor that can be directly influenced and that effectively contributes to preventing and combating environmental degradation is forest vegetation.

The forest vegetation is a real biological barrier both against pollutants of any kind and against harmful climatic factors.

By creating forest protection curtains, the climatic, economic, and aesthetic sanitary improvement of the land is achieved. The installation of antierosion forest curtains is necessary in all areas where the slope of the land is higher than 5% and where the phenomena of surface erosion, deep erosion (ravines and gullies), on torrential alluvium deposits as well as on lands degraded by displacement phenomena. When setting up forest curtain networks for field protection, the aim is to remove as little as possible from the agricultural circuit (maximum 5%). For this purpose, the land configuration will be used (secondary roads, border roads, muddy roads, embankments of some dams, canal banks, unproductive lands for agriculture

Of the total areas subject to the regeneration process, 17972 hectares (66.5%) were natural regeneration, 676 hectares more than in 2017, while 9071 hectares (33.5%) were represented by artificial regeneration, with 1665 hectares less than the previous year. By its legal nature, the forest fund includes, as shown in Table 2, the way in which the forest fund is represented depending on the form of ownership. In 2018, public property accounted for 64.3% of the total area of the National forest Fund, being managed mainly by the National Forests Authority - Romsilva, and private property accounted for 35.7%, being managed mostly by the private forestry structures. The distribution of the National Forest fund to development regions and counties is uneven.

Conservation cuttings were recorded in an increase of 112614 ha in 2018, while in 2014, the proportion was 24423 ha. The area covered with

**Table 2. National Forest Fund for development regions, at the end of 2019**

Forms of ownership	2014	2015	2016	2017	2018	2019
Forest bottom - total	6545	6555	6559	6565	6583	6,592
Public property	4253	4249	4245	4233	4232	4132
of the state	3217	3203	3194	3189	3186	3186
of the administrative-territorial units	1036	1046	1051	1044	1046	1023
Private property	2292	2306	2314	2332	2351	2531
of natural and legal persons	2203	2215	2225	2239	2248	2239
of the administrative-territorial units	89	91	89	93	103	103

Source Data from the European Environment Agency

**Table 3. The evolution of the main forestry indicators in 2019 compared to 2020**

tier I	U. M.	Area 2019(km2)	Area 2020(km2)	Differences (±) 2019
Forest fund from which:	ha	6515173	6519470	+4297
The surface of the forests	ha	6353658	6362547	+8889
Harvested wood	mii m.c.	16992	18705	+1713
Regeneration cuts a forests	ha	99229	107690	+8461
Shaved cuts from total	ha	4826	4452	-374
Artificially regenerated surface	ha	10106	11499	+1393

Source extracted data from INSSE (2020)

regeneration pruning in 2018 was 181561 ha, Regeneration cutting wood covered area 64507 in 2014. In addition, in 2017 an area of 100981 ha was covered with regeneration pruning.

The importance of achieving a correct management of the forest fund implies, first of the importance of forest protection curtains - which represent formations of forest vegetation located at a certain distance from each other or with an objective to protect it against the effects of harmful factors and / or for the climatic, economic and aesthetic sanitary improvement of the lands. In the methodology we highlighted technical modalities for relaying the management of these forest curtains through their role in climatic zones that favor more or less the vulnerabilities of the neighboring agricultural ecosystems [19-21].

An important environmental factor that can be directly influenced and that effectively contributes to preventing and combating environmental degradation is forest vegetation.

The forest vegetation has multiple roles working as a filter and represents a real biological barrier on the one hand against harmful climatic factors, but also against pollutants of any kind. The National forest Fund on December 31, 2019, registered an increase of 9165 ha. This increase is mainly due to the redevelopment of forested pastures and the introduction into the forest fund

of degraded lands and nonforested lands, established under Law1/1990.

The approach to risk in our opinion that affects biodiversity and the resilience of natural capital and on the other hand, the sustainability of agricultural ecosystems can be applied separately depending on the ecosystem yield process being cyclical, and hence the distinct features of agricultural management approaches. Thus, the benefit of agri-environmental measures and subsidies is reflected in the balanced analysis of production methods.

### 3. RESULTS

It is essential to recognize and assess the causes of injuries in order to evaluate the health of forest ecosystems and determine the symptoms caused by distinct classes of hazardous agents. The management of regeneration activities in line with the provisions of forest management or specialized studies for carbon sequestration is highlighted by the soil carbon inventory, which includes its form, capacity, persistence and bulk density, and soil textural class.—Approximately 20% of the emissions from other sectors at the national level are annually offset by the forestry sector's net absorption of CO<sub>2</sub> from the atmosphere. The forestry industry, which serves as the primary CO<sub>2</sub> absorber, provides a variety of mitigation strategies, including preserving and increasing

existing carbon deposits, accelerating atmospheric CO<sub>2</sub> uptake, enhancing the absorber's quality, and maximizing the tangible and intangible benefits of land use they would receive from other locations.

Romania's forestry sector is an important resource as a carbon and CO<sub>2</sub> absorber, with the potential to play a significant role in reducing the impact of greenhouse gas emissions, and can be a real lever through its role in mitigation.

Carbon sequestration contributes to the overall goal of reducing greenhouse gas concentrations in the atmosphere.

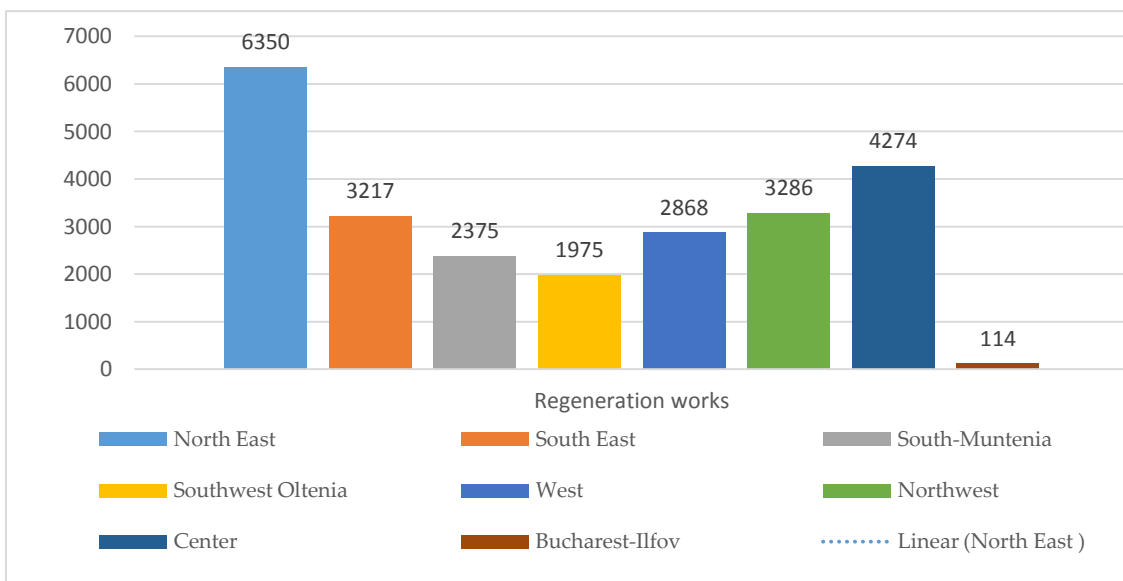
To achieve a sustainable environment, it is vital to take into account the way that the land is used, changes to its structure, additions to it, and the use of pesticides. Other significant factors to take into account include the type of crops that are grown there and the size of the defrişures. It is crucial to maintain and improve the natural wetlands composed of agricultural fields and coastal buffer zones (Henderson and Lankoski, 2021).

According to research that has been supported by (Pugh and collaborators, 2015; Pellerin and collaborators, 2017; Leal and collaborators, 2019), agricultural land contributes significantly to global climate change, accounting for a significant 20 percent of all GES emission [10].

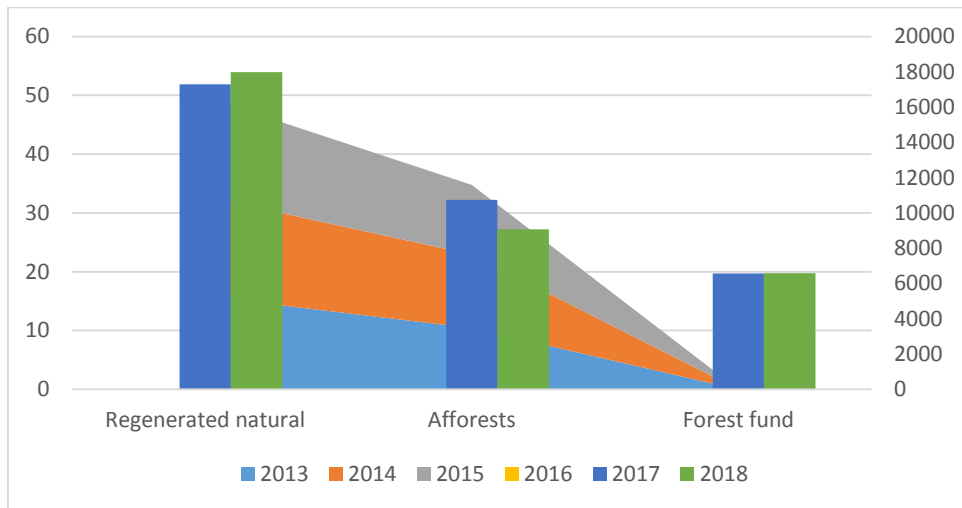
To accomplish this, the coalitions must work together more effectively overall, and technologies must be developed to make it easier to share information and take accountability for commitments made. Such tools would improve the evaluation of activities' true relevance and their impacts.

According to the latest FAO assessment of agricultural and food biodiversity, "deforestation and ecosystem degradation, as well as the shift to intensive production of a number of fewer species, rase, and species, remain the main factors contributing to the loss of biodiversity and ecosystem services" [20]. According to specialized study, carbon absorbers are just as significant as lowering emissions [12,22-24] Nicoloso and Rice, (2021); Mona et al., 2021; Lin et al., 2022; Davoudabadi et al., 2022; Janzen et al. et al., 2022). The broad adoption of ecological approaches in the use and management of cultivated land, according to Lessmann et al. (2022), encourages an exponential rise in soil organic carbon (SOC) levels, which enhances soil fertility and slows the effects of climate change.

The attribution of a direct relationship between the area of the forest fund, by categories of use, in the period 2013 - 2018 - thousand hectares presented in Fig. 2 reveals similarities shown next to each other in the structure of the value of agricultural production by development regions.

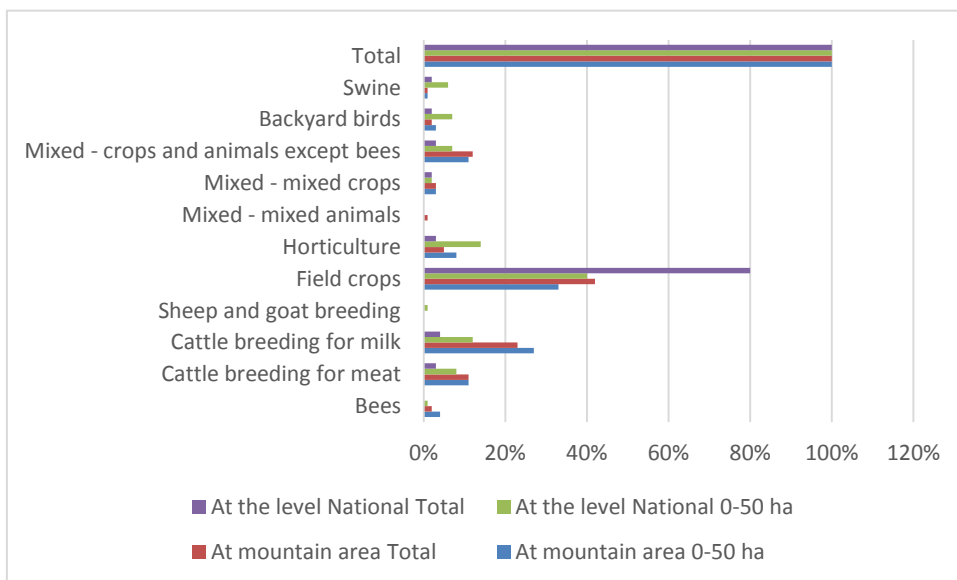


**Fig. 1. Regeneration forest fund**  
 Source Extracted data from INSSE (2019)



**Fig. 2. The area of the forest fund, by categories of use, in the period 2013 - 2018 - thousand hectares**

Source OECD statistical databases



**Fig. 3. Agricultural production at the mountain area in 2019**

Source OECD statistical databases

The very real possibility is that GHG emissions from agriculture will increase again as the agricultural economy improves - especially if livestock numbers increase and / or crop production becomes more intense again. Agricultural ecosystems have the highest carbon stocks and can store more through a range of practices appropriate to local conditions, by cultivating old pastures, maintaining extensive agricultural practices, and avoiding the application of fertilizers and pesticides on pastures with high natural value. These pastures are important for carbon sequestration and the

maintenance of functioning systems that provide important environmental services and support for the maintenance of millions of small-scale farmers [18,25].

As a result, it's not impossible that a regional assessment of carbon emission reductions in forest regions will be more efficient than the agricultural production indices depicted in Fig. 3 as a standardized forest development process.

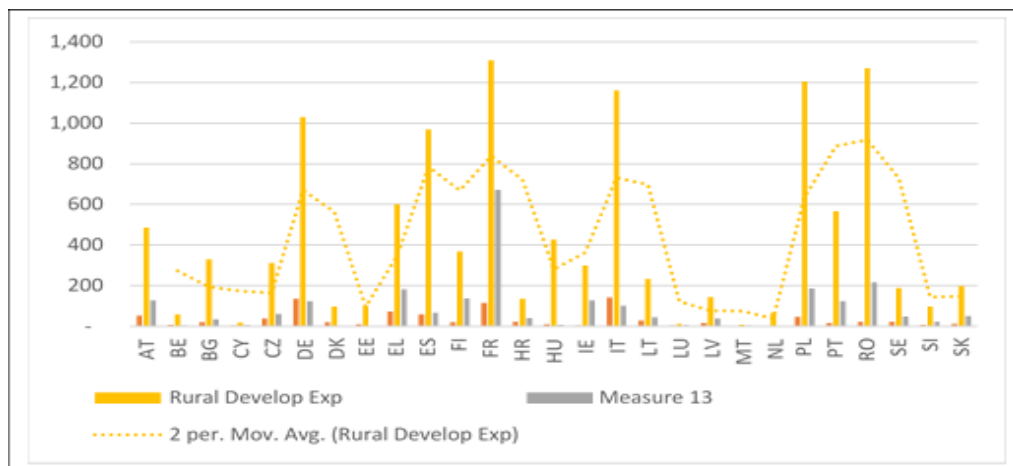
The assessment of the symptoms caused by groups of agents that lead to the degradation of

the forest system can be an analytical cause, in establishing and evaluating these causes can be taken into account assessing the health of forest ecosystems and the prerogative to assess the symptoms caused by groups of agents that could degrade the ecosystem.

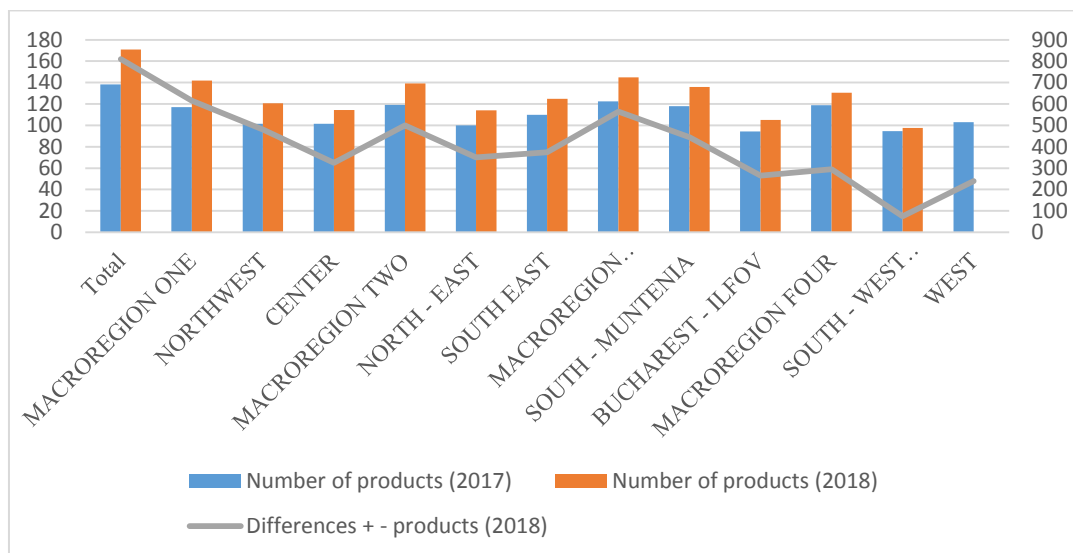
The analysis of the convergence of the agricultural economy to the achievement of environmental conditions was approached holistically by inventorying the causes that lead to greenhouse gas emissions from agriculture, especially production areas, agricultural farms, livestock in areas of development, production and coverage geographical areas indicating connections with environmental indices.

Increasing the accessibility of the national forest fund is a basic condition of sustainable forest management, in compliance with the provisions of management plans approved by law, in the case of protected natural areas.

As shown in Fig. 4, payments for forest and climate commitments are an objective to increase the area occupied by forests at the national level by promoting afforestation of agricultural and non-agricultural areas, helping to support carbon sequestration, adapting to the effects of climate change, reducing erosion, restoring the biodiversity capacity of water retention, as well as restoring and conserving local biodiversity.



**Fig. 4. Measure 13 – Areas under natural constraints in Actual rates**  
Source: Owner research from Eurostat data (2020)



**Fig. 5. Agricultural holdings and cultivated area, by categories** Source: Statistical Yearbook 2018



In addition, as illustrated in Fig. 4, qualified beneficiaries of Measure 13 - Natural Constraints, as defined by the Common Agricultural Policy's goal. Among other purposes, the European Commission is attempting to give tailored methods to the EU's worldwide resilience to climate change, and is prepared to actively aid sustainable rural development [26]. Fig. 4 shows that in AT, DE, FR, IT, and PL, all three climate and average measures of rural development spending were above average, with various nations highlighted in each measure with figures representative, such as Romania (2nd place - Measure 13), which follows France.

An image of agricultural holdings and cultivated area, by categories of agricultural area use is presented in Fig. 5.

Climate contribution also comes from forest improvement activities, including release treatments by removing competing vegetation; pre-commercial thinning to adjust the density, composition and structure of the stand; other fertilization treatments to maintain and improve soil productivity and to improve the rapid development of stands' carbon storage capacity. The benefits of improving the timber stand include improving the health and productivity of forests; hazardous fuel reductions; improved resistance of forests to the impact of drought, insects and disease; and diversified wildlife habitat.

Afforestation and curtailment establishment programs can be analyzed in terms of sequestered carbon and other environmental benefits, but a more detailed analysis of the benefits. Forests play an important role in strengthening society's adaptation to climate change, as it provides vital ecosystem services, such as be the production of timber, non-timber forest products and the hydrological regularization of river basins, whose values are usually underestimated. Therefore, maintaining forests with protective functions that promote the sustainable use of resources can enhance the adaptability of forests, helping to conserve biodiversity, and simultaneously reduce greenhouse gas emissions.

The approach proposed in this study is based on the combination of existing data sources at the level of the national statistical institute, related to data extracted from Eurostat databases. The limited availability of data on the forestry sector in Romania, especially the economic ones, does not allow the presentation of estimates to reduce

emissions in connection with the main measures in the forestry sector and from this perspective the study provides information on the current state of the forest area and forest management. the prospect of reducing greenhouse gas emissions.

### 3. DISCUSSION

The strategic objectives and the action plan consider the coordination with the requirements of reaching the Environmental Strategies regarding the forestry sector aspects that imply a highlighting of the main data regarding the evolution of the forest fund in Romania data extracted from Eurostat statistical databases. Long discussions on the contribution of this sector to meeting the emission reduction targets in the UNFCCC and the EU have led to its consideration in a manner specific to each type of commitment. Thus, the LULUCF sector does not contribute to the EU 2020 target, although a group of eligible activities related mainly to forestry are part of the commitment under the Kyoto Protocol to meet the associated 2020 target decided to include LULUCF in the 2030 Framework on Climate and Energy. The preparation of reporting systems for such a commitment on the LULUCF sector is already included in Decision 529/2013 / EU, including by regularly providing information to the European Commission and the public on sector-specific activities in accordance with Art. 10 of the aforementioned Decision, the next report will have to be submitted in 2018 [27]. The targets for various activities are self-assumed nationally, and the update of the report will reflect the progress towards its own target as well as the new relevant activities. In relation to the emission reduction targets assumed by various EU or international instruments, forest management would make an insignificant contribution if forest management continues on a current basis. However, the major seizure potential is presented by conversions to land with higher carbon stocks, respectively afforestation and conversion to pastures. According to the most succinct statistics, the introduction of those more degraded and undegraded lands, forested lands, which were introduced in the afforested plan through the applied methodological plan, to the forest fund is a consequence of the reforestation actions of the mountain pastures in the first phase of the evolution of the forest fund growth. The implementation of forest regeneration plans as a factor in increasing the effort to reduce greenhouse gases adds to the concern for the

introduction of degraded land into the productive circuit through afforestation, as well as confrontation, construction of forest protection curtains, achievement of objectives for increasing the forest fund by regenerating forests and expanding their surface. The relevance of this study consists in highlighting in the geographical ensemble of Romania by regions of forest fund development through the interdependence represented by the role of forests in the agricultural ecosystem, regenerations by development regions the importance of involvement in proper management forest fund. Reforestation and other activities to improve water retention should be encouraged in mountain areas prone to flooding and erosion.

An important role in the planning and development of effective adaptation to climate change requires solid information on the future climate risks of Climate change have and will have significant effects on forests in Romania, both in the medium term, decades and in the long term long, centuries. Pest infestations are a significant concern for the forestry sector. As it also affects the general health of forests, degrading them along with increasing CO2 emissions. Given these concerns, improving the ability of forests to adapt to climate change is a matter of national security. Within the forest management indicator resulting from the statistical analysis in 2020, locations for forestry works (regeneration pruning, tree care) In the timber harvesting program, from the state forest fund, a margin of 9,500 thousand cubic meters was highlighted, of which main products and accidental products approx. 6,260 thousand cubic meters, to which is added the volume of by products, hygiene, and the resulting conservation cuts. This is in accordance with Eurostat data on the harvesting of accidental products resulting from the devastating wind conditions from 2017 to 2019. It is considered that the extent of privately owned forest fund, which is rising at the expense of the area of public property, is tied to the ongoing forest restitution process.

According to the most succinct statistics, the reforestation of forested pastures is primarily responsible for this evolution of the forest fund growth, but it is also possible that the introduction of more degraded and unforested lands into the forest fund as a result of the forested plan, which supports sustainable forest management while taking into account the socioeconomic and environmental context More active afforestation of appropriate degraded agricultural areas could

lead to both climate change mitigation and adaptation. This would support the maintenance of forest ecosystems for conservation, river basin protection and timber production purposes, while providing common benefits such as carbon storage, reduced soil erosion, landslide prevention and flood prevention.. It is also necessary to increase the capacity of forests to adapt to expected changes in ecological zoning and the distribution of species associations, as well as to increase the likely competitive capacity of invasive species. In order to define the necessary changes in forest management practices, including forestry interventions, the recommended composition for forest regeneration, it is necessary to intensify robust scientific research at local level, which can provide information on possible changes or adapt the results of studies conducted at European level.

Improving the efficiency of agri-environmental policies by successively increasing the basic requirements of agricultural practices, as well as by imposing conditionality, where appropriate, the ability of farmers to manage current risks and adapt to evolving risks, especially in the context of climate change. Against the background of these debates, the whole world is facing higher levels of vulnerability.

Environmental impact assessment is one of the ways to use the potential of geographical ecosystems to improve the old biosphere, including agricultural land, by advancing agricultural production techniques to maintain natural areas, conserve ecosystem functions, and deforestation of forest vegetation outside the forest fund [28,5].

Thus, nature-based solutions to increase society's resilience to the impact of climate change, amplifying the synergy between ecosystem management and reducing climate effects.

For example, managing the restoration of forest protection areas to the maximum protects the agricultural area from the risk of excess water from rainfall. Thus, there are multiple ways to increase carbon sequestration, protecting the biosphere.

Particular attention must be paid to fruit and vine crops, usually located on such land, where the processes of soil erosion and, implicitly, the dangers of nutrient loss by runoff, are more

frequent and more intense. Buffer strips are grass strips adjacent to protection zones where the application of chemical and organic fertilizers is prohibited.

The width of the buffer strips is considered from the limit of the physical block adjacent to the protection zone to its interior. The slope of the land means the average slope of the physical block adjacent to the watercourse. The width of the protection zones is established according to the width of the watercourse, the type and destination of the water resource, or the hydrotechnical arrangement as follows:

The primary reason of forest protection curtain degradation include illegal logging, grazing, fires, frequent defoliation, natural catastrophes, technical faults in installation care, and management, and so on.

Replacement-restoration of weakly productive and degraded stands, preservation cuttings, forestry hygiene and clearing operations, care pruning in young forests, accidental felling, and all other care operations and artificial regeneration contribute to the growth and regeneration of forests, knowing that they are beneficial to the environment and greenhouse gas emissions absorbed by forest areas [22,28].

In 2019, the forest area increased by 9127 ha compared to the previous year. The distribution

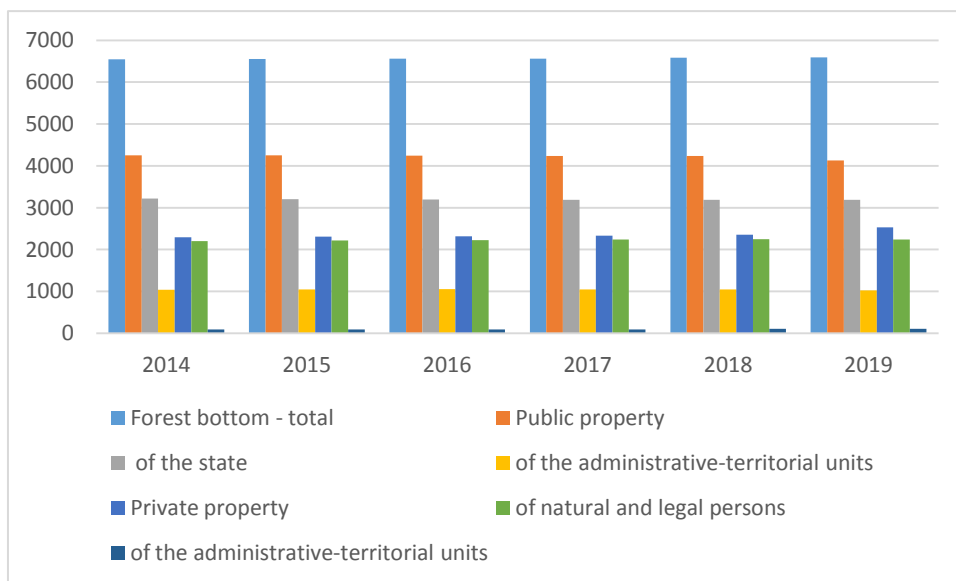
of the national forest fund by development regions and counties is uneven, as can be seen in Fig. 6, depending on the physical-geographical conditions and the economic-social development of the area.

Regeneration or improvement works are being prepared for the forest curtains whenever they are subject to the phenomenon of degradation, they no longer correspond to the role for which they were created.

Forest protection curtains acquire a major role through the conditions of natural balance created even by the good practices used, being a link with the existing vegetation, fact for which the technical forestry embankments for the establishment, care and management of the forest vegetation is of special importance.

With a representation of 27.8% of the country's area, at the level of 2019, the total area of the National Forest Fund of Romania is 6,592 thousand ha. The distribution of forests by relief forms is representative, compared to the European average which is at the level of 32%.

The transformations of the global progress of the agricultural industry have imposed the raising of new issues on the work agenda related to climate change, the pressure on agriculture from the perspective of the effects of the changing climate.



**Fig. 6. National Forest Fund for the development region, at the end of 2019**  
 Source Data from Food and Agriculture Organization of the United Nations (FAO), Forest Europe

#### 4. CONCLUSION

The vulnerability of the forest sector to climate change and the necessary mitigation and adaptation policies and measures at the sector and forest level are constantly evolving issues. therefore research highlighting important steps on the effect of forest land management practices on carbon sequestration and biodiversity in relation to the impact of climate change aspect that are in the light of research assessments on the role of forests in climate mitigation and adaptation policies. Extensive discussions on environmental policy and its adaptation over time have been generated. The Paris Agreement practically aims to strengthen a reliable response to climate change by increasing the capacity of all to adapt to and promote the negative effects of climate change. resilience to climate change in order to contribute to sustainable development

It is true that climate change also entails innovative production models precisely to find new sources that are sustainable, meant to reduce costs for sustainability. This new approach is of particular interest to farmers alike and to researchers, the interference between needs and standards shows that the existence of an ongoing debate on how best to adapt agricultural practices to climate change is still relevant today.

Research also shows that carbon shock absorbers are just as important as reducing emissions. Maintaining and further improving the natural absorbents represented by soils, agricultural lands and buffer zones, permanent meadows, forest areas are essential so that the role of fertilizers appears as a factor in revitalizing agricultural processes [25].

According to Westhoek H et al., avoiding exploitation damages of trees that have been harmed or destroyed during the technical exploitation process could result in the loss of the forest fund, causing certain inequalities in the affected area [29]. Without strategic consideration of the need for effective management, in order to maintain and streamline that natural balance over time, forestry and forests should not be seen as a source of income for logging. The forest economy should be shown to be productive between the ecological role of the forest and costs, as well as solutions that add value in balancing the interests of the natural ecosystem for long-term gain. Agricultural

systems that are more predictable as a consequence of integrated management can assist achieve the intended goals. Furthermore, we have shown that one of the aspects boosting C sequestration in the soil is preserving forest curtain conservation standards through the use of real world ecorality strategies. This vision also directed us in meeting the standards set forth in the Common Agricultural Policy to achieve the goal of reducing greenhouse gas emissions from agriculture [17,18].

Addressing the risks in our opinion that affect biodiversity and the resilience of natural capital and on the other hand, the sustainability of agricultural ecosystems can be applied separately depending on the ecosystem yield conservation process, and hence the distinct features of agricultural management approaches.(Popescu. L) [27]. The adaptation of agricultural systems to soil management settings under environmental conditions is related to a priority conclusion from the standpoint of greenhouse gas emissions. The lack of efficient methods for carrying out the unified agricultural policy to address the needs of cross-compliance and climate change has been and continues to be another factor of land use change. Climate change will benefit agricultural systems in general in the fight to decarbonize agriculture.

In our opinion, the role of agricultural ecosystems that have the highest carbon stocks and can store especially through practices appropriate to local conditions, by cultivating permanent pastures, maintaining traditional agricultural practices by avoiding the application of chemical fertilizers and pesticides on valuable pastures should not be neglected [30]. High nutrients, maximizing the restoration of forest protection areas protects the agricultural area, so there are multiple ways the results of this study have several directions that could be a real benefit of agri-environmental measures and subsidies that are reflected in the balanced analysis of sustainable production methods following three pillars: economic, environmental, and social [15].

In terms of the agricultural context, the economic pillar of sustainability is often the most prevalent. Hence, the conclusion that agriculture depends largely on a good working environment, in conditions of climate vulnerability and agriculture suffers. Applied research is needed in a range of areas both for the development of new practices and technologies for climate change mitigation and adaptation, and for improving existing

practices and technologies in forest areas with a key role in mitigating the risks of agricultural production in their vicinity conservation is vital.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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