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THE EFFECTS OF CLIMATE CHANGE. TRENDS REGARDING THE EVOLUTION OF TEMPERATURE IN ROMANIA

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Abstract

Average temperatures in Romania have risen by more than 1.5 degrees Celsius in the last thirty years, although the transition to a clean economy began with the closure of the gates of large resource-consuming and waste-generating enterprises. This fact confirms that there are enough polluting causes left in Romania that have contributed to the degradation of the environment and climate warming. In such a context, in an attempt to identify the main causes that led to the increase in average temperatures, the present study focuses on the road transportation and animal husbandry sectors assuming that pollutants and waste removed from them could justify this evolution. The forestry sector has also been taken into account, and its ability to balance and contribute to combating the undesirable effects of climate change is well known. In addition, the study aimed at analysing public policies and highlighting the measures that have been adopted at the international level that could inspire the decision makers in our country. Given all these elements, the current analysis indicates the existence of a causal link with the road transportation sector, a situation which could be partially explained by certain concerns about the public measures adopted in this regard. The study will be continued with the inclusion of other potential elements to gain an overview of the local specificities that condition the achievement of the assumed objectives.

Keywords: climate change, pollution, deforestation, animals

1. INTRODUCTION

Globally, in a simplified approach, it can be stated that the intensive exploitation of natural resources, in general, and of forest fund, in particular, has led to the increase in the quantity of waste, air pollutants and a consequent decrease in the absorption capacity of these harmful substances by the forests remained standing, increasing the concentration of atmospheric carbon dioxide (CO2). As it is already known, the coal or oil burning process combines carbon with oxygen in the air to make CO2. These main causes have led to an increase of the global mean near-surface temperature and to climate change. In a detailed approach, without going to a much more detailed level of granularity, that would exceed the scope of this study, it can be stated that the intensive use of fossil fuels (coal, oil and gas) in industry and transport has led to an increase in carbon dioxide (CO2) and methane (CH4).

Also, manufactured chemicals are the main causes of the ozone depletion and ozone hole. Both, these two majos causes have direct consequences over the rising in global temperatures and the climate change. Although global warming caused by CO2 and CH4 air pollution is commonly considered unprecedented, rocks and fossils indicate similar redox atmospheric crises (Retallack, 2007).

One of the most difficult aspects of balancing carbon in the atmosphere is sequestering it through photosynthesis in forests or managing carbon in farming practices such as cover crops or fertilizer use [8].

Moreover, the increase in the demand for food and food waste, which is unanimously recognized for developed countries, is considered to have led to an increase in the number of livestock and the amount of fertilizers used in agriculture, with the consequences of increasing the amount of nitrates (NO3) and ammonia (NH3), released into the atmosphere.

Nitrogen oxides are among the top five contributors to global warming, with 67% of them coming from agriculture (42% from manure and from fertilized agricultural soils). Improperly used, manure is a major source of air pollution and a threat to soil and surface water in densely populated areas[11]; [13]. Air pollution is a stress caused to plant growthnd climate change [13].

Concerns regarding the environmental changes from feeding an increasing number of people in the near future vary from forest area decreasing [1]to assuring enough food from organic agriculture. Moreover, the increase in the need for wood has led to a decrease in forest areas and the implicit capacity to retain pollutants.

These potential causes have led to deteriorating climatic conditions, worsening extreme weather events and the implicit and, irreversible deterioration of the state of forest biodiversity, through the occurrence of fires, diseases, pests and, other disruptive elements that lead to reduced absorption of pollutants. It can be stated that, in addition to excessive logging, globally, humanity loses an average of 5.96 million ha of forest annually due to severe weather events (FAO and UNEP, 2020).

To this, it must be added the rate of deforestation of forest areas, which is about 10 million ha/year. Compared to the rate of expansion of forest ecosystems - either naturally, in abandoned agricultural ecosystems or through ecological reconstruction efforts - it can be said that forested areas of almost 5 million ha/year are being lost (United Nations Department of Economic and Social Affairs, 2021).

Even if the phenomenon of global warming is not unanimously accepted by scientists, as a potential effect of the continued rise in temperatures, climate change affects people's lives, producing annually more and more material and human damage.

Thus, if no immediate action is taken, the effects of climate change are expected to outweigh the current pandemic, caused by COVID-19. In this regard, the Sustainable Development Goals considered only a few principles regarding resilience to climate change and natural disaster hazards. These objectives also included updating policies and strategies, including integrating all measures aimed at climate change, improving education and early warning means to increase responsiveness and reduce impact (United Nations, 2016). As a starting point, it can be said that climate change continues to influence both, the frequency and severity of natural disasters. However, there are also authors who believe that the effects of global warming will vary depending on climatic conditions in different locations on Earth [10].

In this research paper we try to answer some questions:

Is global warming really a real phenomenon that is causing climate change? What could be the real causes of rising temperatures? Can these causes be isolated locally? Does the local evolutionary trend of temperatures depend only on specific climatic conditions and measures that can be taken locally? There are undoubtedly more questions that could be asked, but for the purposes of this study, we will restrict our research to a statistical and economic examination of several selected variables in order to respond to them and reach the most applicable conclusion for Romania.

2. MATERIALS AND METHODS

Romania is located in the northern hemisphere, where the parallel of 45° northern latitude intersects the meridian of 25° eastern longitude. The climate has a temperate continental character with four seasons, with greater temperature differences between the south and the north of the country (higher by about 3 °C), compared to those between the west and east (higher by 1 °C). Precipitation increases with altitude, varying between 400 mm in Dobrogea and 1000 mm in mountain areas. The first climate records in Romania date from 1884. According to the Statistical Yearbook of Romania, published in 2020, the average minimum temperatures at the end of 2019 were 7 degrees Celsius, and the maximum 17.4 degrees Celsius, the highest values that have been recorded since 1901, an increase of more than 1.5 degrees Celsius compared to 1989. As can be seen in Figure 1, in the last sixty years, the trend for each season is upward, and the parameters of the displayed equations confirm this positive evolution and indicate the direction in which they are corrected in the absence of adequate mitigation measures.

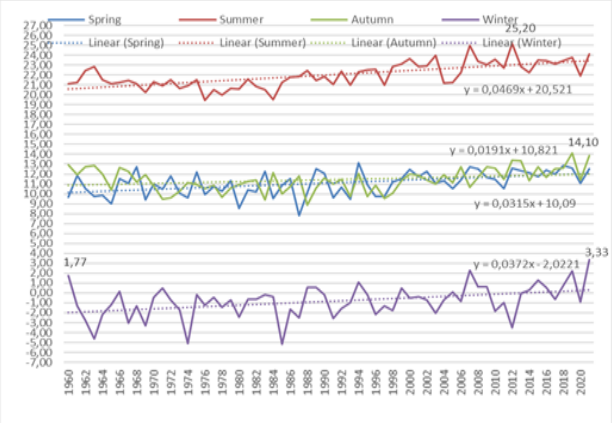


Figure 1. Evolution of average temperatures, by seasons, in the period between 1960-2021. Source: Data processed by National Agricultural Research and Development Institute.

The lowest average minimum temperatures, as well as the highest average maximum temperatures of each season in Romania are found in Table 1.

Table 1. Situation of minimums and maximums of average temperatures, by seasons, in the period between 1960-2021

Season	Minimum		Maximum	
	Celsius	Year	Celsius	Year
Spring	7.8	1987	13.13	1994
Summer	19.47	1976	25.2	2012
Autumn	8.9	1988	14.1	2019
Winter	-5.17	1985	3.33	2021

Source: Data processed by National Agricultural Research and Development Institute

Regarding the average rainfall, there were alternations between rainy and dry years, with a maximum recorded in the decade 2000-2010, compared to all decades that have passed from 1901 to the present. Thus, the downward trend of the average relative humidity level is visible, and the parameter of the displayed equation confirms this negative evolution (Figure 2).

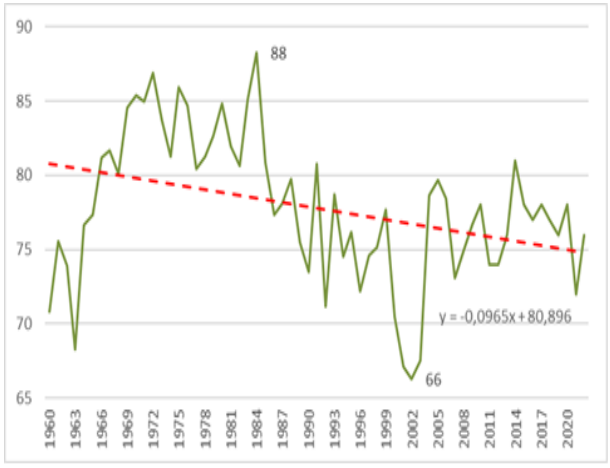


Figure 2. The evolution of the average relative humidity, in the period between 1960-2021. Source: Data processed by National Agricultural Research and Development Institute

Given these observations, we can assume that the impact of climate change and the effects caused by extreme weather events have become visible from year to year due to increase of the global mean near-surface temperature. But what are the causes of this growth? Can a local case be confirmed or can the cases not be imputed internally? De facto, globally, climate change, extreme weather events and natural disasters have continued to occupy the top three in the risk rankings (World Economic Forum, 2020), more than 70% of the causes of disasters can be directly attributed to climate change (EM-DAT CRED / UCLouvain, 2022). The last five years have been the warmest years humanity has ever experienced, and the extreme weather in 2019 has been unprecedented, causing more than 39 million people to be affected globally by the consequences of natural disasters - deaths, disruption of livelihoods and economic losses. At the European level, between 1990 and 2021, material damage of more than $ 205 billion occurred, and, the total number of people directly affected was over 14 million, Table 2).

Table 2. The situation of material damage and people affected in Europe in the period 1990-2021

Country	Total Damages	Total Affected
Germany	57.827.605	575.777
France	41.103.200	4.116.034
Italy	35.721.611	109.374
Spain	18.365.185	6.020.969
Poland	7.872.050	357.374
Czech	6.668.012	1.626.165
Austria	6.622.970	72.246
Netherlands	5.484.711	265.101
Denmark	4.946.639	
Belgium	3.810.132	7.903
Romania	3.639.918	418.901
Portugal	3.121.636	8.693
Sweden	2.970.000	13.500
Greece	2.632.359	23.235
Bulgaria	1.400.250	66.925
Hungary	1.375.400	404.963
Croatia	811.000	19.212
Luxembourg	421.000	1.519
Latvia	325.500	
Lithuania	313.573	780.000
Estonia	130.000	100
Finland	10.000	400
Total	**205.572.751**	**14.888.391**

For the same period of time, Romania suffered damages of over 3 billion dollars, and the number of people directly affected exceeded 400 thousand people. According to the data in Table 3, most of the disasters were caused by floods. The drought also had significant material consequences

Table 3. Situation of material damage and personal injury, affected in Romania in the period 1990-2021

Disaster Type	Total Damages ('000 US$)	Total Affected Persons
Drought	500.000	…
Extreme temperature	…	10.259
Flood	3.132.618	399.719
Landslide	…	330
Storm	7.300	8.593
Grand Total	**3.639.918**	**418.901**

Source: Own processing based on EM-DAT (EM-DAT CRED / UCLouvain, 2022)

Deforestation and excessive rainfall have both contributed to floods, which have resulted in significant damage; 2021 is one of the years that will be particularly challenging from this perspective. Long-lasting droughts have caused a portion of the country's south to become desertified.

Although it is stated that the climate risk in our country has one of the highest levels among the states of the European Union, the risk management system is still insufficient. This shortcoming means that climate risks, adverse weather events, diseases and pests are superficially inventoried, their causes, frequency and impact cannot be accurately determined, and mitigation measures are extremely limited or even completely absent. Prior to 1989, even though Romania was concerned about waste recycling (the 3R concept), the exacerbated pollution caused by the overcapacity industry was not a major impediment. After 1989, the industry was transformed into scrap metal and no longer polluted, but the recycling of waste was no longer, as it should have been, a concern of the deciding factors. The lack of consistent and ongoing interest, as well as the lack of a coherent strategy on mitigation measures, has meant that the financial support that Romania could have directed towards preventing the occurrence of risks should be directed mainly to cover the damages, and the financial advantages that Romania could have, from the marketing of certificates, could be much higher than those currently estimated [3]. As a result, it can be said that natural disasters have increased in intensity, affecting both crop yields and the state of ecosystems, diminishing the capacity for defense and post-event recovery.

Is rising temperatures a Romanian reality? Could this be a cause of the disasters in Romania?

Methodology

In order to draw pertinent conclusions regarding the causes that generated the evolutionary trend of temperature in Romania, this study took into account, both the evolution of the global and national legislative frameworks, as well as the values of temperatures in our country and some potential causes that would have determined this evolution.

Looking from this perspective, the analysis focused both on the legislative framework that was adopted and applied in this regard - globally and in Romania, and on a series of statistical data that were collected from several public sources. Thus, the statistical data of the elements detailed in the introduction were taken into account in the study, as well as potential causes of the temperature increase: the evolution of the average annual temperatures, the number of registered cars, the evolution of livestock, and the area occupied by forests. The time period for which complete statistics were found was between 1990 and 2020.

With regard to the legislative framework adopted, it can be said that concerns about finding the best global solutions have intensified since the end of 1997, with the advent of the Kyoto Protocol extending the United Nations Framework Convention on Climate Change (UNFCCC) since 1992 and comiting the signatory states to reducing greenhouse gas emissions.

Many international voices have said that this protocol has not gone far enough to reduce greenhouse gas emissions [4]. Other authors consider that the benefits of this protocol have been outweighed by the costs (Thorning, 2002) and that, compared to the less developed countries, the richest countries are the ones that have benefited the most and continue to receive many benefits. Other researchers consider the agreement "unfair and inefficient" because its measures have had an extremely low impact on reducing greenhouse gas emissions. Although more than 150 countries have acceded to this protocol since the date of signature and until now, the three mechanisms that were created to limit emissions have not been updated. The only changes to these mechanisms - emission certificates (EIT/ETS), certified emission reduction units (CERs) and credits (ERUs) - have been to reduce the number of certificates/credits granted, which has led to significant decreases in the trading price, discouraging emission reductions, producing the adverse effect [9]. Thus, in December 2015, the United Nations was determined to adopt the Paris Agreement, in order to implement the objectives of the Framework Convention on Climate Change, signed in 1992 in Rio (United Nations, 2015). The agreement aimed to limit global average temperature growth below 2ºC and was the first legally binding international instrument on climate change. In just a few years, climate change mitigation has become constrained by meeting the global warming limit of 1.5 ° C. By 2020, the agreement has been ratified by 189 countries, of which 186 countries they have already communicated the first contributions made in this direction (185 countries, plus the EU) (Hák, Janoušková and Moldan, 2016; United Nations Department of Economic and Social Affairs, 2022) . Furthermore, in 1999, the United Nations established the United Nations Office for Disaster Risk Reduction (UNISDR) and adopted an international disaster reduction strategy. The Sendai Framework was created covering the period 2015-2030. It aims to reduce the number of people affected, the number of victims, the economic losses and the damage caused by natural disasters, as well as a number of measures to reduce catastrophic risks.

At European level, a number of additional regulations have been created to regulate the limitation of temperature rise: the EU Regulation for the reduction of pollution from land-based sources; The European Directive on the Reduction of Emissions from Intensive Animal Husbandry, etc. Romania ratified the Paris Agreement on continuing efforts to limit temperature rise to 1.5 C above pre-industrial levels by Law No. 57/2017, making it a priority for mitigating climate change and saving the environment.

For the current study, the analysis of road cars registered in circulation that are authorized to drive on public roads, based on their registration in the records of the competent bodies for passenger transport, with a maximum of nine

seats (including the driver). As is already known, exhaust fumes from vehicle engines, especially during the acceleration stage or at high speeds, contribute to pollution. In Romania, only 24% comply with the Euro 5 and Euro 6 pollution norms, and the European Commission is the one that demands firm measures to reduce the age of the car fleet (Fig. 3). Moreover, all the programs for the renewal of the Romanian car fleet were not well thought out enough. This led to the entry of many cars from Western Europe with pollution standards below Euro 5, which led to the current situation. Some of these cars were scrapped under the Romanian car park renewal program. Compared to 1990, the fleet has increased almost sixfold, so that at the end of 2020, the number of registered cars was 7.3 million, which led to air pollution and worsening air quality [2].

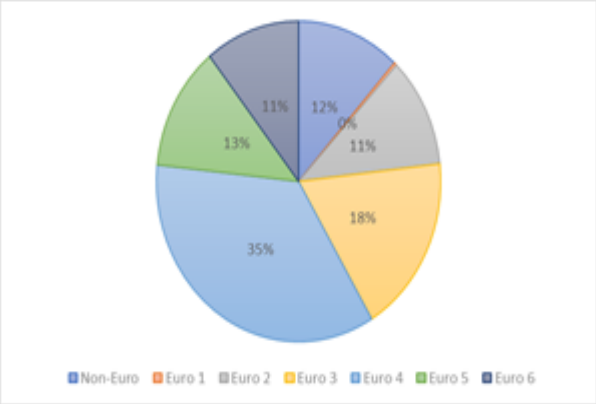


Figure 3. Structure of registered cars, according to pollution norms - 2020 (TRN103E). Source: Own processing based on INSSE

The herds of animals considered in the current study represent the total number of domestic animals raised for production, reproduction and traction. Organic nitrogen removed from animal waste is broken down into ammonia by microbial action. Subsequently, ammonia is converted to nitrites and nitrates. The waste thus produced has different concentrations of nitrogen and phosphorus, depending on the species. Furthermore, nitrogen in different combinations with oxygen forms nitrogen oxides, among the main gases responsible for global warming. In Romania, as can be seen in Figure 4, the number of animals has decreased significantly in the last thirty years. Over 80% of the total livestock production sector is occupied by poultry farming. The European Union is calling for a reduction in emissions from intensive livestock farming.

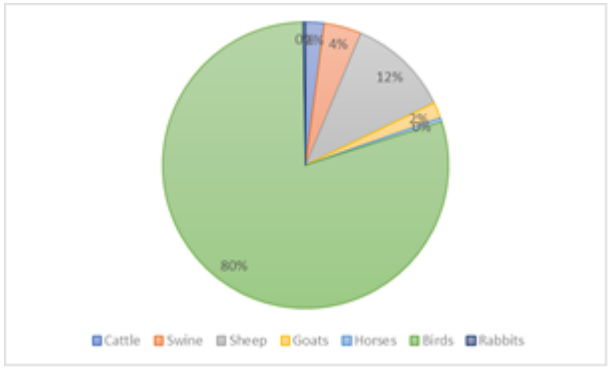


Figure 4. Livestock Structure-2020 (AGR201A). Source: Own processing based on INSSE

The current study focused on the extent of forests because of the beneficial function that forests play in decreasing pollution. According to Romanian law, this includes land that has at least 0.25 ha of tree cover. The trees must reach a minimum height of 5 (five) meters at maturity, under normal vegetation conditions. As can be seen in Figure 5, the area occupied by forests has increased in Romania by over 200 thousand hectares. At the same time, in Figure 6, the evolution of the average annual temperature showed an upward trend and the positive parameter in the equation confirms this aspect.

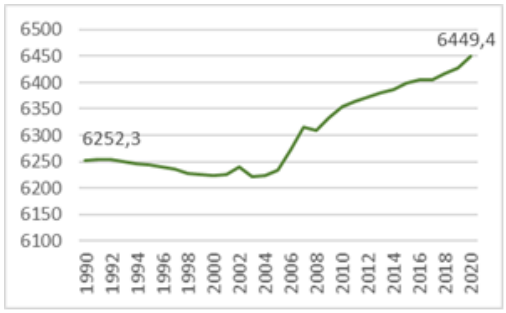


Figure 5. Evolution of the area occupied by forests - 1990-2020 (AGR301A) - thousand hectares

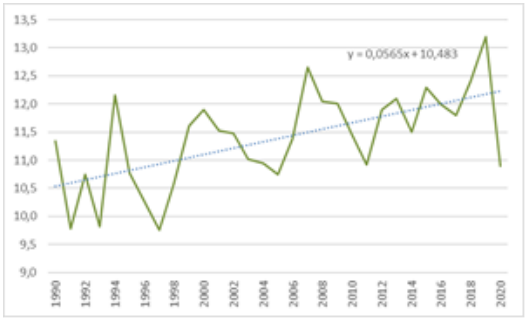


Figure 6. The evolution of the average annual temperature - degrees Celsius. Source: Own processing based on INSSE data and data of NARDI (National Agricultural Research and Development Institute

The average yearly temperature has increased over time, despite a decline in livestock and an increase in forested land.

Was the rise in temperatures in our country caused primarily by the rise in the number of registered cars and the proportion of those with pollution standards below Euro 5? Are there any further prominent components?

3. RESULTS AND DISCUSSIONS

Based on the premises described above, the data collected for the period 1990-2020 were statistically analyzed in order to demonstrate the economic links between rising temperatures, herd evolution, an increase in the number of registered cars, and forest area. The data series used are annual. As can be seen in Figures 3, 4 and 5, the evolution of the data series over time has an increasing trend, with the exception of the number of animals, which has decreased. It is necessary to test the stationarity of the data to see if the shocks to the data series are temporary or permanent. If one of the series is not stationary, a stationary series will be obtained by differentiation. Thus, the order of integration of the series will be equal to the number of successive differentiations necessary to reach a stationary series (or the number of unit roots of the series). The most commonly used stationarity tests are the ADF (Augmented Dickey-Fuller) and PP (Phillips-Perron) tests. Based on these premises, the results are as follows:

Table 4. Unit root tests for evolution of temperatures, number of cars, number of animals and area occupied by forests (1990-2020)

Variable	Level		First difference		The second difference		Conclusion
	ADF	p(H0)	ADF	p(H0)	ADF	p(H0)	
Degree_Celsius	0.2102	0.6021	-7.4454	0.0000			I(1)
Cars_th	9.5936	1.0000	-1.1461	0.2233	-5.5925	0.0000	I(2)
Animals_mil	-2.2895	0.0236					I(0)
Forest_th_ha	2.7104	0.9976	-3.0014	0.0040			I(1)

Source: Authors' own processing in EViews12

The results suggest that the livestock series is stationary, without any differentiation. It is found, therefore, that the temperature-related series and that relating to the area occupied by forests become stationary at the first differentiation (the difference between the value recorded at time t and that at time t-1). For the last series regarding the total number of registered cars, the differentiation was continued until the stationary was obtained. According to the ADF test, for the herd, the risk that the initial series, in level, is not stationary is 2.37% in the model without exogenous variables. The value is below the standard threshold of 5%, which leads to the rejection of the unit root hypothesis. In this case, the null hypothesis is rejected, so the series is stationary. For the evolution of the temperature and the surface occupied by the forests, according to the ADF test, the probability was higher than the 5% threshold, so the null hypothesis cannot be rejected, and the series is not stationary in level. Therefore, the series was calculated by simple differentiation, for the model without exogenous variables, with the series becoming stationary in the first difference, i.e. integrated of the first order, symbolic I (1). For the evolution of the number of registered cars, according to the ADF test, the probability was higher than the 5% threshold, both in level and in the first differentiation. Thus, a second differentiation was necessary, the series becoming stationary of the second order, symbolic I (II). Similar results were obtained by applying the Phillips-Perron test. The null hypothesis in the case of the ADF test refers to the presence of unit roots. Given the results in the previous table, the linear correlation coefficients between the variables were further calculated, and the correlation result can be found in Table 5.

Table 5. Correlations between indicators

Covariance Analysis: Ordinary
Date: 04/08/22 Time: 03:26
Sample: 1992 2020
Included observations: 29
Balanced sample (listwise missing value deletion)

Correlation t-Statistic Probability	ANIMALS_MIL	D(CARS_T...	D(DEGRE...	D(FOREST...
ANIMALS_MIL	1.000000			

D(CARS_TH,2)	-0.001820	1.000000		
	-0.009455	-----		
	0.9925	-----		
D(DEGREE_CEL...	-0.018081	0.399653	1.000000	
	-0.093969	2.265442	-----	
	0.9258	0.0317	-----	
D(FOREST_TH_...	0.222452	-0.063494	0.053055	1.000000
	1.185601	-0.330589	0.276073	-----
	0.2461	0.7435	0.7846	-----

Source: Authors' own processing in EViews12

The results show the existence of a significant correlation between the total number of registered cars and the evolution of temperatures in the last thirty years (Table %). This aspect confirms the preponderance of polluting cars in traffic, doubled by the increase in the number of cars owned by Romanians (approximately one car for two people), in accordance with the European Union's concerns regarding the age of the Romanian fleet. The rest of the results indicate that there are no very strong links between the selected indicators. The lack of a link between forest area and temperature change could be justified by the fact that the area occupied by forests may have increased with non-valuable species, which do not have an effective capacity to mitigate the effects of pollution. The same result could be interpreted in the light of the conclusions of other specialists, according to which the statistical data could be different from those subject to the present study due to some deficiencies regarding the way of forest inventory. Regarding the number of animals, given its structure, the results look different if the poultry sector is eliminated from the livestock.

In this new context, the links between the evolution of the number of cars and the increase in temperature are still maintained, but there is a direct link of medium intensity between the number of animals / birds and the area occupied by forests (could the large number of sheep and goats justify this result?). In a study conducted by the EPA (US Environmental Protection Agency) the entire herd of animals was considered without any differentiation.

The results of this study suggest that one of the causes that contributed to the increase in temperatures in Romania could be the structure of the Romanian car fleet, but also poor management even non-existence of waste recycling and a lack of adequate environmental measures in urban areas. These causes can be caused by the inefficiency of public policies that have been adopted in this regard. But from this point of view, in order to draw relevant conclusions, the study should be extended with at least a few other variables: the number of new cars purchased through the "scrap" program, the number of kilometers of bike lanes, the number of vehicles used for public transport and the poverty rate, given that the purchase of a new car involves a certain financial situation, contrary to the current evolution in Romania. At the same time, the results suggest that public policies must take into account the integration of the environmental objectives assumed, by joining the 2030 Agenda, into the entire Romanian economy in a coherent and balanced manner. The non-integration of environmental objectives at the level of the entire population led to a massive import of old cars that "relieved" the rest of Europe of pollutants, bringing them to Romania, which confirms the opinion of many researchers that local climate could contribute to influencing global warming. Moreover, the simple financial penalty for Romanians who import these cars is unnatural, if a much higher goal is considered, that of reducing the warming of the Earth's mean near-surface temperature. Romania needs coherent and continuous public policies that will ultimately lead to the mitigation of the effects of climate change caused by rising temperatures. Pollution and mitigation measures and control mechanisms should be inspired by the full range of measures and restrictions taken at the European and global levels In such a context, Romanian waste management can be inspired by the mandatory regulations that were adopted in Denmark in the late 1980s on the capacity to store manure and limit the number of animals per hectare of agricultural land, plus a number of other measures (Rules of Harmony). This early rule prevented the release of very large amounts of local nitrogen and phosphorus into the atmosphere. Subsequently, in 1993/1994, another legislative amendment was introduced creating a system of nitrogen quotas in accordance with the size and specificity of the farms and the minimum requirements for the use of nitrogen in manure, strictly controlled by the Ministry of Agriculture and the Envronment. The legislative requirements were the result of studies and research undertaken by universities and tested by a large number of agricultural farms. The regulation has led to a 51% reduction in ammonia (NH3) emissions from animal waste.

In fact, Romania can also be inspired by the German model- the so-called Clean Air Plans - regarding the measures that have been adopted in urban areas, such as the improvement of public transport and modernization of vehicles, the implementation of pedestrian areas, bicycle systems and shared cars, or even street cleaning. This system of adjacent measures would reduce the number of people who will use their personal cars, which would help reduce pollution. What can be deduced from the two examples? That an effective measure can be created only by involving several actors (universities, states, entrepreneurs and the population) and by finding those solutions that can be offered to the population as an alternative to the current habits. Last but not least, the application of the measures must be closely monitored in order to obtain exactly the desired results.

4. CONCLUSIONS

Although there are some theorists who completely dispute the phenomenon of global warming, there are also scientists who are still working to identify the causes that determine this phenomenon [20]. Many experts believe that certain extreme weather events cannot be fully explained by all the causes that have been inventoried so far. Other researchers cannot explain the causes of the disasters. Although there are currently unknown causes, or which can only be partially justified, concerns about their identification and appropriate mitigation measures have been noted, especially in the last thirty years.

To the question we asked above, "was it enough to increase the number of registered cars and the share of those with pollution standards below Euro 5, for temperatures in our country to rise?" the answer is yes. Yes, this is a cause that could lead to a rise in temperature and could be blamed internally, and subsequent causes have their origins in public policy. The results of the study suggest that the development of future public policies must take into account a different approach, that corresponds to the current global and regional context. The lack of integration of the assumed environmental objectives, by adhering to the 2030 Agenda has termined that in the last thirty years the Romanian car park will be composed mainly of polluting cars from Western Europe. Moreover, the results suggest that increasing the forest fund is not enough, the attention of the authorities must be especially focused on increasing its quality. Last but not least, the lack of permanence of environmental measures when purchasing second-hand cars - even if it is only the additional taxation of such imports - has led to an increase in their share of the total Romanian car fleet. From this point of view, it can be stated that public policies have contributed negatively to the evolutionary trends of temperature in Romania, that, in fact, they are the cause of the rise in temperature in our country.

Based on these results, the authors mention that this study will be deepened by adding more elements, in addition to the two variables already stated above, to identify other potential causes that could contribute in particular, to the increase in temperature in Romania.

In fact, the study will be followed by other studies by which the authors will try to link these causes to the disasters that occur in Romania, more and more often.

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