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THE MULTIPLICATION OF NATURAL DISASTERS IN THE LACK OF A SUSTAINABLE FOREST MANAGEMENT

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ABSTRACT:
WITHOUT THE EXISTENCE OF HEALTHY AND THICK FORESTS, LIFE CANNOT EXIST ON THE PLANET. BY NOW, 80% OF FORESTS ACROSS THE GLOBE HAVE BEEN DAMAGED OR DESTROYED. FORESTS HAVE, IN ADDITION TO THEIR ECONOMIC IMPORTANCE, AN ESSENTIAL ROLE IN MAINTAINING THE CHARACTERISTICS OF THE CLIMATE.
CLIMATE CHANGE AND INCONSISTENT CUTTING OF FORESTS, AND BY THIS WE MEAN THE REMOVAL OF FORESTS OR STANDS OF TREES, WHEN THE LAND ACQUIRES FUNCTIONS OTHER THAN THOSE OF FORESTRY, AMPLIFY THE EFFECTS OF A NATURAL DISASTER. THE EFFECTS OF UNCONTROLLED FOREST ENGINEERING CAN BE OBSERVED IN RISK AREAS, BOTH IN ROMANIA AND IN THE REST OF THE WORLD. AMONG THE MOST DEVASTATING DISASTERS ARE LISTED: LANDSLIDES, FLOODS, BLIZZARDS DURING WINTERTIME.

KEY WORDS: NATURAL DISASTERS, FORESTS, DEFORESTATION, CLIMATE CHANGE

INTRODUCTION

In Romania, approximately 29% of the country's surface is covered by forests, compared to the European Union average of around 40%. About 51.9% of the forest areas are situated in mountainous areas, and the rest in hilly and plain areas. Unfortunately, the phenomenon known as illegal cutting of forests is very widespread both in the world and in Romania.

The term “deforestation” is often erroneously used to describe any activity that results in the complete removal of trees from an area. The removal of all trees from an area in accordance with the principles of sustainable forest management is correctly described as a regeneration harvest (thus, the activity of massive timber exploitations which operates on the

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basis of concretely established programs and which complies with the legislative regulations and norms in force must not considered as a deforestation activity).

In fact, there are several species of trees whose natural regeneration is quite difficult or does not even occur in the absence of natural disturbances or human interventions.

Therefore, deforestation or logging must be understood as a process of removing a forest or a stand of trees, when the cleared land is used for purposes other than forestry (eg for agriculture, leisure, urban planning, etc).

Reasons for deforestation:

Deforestation occurs for various reasons:

- Recovery of wood in raw or semi-processed form;
- Manufacturing of charcoal from wood (mangal);
- Expansion of some industrial objectives;
- The opening of new industrial objectives;
- Development of road and railway infrastructure;
- Expansion of agricultural/non-agricultural crops;
- Expansion of urban areas;
- Expansion or establishment of recreational areas.

In addition to the classic methods used to deforest certain lands, in some cases use is made of arson. This method is used when the lands to be deforested are difficult to access for exploitation equipment or when the value of the wood mass (from an economic point of view) to be removed does not justify the application of classical methods that involve other costs. The arson method is used less and less, due to the fact that it presents risks (spread of fires, accidents, etc.) and international treaties impose restrictions on conservation, sustainable management and the control of carbon dioxide emissions in the atmosphere.

Developed countries that have massively deforested in past centuries have realized that uncontrolled forest engineering can produce devastating effects. That is why laws were imposed to control the exploitation areas.

Man, through his actions (forest fires and illegal deforestation) has a major impact on the environment but also on the economy. Compared to purposeful deforestation, illegal deforestation is a trigger of climate change and natural disasters.

Romania – Current situation

At the beginning of the 20th century, Romania was covered by forests in proportion of approximately 40.8% of its surface. Nowadays, the percentage of forested areas has decreased to approximately 26.7% (fig. 1), under these conditions, Romania is at the bottom of the ranking of the European countries in terms of forested area (statistics show that in Europe we are in last place in terms of forested area) [1]. Romania has become a source of timber, over 350,000 hectares of forest have been illegally cut in 15 years.

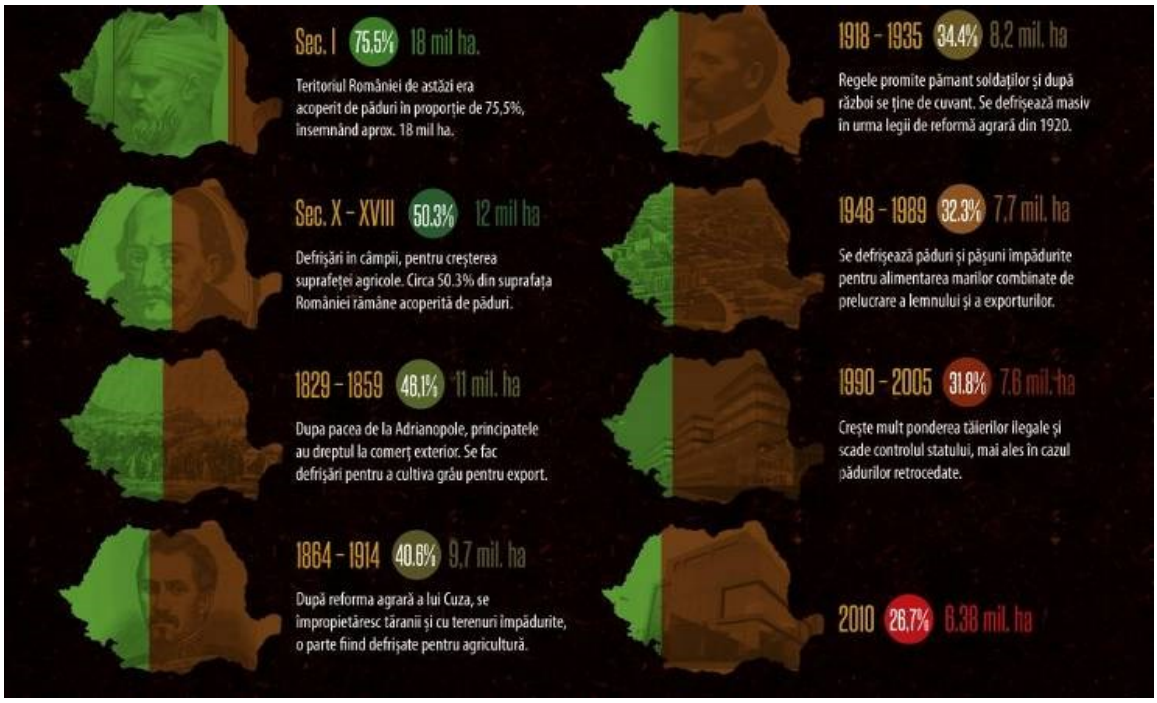

Figure 1. *The evolution of forested areas in Romania [1]*

According to Greenpeace, in 2017, a number of 12,847 cases of illegal logging were identified in Romania, which represents an average of 34 cases/day, increasing by 32% compared to 2016.

THE FOREST FUND

Romania's forest fund totaled, in 2021, 6.60 million hectares, of which 6.45 million hectares represented forests area. These areas are slightly increasing compared to previous years, shows a study on forestry activity carried out by the National Institute of Statistics [2].

In 2021, the area of forests was 6.45 million hectares, with softwood species covering 1.91 million hectares (respectively 29.8%), and broadleaf species 4.53 million hectares (respectively 70.2%), and in 2012 the forest area was of 6.37 mlion hectares, softwood species covering 1.945 milion hectares (respectively 30.5%), and broadleaf species 4.42 milon hectares (respectively 69.5%) [2].

In 2021, public property represented 64.3% of the total area of the national forest fund, being mainly administered by the National Forest Administration - Romsilva, and private property represented 35.7%, being mostly administered by the private forestry bodies. In 2012, public property represented 65.6%, and private property represented 34.4%, since then having the same majority administration in the case of both categories. The area of the forest fund in private property has an increasing trend, to the disadvantage of the area in public property, due to the continuation of the process of retrocession of forests (fig. 2).

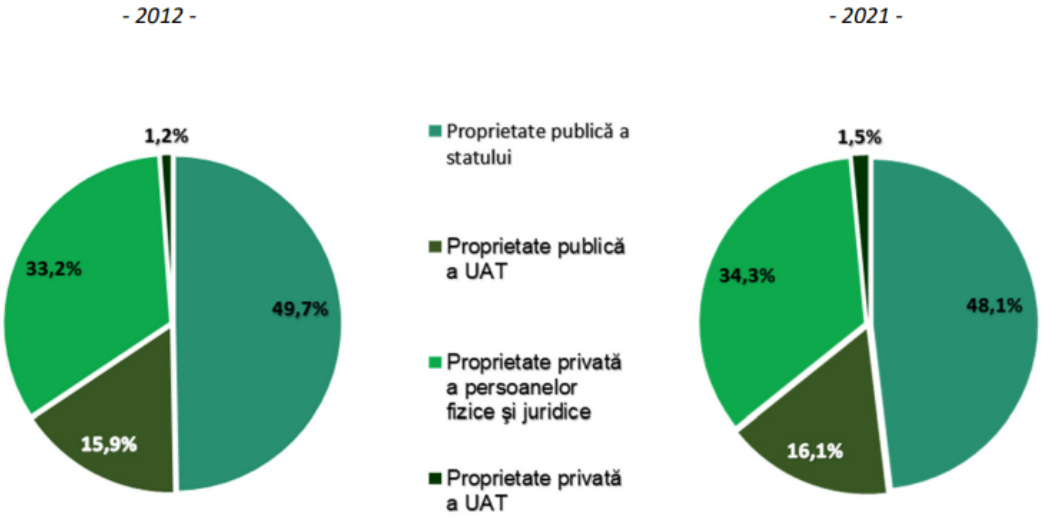

Figure 2. *Structure of the surface of the forest fund, by forms of property [2]*

From public data [2] it appears that the state has smaller and smaller areas of forests, while private owners - increasingly larger such areas.

In 2021, the forest fund was concentrated in a significant proportion in the Center (19.2% of the total forest fund) and North-East (18.2%) development regions, followed by the West (16.2%), North–West (15.3%), South–West–Oltenia (12.3%), South– Muntenia (10.0%), South–East (8.4%) and Bucharest–Ilfov (0, 4%) development regions.

Larger forest fund areas were registered, in 2021, in the counties: Suceava (438 thousand hectares), Caraş-Severin (434 thousand hectares), Hunedoara (316 thousand hectares), Argeş (277 thousand hectares), Vâlcea (274 thousand hectares) Bacău (273 thousand hectares), Harghita (264 thousand hectares), Neamţ (262 thousand hectares) and Maramureş (260 thousand hectares) (fig. 3).

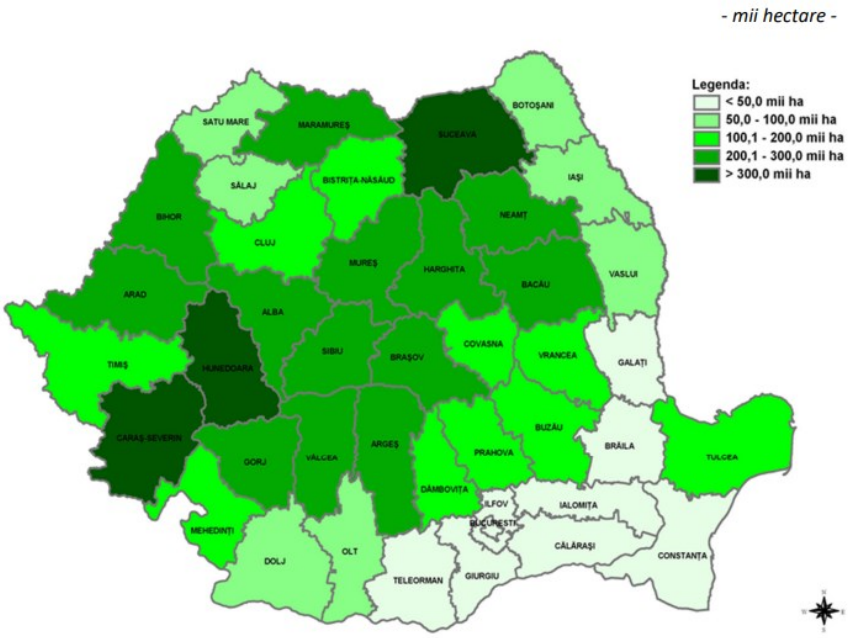

Figure 3. *Romania's forest fund by county [2]*

TIMBER

In 2021, approximately 20 milion cubic meters (gross volume) of wood were harvested, 342 thousand cubic meters more than in 2020. By forest species, softwoods represent 40.1% of the total volume of timber harvested, beech 30, 8%, various hard species (alcacia, sycamore, ash-tree, walnut, etc.) 11.3%, oak 10.1% and various soft species (linden, willow, poplar, etc.) 7.7%.

At the level of the development regions, 25.5% of the total volume of timber was harvested from the North-East region, 24.3% from the Center region, 12.9% from the North-West region, 12.2% from the West region, 10.7% from the South-Muntenia region, 7.3% from the South-West Oltenia region, 6.9% from the South-East region and 0.2% from the Bucharest-Ilfov region.

The structure of wood species harvested at the level of the development regions is as follows: softwood represent the majority of the timber harvested in the Center (58.6%), North-East (54.5%), and South-East (29.5%) development regions, oak in the Bucharest-Ilfov (40.0%) development region, and beech in the West (45.0%), South-Muntenia (29.4%), South-West-Oltenia (36.5 %) and North-West (36.2%) development regions (fig. 4).

At the county level, in 2021, the largest amount of timber was harvested in Suceava county (10.6%), followed by Harghita (8.8%), Neamţ (6.0%) and Bacău (5. 6%), and the smallest quantities were harvested in Giurgiu county (approximately 0.6%), Olt, Ialomiţa and Brăila (approximately 0.4%), Teleorman, Ilfov, Constanţa and Galati (0.3%).

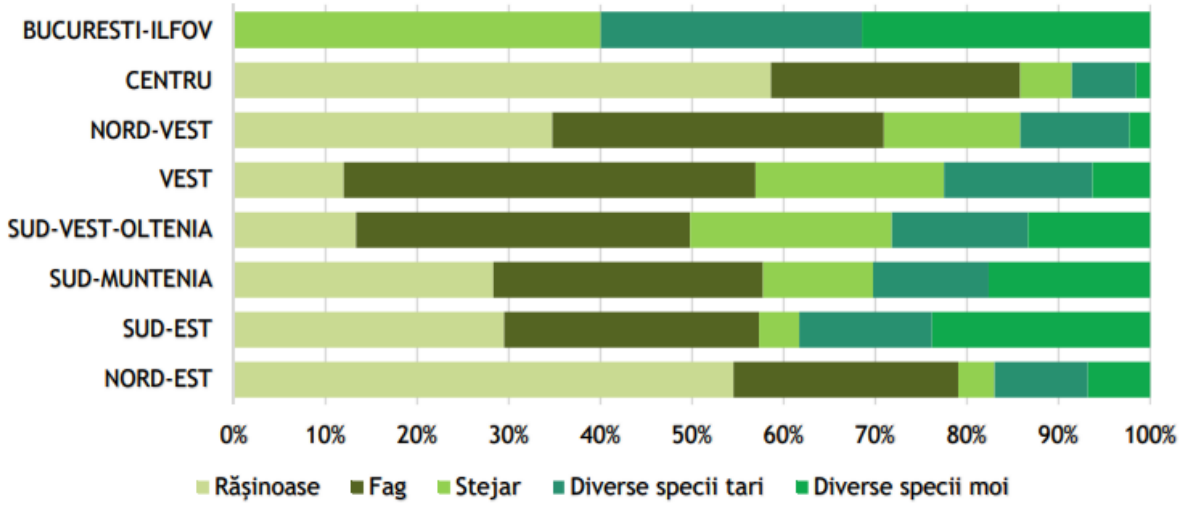

Figure 4. *The structure of harvested timber species, by development region [2]*

FOREST REGENERATION

In 2021, forest regeneration works were carried out on 23,981 hectares, 1,746 hectares less than in 2012. Of the total areas subject to the regeneration process, 15,904 hectares (66.3%) were natural regenerations, with 1,258 hectares less than in 2020, while 8077 hectares (33.7%) were represented by artificial regenerations, 50 hectares more than in 2020.

During the entire analyzed period, artificial regenerations had a lower share in the total regenerated surface than natural regenerations. Between the first and the last year of the analyzed series, an increase in the proportion of naturally regenerated surface, at the expense of artificial regeneration, is observed, in 2012 the share of natural regeneration being of about 57% and in 2021 of about 66%, with 9 percentage points higher (fig. 5).

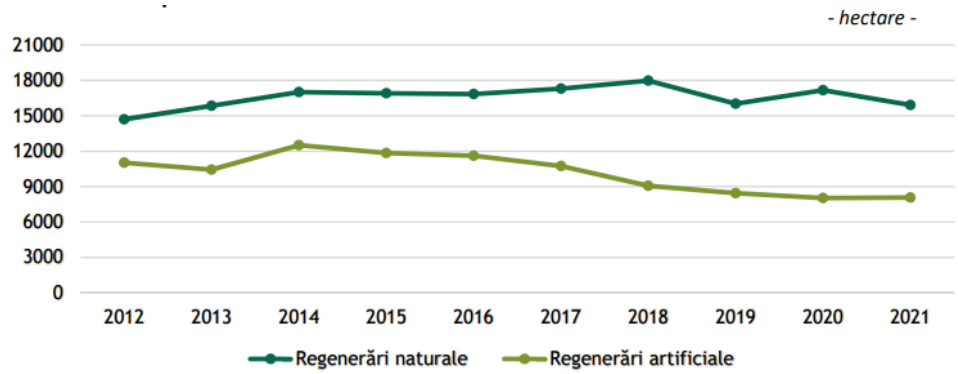

Figure 5. *Evolution of regenerated surfaces, by types of regeneration [2]*

In 2021, most of the regenerations, i.e. 99.0% were carried out on lands in the forest fund, 0.8% on lands outside the forest fund and 0.2% on lands taken over in the forest fund.

Also in 2021, land preparation works were carried out on an area of 21838 hectares, with 19587 hectares more than in 2020, soil preparation works on an area of 1579 hectares, with 34 hectares more than in 2020 and tending operations for young crops on 61871 hectares, with 3230 hectares less, compared to 2020.

At the same time, natural regeneration support works were carried out on 16,110 hectares, with 1,341 hectares less than in 2020. Between the first and last year of the analyzed series, an increase in the areas with land preparation works and a decrease of the tending operations for young crops and natural regenerations can be observed, while natural regeneration support works were kept approximately at the same level (fig. 6).

Denumirea lucrărilor / Anul	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Pregătirea terenului	3683[2)]	2761	2522[5)]	2977	3023	2981	2224	2481	2251	21838
Pregătirea solului	...	2614	2222	1943	1816	1549	1379	1246	1545	1579
Împrejmuire plantaţii şi regenerări naturale instalate	-	-	-	-	-	7937[1)]	1191[1)]	784[1)]	539[1)]	1520[1)]
Lucrări de îngrijire a culturilor tinere si regenerarilor naturale	85308	84951	88379	81378	83730	85299	83027	72613	65101	61871
Lucrări de ajutorare a regenerării naturale – total	16321	17598	20353	18482	18134	19044	20662	18408	17451	16110
– lucrări pentru instalarea semintişului natural	5429	5840	4966	5311	5417	5979	6327	4262	4959	3988
– semănături şi plantaţii sub masiv	395	342	224	306	711	698	259	363	248	206
– lucrări de întreţinere	10497	11416	15163	12865	12006	12367	14076	13783	12244	11916

1) indicator introdus începând cu anul 2017
2) conţine şi pregătirea solului

Figure 6. *Land and soil preparation works, tending operations for young crops and natural regeneration support works (ha) [2]*

Greenpeace Romania launched, in 2018, the "Forest Guardians" mobile application, which allows users to be actively involved in the fight to protect forests, especially virgin forests, by identifying illegal logging and reporting it to the authorities. In the first week after the launch of the "Forest Guardians" application, 2300 users were registered who monitored the forests of the Secular Land, the most valuable forests of Romania. 450 satellite images of virgin forests, equivalent of about 15,000 hectares, have been uploaded to the application.

DESCRIPTION OF IMPACTS

Environmental impact assessment is defined as the process intended to identify, describe and establish, depending on each case and in accordance with the legislation in force, the direct and indirect, synergistic, cumulative, main and secondary effects of a project on human health and on the environment, completed by the environmental impact assessment report. The framework procedure for environmental impact assessment is established by H.G. 445/2009, in accordance with the provisions of O.U.G. no. 195/2005 on environmental protection, approved with amendments and additions by Law no. 265/2006 [3].

ECONOMIC IMPACT

If we study the problem of deforestation superficially and from the point of view of quick but short-term benefits, the economic advantages resulting from the exploitation of timber and vacant land are obvious. The profit can be considerable in a relatively short period of time and with low costs (especially illegal deforestation, those which feed the black market, operate with unqualified personnel, remunerated below the value of the work performed and which do not involve costs related to the reforestation of the cleared land surfaces).

If we look more closely at the problem of deforestation and take into account the studies carried out by researchers from all over the world, we reach at least worrying conclusions regarding the influence on the world economy that the decrease in the amount of renewable resources can have.

Thus the destruction of forests and other aspects of environmental degradation could halve the living standards for underdeveloped countries around the world and could reduce global GDP by approximately 7% by 2050.

Forest products play an important role in the development of human society, it can be compared to the role played by water or arable land. Today, developed countries continue to use timber for house construction and wood pulp for the manufacture of various types of paper. In developing countries almost 3 billion people use wood for heating and cooking, with the forest products industry representing a significant part of the economy in both developed and developing countries. The financial gains obtained in a short term are realized by transforming the lands occupied by the forest into lands intended for agriculture or by overexploitation of wood products. These actions usually lead to the loss of income in the medium and long term due to the decrease in biological productivity. Thus, many areas whose development was based on the utilization of wood are currently facing a decline due to the substantial decrease in the incomes obtained from the ever-lower production of timber.

IMPACT ON THE CLIMATE

Deforestation (uncontrolled cutting) is a process that continuously shapes the climatic and geomorphological characteristics both at a regional and at a global level.

Deforestation is a factor that contributes to global warming, being often considered as one of the major causes of increasing the greenhouse effect [4].

The greenhouse effect should not be analyzed only on a global scale, it being present and manifesting itself in a perceptive manner in most large cities. An example in this sense is the capital of Romania, Bucharest, which is known to be the European capital with the smallest forested area in relation to the number of inhabitants. Thus, expert observations show that in the center of the city, where vegetation has been eliminated in favor of buildings and boulevards, the average temperature on summer days is 3 to 5 degrees higher than the temperature measured in the peripheral areas or in suburban areas where the forest vegetation is richer.

Recent calculations show that carbon dioxide emissions directly caused by the cutting and degradation of forests contribute on average approximately 12% of the total anthropogenic carbon dioxide emissions, with values between 6 and 17% in Romania. Trees, as well as other plants, can remove carbon dioxide from the atmosphere during the process of photosynthesis by releasing oxygen during the process of respiration.

IMPACT ON HYDROLOGICAL SYSTEMS

The hydrological cycle (water cycle) is also affected by massive deforestation. Trees use underground water, through their roots they extract water and release it into the atmosphere. When part of the forest is deforested, the amount of water evaporated into the atmosphere through this mechanism decreases, resulting in a much drier local climate.

Deforestation also reduces the water content of the soil; by lowering the groundwater level, the soil cohesion also reduces (the risk of rain erosion and landslides increases). Forests can increase the recharge capacity of aquifers, but to the same extent they can also constitute a major factor in the depletion of underground water reserves.

The decrease in the areas covered by forest reduces the capacity of interception, retention and transpiration of the waters from precipitation. Thus, instead of the water from precipitation being captured and then directed to the aquifer systems, deforested areas favor the emergence of the phenomenon of surface runoff, characterized by a much faster inflow than in the case of underground water. This phenomenon leads to the formation of flood-waves and implicitly floods, the frequency and severity of which is much higher than in forested areas.

IMPACT ON SOIL

One of the problems identified is the increase in soil erosion (considering that it takes approximately 100 years to form a cm3 of topsoil). Unaffected forests have a very low rate of soil loss, approximately 2 tons per km2; through deforestation, the rate of soil erosion increases, by increasing the amount of water that drains on the surface (superficially) and decreasing the amount of litter from the surface to provide organic materials. Over time, serious phenomena of deep erosion appear, which, in addition to the loss of significant amounts of fertile soil (or even total), favor the formation of both trenches and ravines that will be transformed into streambeds during periods of abundant rainfall.

A second big problem is landslides, which often result in significant material damage, the blocking of communication routes, but also in the loss of human lives. In addition to reducing soil cohesion due to the reduction of its moisture, deforestation contributes directly to soil instability by destroying the root system (being correlated with a reinforcing effect provided by tree roots). The lands most exposed to the occurrence of instability phenomena are those that have a steep slope, favoring the occurrence of the phenomenon of erosion, and the vegetation layer has a relatively shallow depth (below 1 m).

IMPACT ON ECOSYSTEMS

A direct result of deforestation is the decline of biodiversity. The removal or destruction of forested areas has led to the degradation and reduction of biodiversity in those areas, given the fact that forests provide natural habitat conditions for numerous faunal species.

At the same time, the forest viewed as a biotope is able to provide natural remedies and adaptation solutions for the plant and animal species it shelters. Massive deforestation can destroy certain genetic adaptations (such as resistance and resilience to certain pests of characteristic species) irreparably.

Another undesirable effect of deforestation, especially when it aims to expand or build new residential areas or tourist resorts, due to the relatively high capacity to adapt to the new habitat, is the appearance of "hybrid species" such as "garbage bears" (frequently found in the Braşov, Sinaia, Predeal area, etc.) or "city foxes" (a delicate problem in the UK). These species represent risk factors for the resident population, being exposed to direct attacks but also to diseases, if we consider these animals as vectors for the transmission of serious diseases such as hydrophoby, rabies, etc.

CONCLUSIONS

Deforestation and, implicitly, the degradation of ecosystems were encouraged by a series of economic incentives, which showed us that the utilization of timber and the use of land occupied by forests for other purposes is much more profitable at the moment than the preservation of forests. Many important functions of forests cannot be quantified, they have no market, and therefore no intrinsic economic value for their owners or for the communities whose well-being is based on the utilization of wood.

No other terrestrial ecosystem provides a more complex balance and greater stability than the forest. Green spaces, regardless of ownership and destination, serve to improve the quality of the environment and maintain ecological balances.

A solution to eliminate these effects would be reforestation. Romania will be entitled, from the European Union, to 730 million euros through the National Recovery and Resilience Plan within the call for projects PNRR/2022/C2/I.1.A, as follows:

- 500 million euros - "Support for Investments in new areas occupied by forests";
- 100 million euros - "Support for restoring the forest potential affected by fires, by unfavorable weather phenomena that can be assimilated to a natural calamity, by plant infestations with harmful organisms and by catastrophic events";
- 5 million euros through the de minimis aid scheme - Reforestation carried out starting from February 1, 2020 until the date of approval of the state aid scheme;
- 95 million euros - The establishment of forest curtains for the protection of communication routes according to Law no. 289/2002 and for the afforestation of degraded lands according to Law no. 100/2010;
- 30 million euros - for urban forests. [5]

Following what has been presented, it is left up to mankind to decide whether forest resources are vital or not.

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