# THE RELATION BETWEEN BEARS AND FOREST CLEAR-CUTTING

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**Abstract**
Deforestation, forests diminution, and scarcity of natural food are widely regarded as the primary factors contributing to the presence of brown bears in urban areas of Romania, and human-bear conflicts. Public misunderstanding regarding forest and bear management practices often leads to skepticism of expert information, worsened by misinformation in the media and social networks. This article aims to offer insight into deforestation and human-bear conflicts in Romania. It analyzes national and international official data, to assess the percentage of forested areas, primary causes of deforestation, brown bear population and density, and the number of human-bear conflicts. It also compares Romanian data with other European countries to explore the potential correlation between forested area percentage and human-bear conflicts. Between 2000 and 2020, Romania's forest area comprised 29.02% of its land, while Poland, France, and Italy had percentages of 29.89%, 30.04%, and 30.65%, respectively. Interestingly, the proportion of forest cover did not consistently correlate with the frequency of conflicts. Countries with similar forest percentages to Romania experienced fewer conflicts, whereas countries with higher percentages, like Slovenia (61.65%) and Slovakia (39.86%), faced numerous human-bear conflicts due to the dense brown bear population. The management of bears served as a valuable indicator of the extent of damage caused by these animals. In Croatia, Sweden, Slovakia, and Slovenia, where 10-16% of the bear population was harvested annually, lower levels of damage were reported. In contrast, Romania, with an annual harvest of only 2-3% of the bear population, experienced higher levels of damage.
**Keywords:** deforestation, brown bear, management, logging, density.
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## 1. INTRODUCTION

„Deforestation" and human-bear conflicts are frequently the subject of media debates, and society sees a correlation between these two subjects. This association was discovered in a recent study by Cimpoca



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and Voiculescu (2022). However, deforestation was seen here as an action resulting in changing the destination in the use of the land. In this study, the conflicts were also associated with the large bear population size, the expansion of human settlements, and anthropogenic food.

Illegal logging (nicknamed deforestation) in Romania "was reducing the brown bear's natural forest habitat, and the lack of natural food in the forest pushes bears into urban and rural areas", where they produce damage to crops or domestic animals, points out Radio Romania International (2017). These arguments were also supported and advanced to the general public by Rossberg (2018), Hup & Noppen (2022), and Hup (2023) in their articles.

Jurj et al. (2021) and Roellig et al. (2014) both observed a rise in human-bear encounters due to habitat fragmentation from urbanization, expanded road infrastructure, and railway networks.

Deforestation is a term that is misunderstood by society. Law No. 46/2008 defines it as being "the complete removal action of the forest vegetation, without being followed by its regeneration, with the change of use and/or destination of the land".

Many associate clear-cutting with illegal cutting, but the complete removal of trees from some surfaces can also be the effect of abiotic factors (e.g., wind, drought, storm, fire) or biotic factors (e.g., defoliating insects and bark beetles) on the affected surfaces. When trees are felled or dried by these factors, interventions are compulsory in the form of logging, which requires approval from competent authorities. It is important to note that deforestation shares only one key similarity with felling: the large area from which the trees are removed. This often leads to controversy and speculation, and that is because society does not notice that legally approved cuttings result in uncovered land that will be afforested, through artificial regeneration works, in the next two growing seasons (Law No. 175/2017).

Deforestation also involves the harvesting of trees due to the permanent changing of destination of some lands from the forestry circuit or the temporary occupation of some areas from the forest area. Although the action fits precisely the definition of deforestation stated at the beginning of the chapter, the Forestry Code calls such interventions "legally approved deforestation" (Law No. 46/2008). Approval of the permanent removal of lands from the forestry circuit is usually conditional on providing compensation land equal to the removed forest area, which is not degraded or productive and suitable for afforestation. The land provided must be afforested/reforested within two growing seasons from receipt by the entity that takes over the land.

In order to temporarily occupy areas from the National Forest Area, the beneficiaries must pay a fee. This fee includes the costs of replanting the forest on the occupied land and ensuring that the trees can reach the canopy stage. (Law no. 46/2008).

Logging of timber from existing forests is practiced in all European countries or other continents, and illegal logging is a practice found globally (PETI, 2023). In Romania, tree harvesting is done according to the

annual allowable cut of forests, established by the specialists in the field and exposed in the forest management plans.

Based on the aspects outlined in this chapter, the paper's aim was to examine the various potential factors affecting brown bears, leading to the abandonment of their natural habitat and an increase in incidents between humans and bears, to furnish the public with truthful and unbiased information regarding the state of deforestation and brown bears in Romania.

The study will answer the question: The clear-cuttings or the high density of bears were the cause of the huge number of human-bear conflicts produced in Romania?

Reaching the purpose implies achieving the following objectives:

a) Determining the proportion of forests of the total land area and the proportion of clear-cuttings areas in Romania and other European countries.

b) Analysing the primary factors that led to the clear-cuts of forests.

c) Evaluating the numbers, densities, and damages caused by bears in Romania and other European countries.

## 2. MATERIALS AND METHODS

### 2.1. Study area and data sources

The general framework covers aspects related to the forest area, dominant factors of clear-cutting, brown bear density and population, and human-bear conflicts in Romania, France, Spain, Italy, Slovenia, Poland, Sweden, Czech Republic, Switzerland, Bulgaria, Austria, Slovakia, Portugal, Croatia, and Germany (Figure 1).


**FIGURE 1. MAP OF THE STUDIED COUNTRIES**
Source: Author's own representation based on Google Earth maps 2024

The choice of the last 14 countries was linked to the different land areas, forest percentages, and densities of bears, as well as different brown bear damage numbers compared to Romania. The necessary statistical data on Romania's total forest and land area and the above-mentioned European



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countries were extracted from The Food and Agriculture Organization of the United Nations (FAOSTAT) platform and reported by officials from 2000 to 2020.

This paper also examines the situation of clear-cut areas and the factors that contributed to this action. The information for this stage was extracted from the Global Forest Watch platform and covered the 2001-2020 period.

Data on brown bear populations and habitats in the researched countries was collected from the European Environment Agency Platform (Eionet), from 2000-2018, the International Union for Conservation of Nature Red List of Threatened Species (IUCN), along with information from the national brown bear management or action plans of the studied countries.

The data on the annual instances of damage caused by bears to livestock and crops were gathered from the Romanian brown bear damage national database, the Slovakian brown bear management plan, and the Life Dinalp Bear project for Slovenia and Croatia, focusing on countries with a high bear population density. Additionally, information was sourced from the National brown bear management or action plans for other countries included in the study to ensure comprehensive coverage. To maintain consistency in the analysis, the study concentrated on the years with the highest reported bear-related damage. Due to variations in the recorded period for each country, the research period ranged from 1996 to 2022.

## 2.2. Methodology

To show the evolution of the forest area, related data were extracted individually for each year. Based on the data retrieved, the share of forest areas of the total land surface was calculated to assess the condition of Romania's forests compared to other studied countries. For this calculation, the average forest area percentage was used (Table 1). The same methodology has been utilized to determine the proportion of clear-cut areas from the total range of the forest in studied countries. For this part, the number of clear-cut hectares was applied.

The number of clear-cut hectares was also used to determine the proportion of each dominant factor contributing to the logging produced in the considered countries. The dominant factors analysed were „forestry", „shifting agriculture", „unknown causes", „urbanization", and „wildfire". Based on the legislation in force during the research period, a brief description of the conditions under which each factor can perform clear-cuts in Romania was made. After extracting the data from the Eionet Platform and calculating the average number of bears in each bioregion, their density was calculated by relating to the habitat areas of the bears (Table 2).

TABLE 1. LAND SURFACE AREA AND FOREST AREA IN 2000-2020

| Country | Land surface area (thousands of hectares) | Forest area surface (thousands of hectares) | | | | Average forest area percentage |
|---|---|---|---|---|---|---|
| | | 2000 | 2010 | 2015 | 2020 | |
| Austria | 8,252 | 3,838 | 3,863 | 3,881 | 3,899 | 46.90% |
| Bulgaria | 10,856 | 3,375 | 3,737 | 3,833 | 3,893 | 34.17% |
| Croatia | 5,596 | 1,885 | 1,920 | 1,922 | 1,939 | 34.25% |
| Czech Republic | 7,720 | 2,637 | 2,657 | 2,668 | 2,677 | 34.46% |
| France | 54,756 | 15,288 | 16,419 | 16,836 | 17,253 | 30.04% |
| Germany | 34,939 | 11,354 | 11,409 | 11,419 | 11,419 | 32.63% |
| Italy | 29,572 | 8,369 | 9,028 | 9,297 | 9,566 | 30.65% |
| Poland | 30,613 | 8,369 | 9,329 | 9,420 | 9,483 | 29.89% |
| Portugal | 9,161 | 3,281 | 3,252 | 3,312 | 3,312 | 35.91% |
| Romania | 23,008 | 6,366 | 6,515 | 6,901 | 6,929 | 29.02% |
| Slovakia | 4,808 | 1,901 | 1,918 | 1,922 | 1,926 | 39.86% |
| Slovenia | 2,014 | 1,233 | 1,247 | 1,248 | 1,238 | 61.65% |
| Spain | 49,956 | 17,094 | 18,545 | 18,551 | 18,572 | 36.41% |
| Sweden | 40,728 | 28,163 | 28,073 | 27,980 | 27,980 | 68.87% |
| Switzerland | 3,952 | 1,196 | 1,235 | 1,252 | 1,269 | 31.33% |

Source: Author's own representation based on FAOSTAT data 2023

TABLE 2. THE NUMBER, DENSITY, AND HABITAT AREA OF THE BROWN BEAR

| Country | Brown bear's average number in the period (2000-2018) | Suitable habitat area (km2) | Brown bear density (individuals/ 100km2) |
|---|---|---|---|
| Germany | Extinct | Not reported | - |
| Portugal | Extinct | Not reported | - |
| Switzerland | Presence uncertain | Not reported | - |
| Austria | 8 | 2,622 | 0 |
| Bulgaria | 484 | 12,822 | 4 |
| Croatia | 951 | 12,372 | 8 |
| Czech Republic | 3 | 3,900 | 0 |
| France | 28 | 6,818 | 0 |
| Italy | 113 | 7,076 | 2 |
| Poland | 112 | 8,274 | 1 |
| Romania | 6,372 | 69,000 | 9 |
| Slovakia | 900 | 12,000 | 8 |
| Slovenia | 550 | 12,096 | 5 |
| Spain | 244 | 21,990 | 1 |
| Sweden | 2,940 | 150,000 | 2 |

Source: Author's own representation based on Eionet Platform data 2023



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Furthermore, the annual average of damage caused by brown bears in countries with a high concentration of bears per square kilometer was assessed. The number of damages caused to people's property by bears in countries with low bear densities was also evaluated for a better comparison. The results were compared with the surface of forests and clear-cut areas (Table 3) and presented in the next chapter in graphical form using the Microsoft Excel spreadsheet program.

**TABLE 3. BROWN BEARS DAMAGE, FOREST AREA SURFACE AND CLEAR-CUT SURFACE IN THE PERIOD 2001-2020**

| Country | Forest area in 2020 (hectares) | The area of the forest in Romania compared to the rest of the countries (%) | Clear-cut surface (hectares) | The annual average of damage produced by bears to crops and livestock |
|---|---|---|---|---|
| Austria | 3,899,000 | > 78 | 350,562 | 40 |
| Bulgaria | 3,893,000 | > 78 | 137,216 | 196 |
| Croatia | 1,939,000 | > 257 | 87,970 | 24 |
| Czech Republic | 2,677,000 | > 159 | 457,497 | 0 |
| France | 17,253,000 | < 149 | 1,263,230 | 0 |
| Germany | 11,419,000 | < 65 | 946,834 | 0 |
| Italy | 9,566,000 | < 38 | 425,678 | 166 |
| Poland | 9,483,000 | < 37 | 1,152,278 | 38 |
| Portugal | 3,312,000 | > 109 | 1,464,391 | 0 |
| Romania | 6,929,000 | - | 382,412 | 950 |
| Slovakia | 1,926,000 | > 260 | 224,537 | 56 |
| Slovenia | 1,238,000 | > 460 | 49,573 | 464 |
| Spain | 18,572,000 | < 168 | 1,594,954 | 29 |
| Sweden | 27,980,000 | < 304 | 4,891,827 | 260 |
| Switzerland | 1,269,000 | > 446 | 40,796 | 0 |

Source: Author's own representation based on FAOSTAT and GFW data 2023

## 3. RESULTS

### 3.1. The share of the national and international forest area of the total land surface

Slovenia has the smallest land area, with 2,014,000 hectares, while Spain has the largest, with 49,956,000 hectares. Their forest areas were 61.65% and 36.41%, respectively (Figure 2).

Romania's total land area in the analysed period was ~ 23,008,000 hectares, of which 29.02% was covered in forest (Figure 7). In the year 2020, Romania's total forest area was of 6,929,000 hectares (Figure 8). It was 460% larger than Slovenian forests, 37% smaller than the one of Poland, 38% smaller compared with Italy, 65% smaller than the one of Germany, and 149% smaller compared with France.

Italy has a land area that is with 29% larger than Romania, while Poland's total land area is 33% greater than Romania. The percentage of Romanian forests was 1.63% lower than the one of Italy and 0.87% lower compared with Poland.

Germany's land area is 52% larger than Romania, while the lands in France amount to 138% more than those in Romania. The percentage of Romanian forests was 3.61% lower than Germany's and 1.02% lower compared with France.

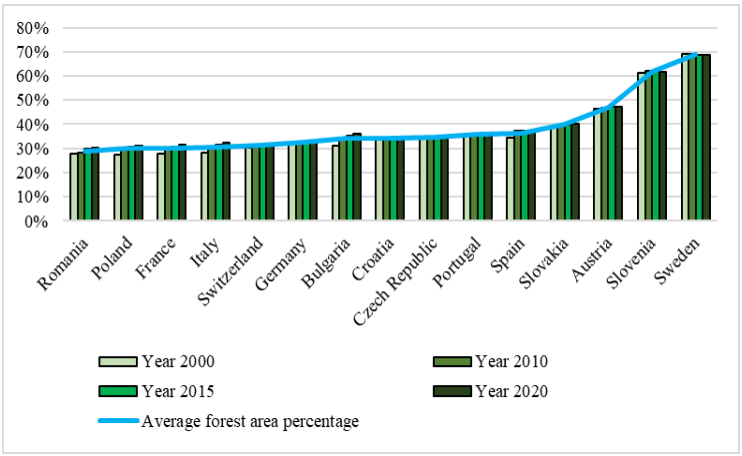


**FIGURE 2. FOREST AREA PERCENTAGE OF THE TOTAL LAND AREA IN 2000-2020**
Source: Author's own representation based on FAOSTAT data 2023

### 3.2. The situation of clear-cut areas in Romania and other European countries and the dominant factors

In the period 2001-2020, the highest percentage of tree cutting carried out in the analyzed countries was registered in Portugal (n=44%), Sweden (n=18%), Poland, and Slovakia (n=12%). The lowest percentage was 3%, recorded in Switzerland. Romania's percentage of clear-cuts was 6%, as is presented in Figure 3.

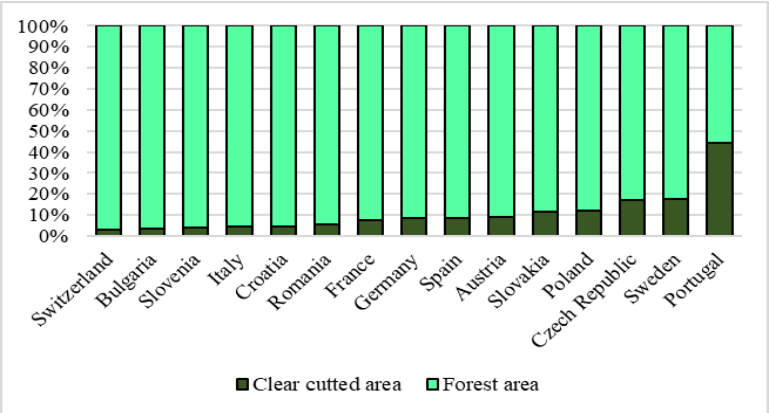


**FIGURE 3. THE PROPORTION OF CLEAR-CUTS AREAS OF FOREST AREA IN SOME EUROPEAN COUNTRIES IN 2001-2020**
Source: Author's own representation based on GFW data 2023



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Between 2001 and 2020, 382,412 hectares of forest were clear-cut in Romania. The annual average of forest hectares in Romania, from which the dominant factors completely cut trees, was approximately 19,121 hectares (GFW, 2023).

Of the total clear-cut area, 94% was due to forestry cuttings, while only 0.36% was converted from wooded pasture to agricultural land.

Unknown factors of clear-cuts had a share of 3.53%, and 1.68% represents the forested land that was affected by wildfires (Figure 4).

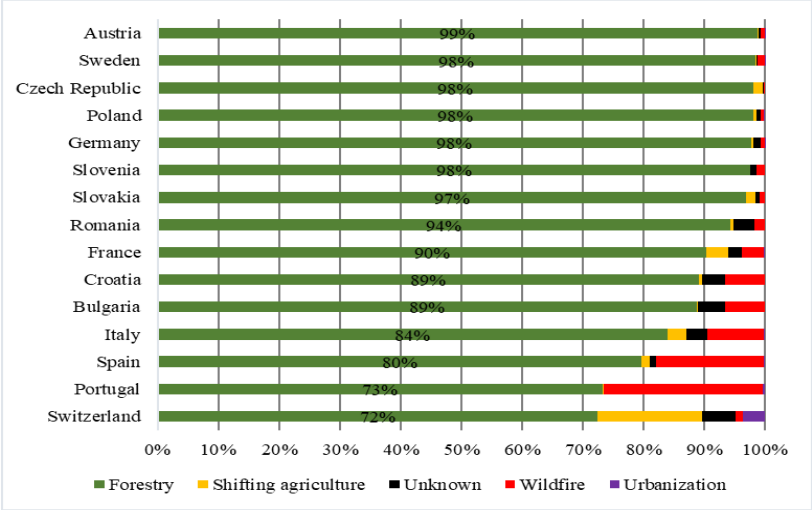


**FIGURE 4. PERCENTAGE CONTRIBUTION OF DOMINANT FACTORS TO FOREST HARVESTING IN 2001-2020**
Source: Author's own representation based on GFW data 2023

In the rest of the studied countries, the main dominant factors that contributed to the clear-cutting of trees from the forest were the same as in Romania. According to Figure 6, the highest percentage of the „forestry" factor was registered in Austria (n=99%), and the lowest was in Switzerland (n=72%) and Portugal (n=73%).

The last two countries mentioned had higher values of the dominant factor, "shifting agriculture" (e.g., Switzerland = 17%) and „wildfire" (e.g., Portugal = 26%).

### 3.3. The studied European countries' bear number and density, suitable habitat, and the number of damage produced by brown bears

The data reported on the Eionet Platform (2023) show that there were approximately 6,372 bear individuals on the territory of Romania. Their density was 9 bears/100 km$^2$.

On the same platform, it is stated that Slovakia and Croatia had 900 and 951 bears. In these cases the density was 8 bears/100 km$^2$.

The number of bears reported for Slovenia on the Eionet Platform was 550, and the density was 5 individuals/100 km$^2$.

In Germany and Portugal, *Ursus arctos* L. was listed as an extinct species in the 2016 IUCN assessment, and in Switzerland, the presence of bears was uncertain (IUCN, 2023).

As Table 3 shows, the annual average of damage caused by bears was approximately 950 cases in Romania (MMAP 2023) and 464 cases in Slovenia (Jonozovič & Berce, 2019). According to Figure 5, these countries registered the highest number of brown bear damage to human crops and livestock of all the studied countries.

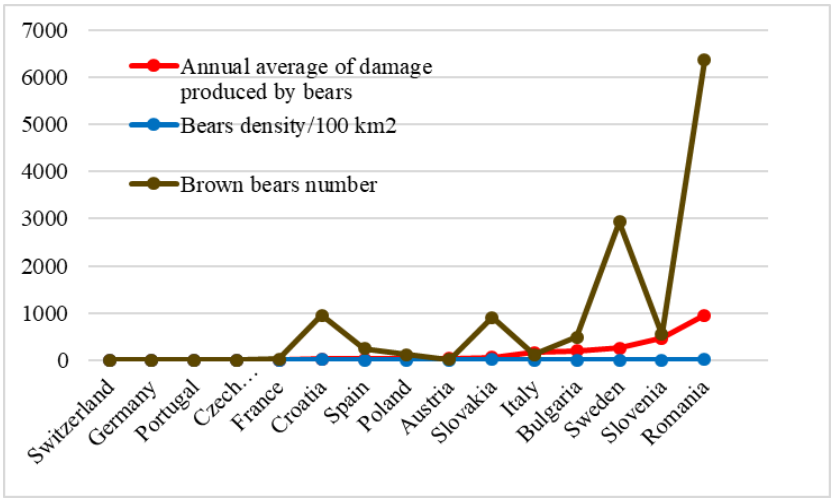


**FIGURE 5. THE SITUATION OF BROWN BEAR'S DENSITY, NUMBER AND THE DAMAGE PRODUCED BY BEARS**
Source: Author's own representation based on Eionet Platform data 2023

In Slovakia, also a country with a high density of bears, the annual average number of damage caused by brown bears was 56 (Rigg & Adamec, 2007).

Except for the countries that did not have *Ursus arctos* L. species on their territory, the lowest number of damages was recorded in Croatia. This country's annual average recorded damage was of 24 cases (Skrbinsek et al., 2019).

## 4. DISCUSSIONS

The present study showed that Romania had a larger forest area than eight of the 15 analysed countries during the examined period. According to FAO (2023) data, forestry activities were the primary dominant factor contributing to the clear-cuts in Romania's forests. These activities are necessary for sustainable and continuous forest management and are part of the treatment application techniques in the Romanian forests (Order No. 2535/2022). Forestry activities were also carried out in the rest of the countries studied, and in countries with a forest percentage almost similar to that of Romania, like Germany and Poland, the percentage of forestry activities was 4% higher than the one of Romania.



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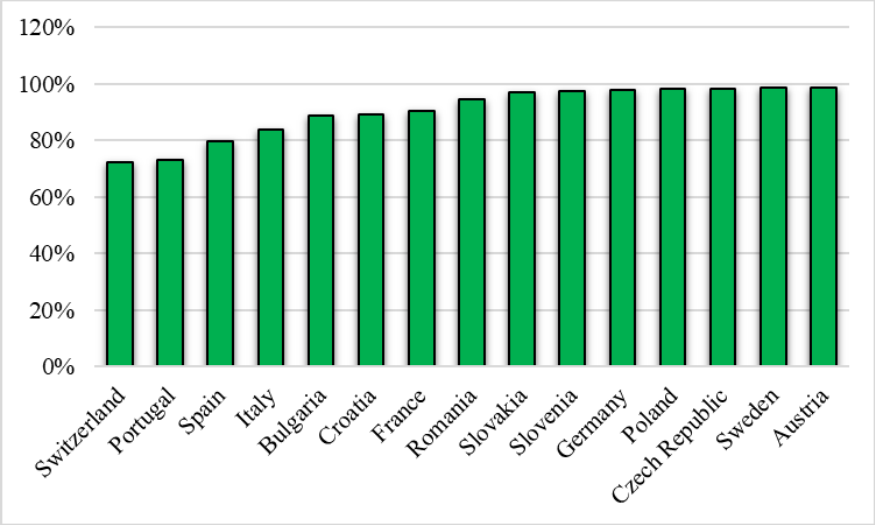


**FIGURE 6. COMPARISON OF "FORESTRY" FACTOR (CLEAR-CUTTING) PROPORTION OF THE FOREST AREA IN 2001-2020**
Source: Author's own representation based on GFW data 2023

There were also countries where the share of clear-cutting due to forestry interventions was lower, e.g., Spain, Portugal, Italy, and France, but this was due to the higher percentage of areas affected by wildfires. In Romania, the number of hectares on which trees were affected by wildfire was not as alarming as in other countries because it was 98% lower than the number in Spain and Portugal.

However, in the case of Spain (Diego et al., 2023) and Portugal (Mateus & Fernandes, 2014), the losses were both due to anthropogenic factors, but especially to abiotic ones; in Romania, it was confirmed that the main factor in the outbreak of wildfires was anthropogenic. In most cases, the burning of the forests occurred due to the extension of the fire carried out by various farmers, aiming to burn stubble or meadows near the forest (Popa, 2023). Such events affect the bear's habitat, and those who contribute to this action are not the wood harvesters but precisely the farmers who, through their carelessness, leave the fire unattended or can no longer control it.

In addition to forestry treatment application, the interventions could also be constituted by salvage logging, which could be confused with deforestation, because of the surface, sometimes large, on which the cuts were made. In Romania, this forestry intervention was carried out as a result of the cutting of fallen trees due to the effect of abiotic or biotic factors. The Forestry Code of Romania provides the full harvesting of these wood products, and "the maximum period of artificial regeneration for these exceptional situations cannot be longer than five vegetation seasons after cutting" (Law No. 46/2008).

The clear-cuts were not only the consequence of the harvesting by the economic agents from the forests of Romania, as shown in the analyzed data. The cuttings mentioned above were a consequence of changing forested lands into agricultural land. However, in Romania, transitioning to agricultural land

is not carried out by converting forest areas but by using forested lands from outside the National Forest Area, and these kinds of lands are not located in brown bears' natural habitat.

Indeed, agricultural lands near the bear's habitat could create conflicts between bears and people because the agricultural species grown on these lands can be food sources for bears, and such cases have been reported in Romania by Jurj (2021). The field data showed that the presence of bears in agricultural crops did not occur as an effect of cutting trees from the lands transformed into agricultural lands but occurred when their high density created an intraspecific pressure in the bears' habitat, and some individuals were pushed towards the edge of the bear's area or even outside it.

The ”unknown factor” of the clear-cutting from Romanian forests could have been the cuttings carried out to change the destination of the forest areas in lands with special destinations, such as the lands permanently transformed from the forest area (e.g., roads, residential houses, or railways) or those temporarily occupied by different objectives of interest (e.g., gas wells or interventions on electrical networks).

According to the Romanian Forest Code, the Ministry of Environment, Waters, and Forests approved the cutting of trees on the surfaces on which the objectives mentioned above will be achieved, so they were not illegal. In any case, depending on the objectives that were to be achieved following the change in the destination of the lands in the forest areas, the beneficiaries had the legal obligation to give other lands as compensation for those removed from the forestry circuit. Of course, exceptions may also be encountered, provided by the Romanian legislator for some categories of objectives, which exempt particular beneficiaries (e.g., the National Meteorological Agency, the Special Telecommunications Service, as well as the objectives declared by national interest) from the obligation compensating the areas permanently removed from the National Forest Area (Law no. 46/2008).

The land area given in compensation could not be less than three times the area of the requested land, or, in exceptional situations, it had to be at least equal to it. Also, article no. 37 of the Forestry Code stipulates that the lands used to compensate for the areas removed from the forest circuit must be compact, non-degraded, and not located in the alpine or subalpine bioregions, and the afforestation of the new surfaces had to be done within two growing seasons.

In Law No. 46/2008, the Romanian Parliament has specified that lands given as compensation must be contiguous to the forest area. In this particular instance, the brown bear habitat area in Romania was not decreased; rather, it was fragmented, resulting in the loss of connectivity to important feeding or shelter areas (Szabo et al., 2012).

The logging of some forest areas of Romania could also have been the result of the temporary occupation of those forest areas by different entities (e.g., National Gas Society Romgaz or Romanian



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Electricity Distribution Company) and could be confused with deforestation. According to Law no. 46/2008, to execute the established objectives, the beneficiaries are conditional upon the payment of the costs of reestablishing forest vegetation on the temporarily occupied land, as well as the costs of maintaining the possibility of reaching the canopy stage. If, at the end of the approved period of temporary occupation, the land does not meet the conditions provided by the legislator, the deposited guarantee and the related bank interest are retained in the fund for the improvement of the land fund with forestry purposes.

Unlike the permanent transformation of some lands from the forest area, the temporary occupation of the forest area is for a limited period of time (usually up to 10 years). When certain lands are temporarily occupied within a forest area for a limited period, this does not reduce the habitat of bears but only fragments it.

Therefore, clear-cuts applied in Romania cannot be associated with deforestation as long as the areas from which the trees were cut had to be reforested or replaced by other land that can be afforested, according to the provisions of Law No. 46/2008. Furthermore, the statistical data (ASR, 2021) from 2001-2020 shows that Romania afforested 25,738 hectares of forest land annually while cutting down an average of 19,121 hectares per year, based on Global Forest Watch (2023) data.

The percentage of the dominant factor, “urbanization”, in Romania was lower than the percentage in Switzerland, France, Poland, or Portugal. This factor could have also contributed to the fragmentation of the bear's habitat in Romania, as stated by Jurj et al. (2021) and Roellig et al. (2014), and also to the raising of the number of conflicts between humans and bears. The construction of residential houses near the habitats of bears has an impact on the behavior of these animals. It pushes them to seek food near human settlements since the source of food is continuous in these areas. Moreover, people who live in these settlements often feed the bears without realizing the risks associated with such actions (Cimpoca et al., 2024). This behavior change at bears can lead to dangerous situations for both humans and animals.

According to the data used in this study, Romania was not the country with the highest number of clear-cuts in Europe. The study analyzed the percentage of clear-cuts in the forest areas of 15 European countries and found that Romania ranks 6$^{th}$, which means that it was not among the countries where clear-cutting was most prevalent. According to a study by Munteanu et al. (2016), clear-cuts in Romania decreased yearly by 50% from 2000-2013 compared to the period before the one analyzed.

Romania was known for having one of the largest numbers of virgin forests in Europe, which provided home to 84% of the mammal species (Biriș & Veen, 2005). This fact was also confirmed public by the authorities (Badea, 2019) and through the ”Catalog of virgin and quasi-virgin forests in Romania” (MMAP, 2022). It is important to note that in these virgin forests, the harvesting of any type of wood is

prohibited (Law No. 46/2008), so the bears have a shelter area in these forests as well, because not all the forest areas in Romania are cut down.

Logging is a common practice in all European forests that are home to bears. However, this activity may not negatively impact the bears' habitat as long as the clear-cuts are small. Large clear-cuts have a more negative effect on the bear's habitat (Swenson et al., 2000). In Romania, shelter wood cuttings (progressive, preservation, and gardening cuttings) were promoted (Ciceu et al., 2019) instead of flat-cutting, and compared to period 1946-1954, when entire slopes and basins were clear-cut (Simionescu, 1993), during the period analyzed in this study the size of the forest areas that could be clear-cut was of maximum 3 hectares.

Also, flat-cutting was allowed only in spruce, poplar, willow, or pine forests (Law No. 26/1996), and the fruits of these species are not part of brown bear's diet. Furthermore, in Romania, in the studied period, clear-cutting of forest areas was only permitted once the neighboring perimeter forest area that had previously been clear-cut had reached the canopy stage (Law No. 46/2008).

The author's field research showed that clear-cuts positively affect bears because, on those surfaces, the development of shrub species like *Rubus idaeus*, *Vaccinium myrtillus*, and *Rubus hirtus*, which are absent from the forests with the full consistency of trees, is ensured (MM, 2006). The brown bear is not a browser, and these plants are part of the bears' diet. Under these conditions, an optimal pack of bears is not deprived of natural food. Also, the forest that grows after clear-cutting provides bears with more conditions of tranquility and escape cover than an old and sparse forest, thanks to the thickness of the trees (Colton et al., 2021).

Germany, France, Italy, and Poland had a much larger land area surface than Romania. However, the percentage of forest in these countries was close in value to that of Romania.

In this situation, if it is considered that the forested area in these countries was sufficient to ensure optimal survival conditions for the bears, and that was the reason why there were not as many human-bear conflicts as in Romania, it means that the forests in Romania are not few either and that the cause of conflicts is rather different.

Romania has the highest bear density of all the countries. Croatia, Slovakia, and Slovenia followed closely after. Romania was the country where the most damages were recorded, followed by Slovenia and Slovakia.

Slovenia and Slovakia had a higher percentage of forest than Romania, but despite this, bears also caused a lot of damage in the territory of the two countries. Also, Slovenia's forest percentage was higher than Croatia's, but most damages were recorded in Slovenia.



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The situations discussed above do not confirm the theory that bears do not have enough natural food when the percentage of forest is lower, and because of this reason, they enter the human habitat, where they cause a lot of damage.

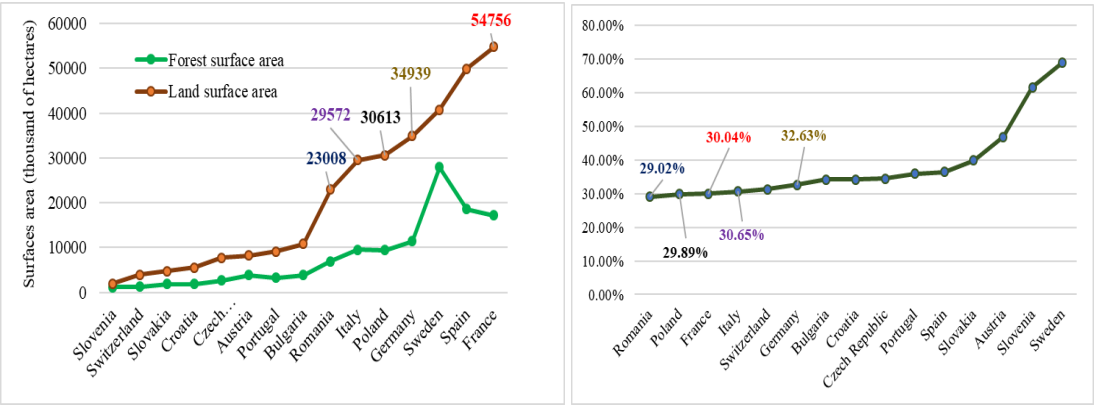


**FIGURE 7. THE PERCENTAGE OF FOREST AREA IN RELATION TO THE LANDS SURFACE AREA IN 2020**
Source: Author's own representation based on FAO data 2023

This suggests that the cause of the abandonment of the natural habitat, as well as the occurrence of numerous human-bear conflicts, was not due to clear-cutting or the percentage of forest, but rather the density was the primary factor impacting this. Otherwise, countries with a forest percentage close to Romania's should have faced the same number of conflicts as Romania, which it did not happen.

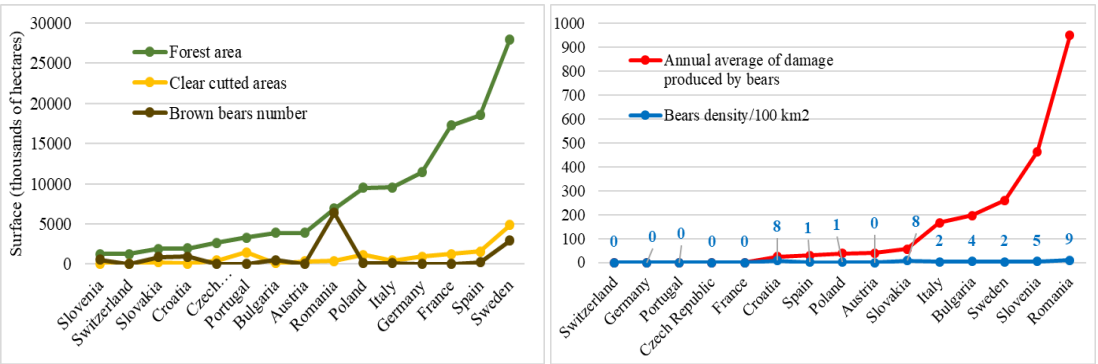


**FIGURE 8. THE DENSITY AND NUMBER OF BROWN BEARS, AS WELL AS THEIR DAMAGES, IN RELATION TO FOREST AREAS AND CLEAR-CUTS**
Source: Author's own representation

The management of bears was also another good indicator for a lower level of damage because revised literature indicated that brown bears were harvested at a rate of 10-16% annually in Sweden (Rovbase, 2021), Slovakia (Rigg & Adamec, 2007), Slovenia (Skrbinsek et al., 2019), and Croatia (Marsden et al.,

2022), and during the period when the highest levels of damage were reported in Romania, only 2-3% of bears were authorized for extraction (Order No. 724/2019, Order No. 723/2022).

## 5. CONCLUSIONS

The primary dominant factor for so-called "deforestation" in Romania was forestry work, which are essential for sustainable woodland management. However, it is noteworthy that this activities were also conducted in the other analyzed countries, but Romania did not have the highest number of hectares clear-cut among all the studied countries; on the contrary, it was at the bottom of the ranking.

The research conducted by the authors revealed that the abandonment of natural habitat and the prevalence of human-bear conflicts are not attributed to logging or the percentage of forest. Instead, they are linked to a high bear density. This is evident from the fact that countries with similar forest percentages to Romania have not experienced the same level of conflicts, as they maintain low bear densities.

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