forests

MDPI

Review

Pressures and Threats to Nature Related to Human Activities in European Urban and Suburban Forests

Ewa Referowska-Chodak

Department of Forest Protection and Ecology, Faculty of Forestry, Warsaw University of Life Sciences (SGGW), ul. Nowoursynowska 159, 02-776 Warsaw, Poland; ewa_referowska_chodak@sggw.pl

Received: 12 July 2019; Accepted: 2 September 2019; Published: 4 September 2019

Abstract: This review regards the pressures and threats linked with the human use of European urban and suburban forests. They can be divided into the following major categories: urban development, fragmentation, and isolation of forests; human pressures on soil and vegetation (e.g., changes in vegetation due to trampling, environmental and especially air pollution); human pressures on animals (e.g., wildlife losses due to collisions, frequent presence of dogs accompanying the visitors); and other threats and damages (e.g., littering and acts of vandalism). The directions of negative relations between people and forests shown in this review draw attention to the high complexity of the discussed issues. Awareness of this complexity (when planning and implementing forest management) can limit or counteract conflicts arising from the use of urban and suburban forests by people. This is of particular importance in the era of progressing urbanization and the evolution of human needs regarding the use of forests.

Keywords: human impact; urban forest; suburban forest; peri-urban forest; threat; urban forestry

1. Introduction

Urban and suburban forests are of interest to urban forestry, which is best developed in North America and Europe [1–4]. According to EUROSTAT data [5], the share of green urban areas in the area of the selected 398 European cities ranges from 0.1% (Matera, Italy) to 26.3% (Karlovy Vary, the Czech Republic), with an average of 7.1%. It includes all green areas, not only woodlands, for which only fragmentary data are available [6]. For example, a study of 18 selected European cities showed that urban woodland cover ranges from 0.3% for Copenhagen to 24% and 27% for Zurich and Stuttgart, respectively, and suburban woodland cover ranges from 1% in Copenhagen to 65% in Stuttgart in the 5 to 10 km ring around the city center [7]. A more recent study of 15 selected European capitals showed that urban tree cover ranges from 0.9% in Athens to 57.3% in Stockholm, and peri-urban tree cover ranges from 4.0% in Amsterdam to 75.7% in Stockholm [8], but this included all trees, not only woodlands.

The closeness and accessibility of urban and suburban forests are of particular importance because of the progress of urbanization (including the increasing number of inhabitants in cities, towns, and large villages) and the broad spectrum of human needs in relation to forest use. These needs relate to all types of ecosystem services offered by forests, which influence human well-being such as provisioning services (e.g., picking of forest fruits or timber harvesting [9]), regulating services (e.g., moderating the urban microclimate or protecting against air pollution [10,11]), and cultural services (e.g., recreation or education [12,13]).

There are some problems associated with the human use of urban/suburban forests. Although these problems are quite common throughout the world, they are relatively rarely (in a comprehensive way) described in the literature. The literature review identifies all of the main problems, some of which are complex and have broad implications. One of them is **deforestation** [14–16]. This process varies in intensity depending on the part of Europe [17,18]. Deforestation has allowed people, for example, to get fuelwood and construction materials [19] to expand cities [14] and to develop infrastructure, especially roads [15]. It is noteworthy that the construction of roads facilitates both land conversion and colonization as well as logging and hunting [16].

The second threat is forest **fragmentation** [14–16], which occurs due to the continuous development of cities and related infrastructure. It results from historical conditions, imperfect law, and the type of forest ownership, which affect the concept and implementation of the management of European urban and suburban forests [12,20–23]. It causes edge effects [15,16], as the habitats surrounding forest patches can influence forest biodiversity by affecting ecological processes such as biomass and nutrient cycling, dispersal, establishment, survival, predation, regeneration, and growth [15,16]. This leads to the subdivision of populations into small units and their isolation because of barriers to migration [14,16], like open spaces, buildings, fenced plots, and roads, and thus influences the processes of gene flow, inbreeding, and genetic drift [15,16]. In small areas, there are fewer species [14–16], and these have smaller spatial requirements than those of other species [16]. Besides, chance factors also affect survival and reproduction, and the interception of fewer colonists in smaller habitat patches compared to large habitat patches also leads to a higher rate of extinction [14].

The third threat contributing to the negative human impact on urban and suburban forests is **inappropriate forest management**. This causes changes in forest plant communities such as pinetization (i.e., planting of pine forest on fertile soil), monotypization (i.e., planting of pure forest stands instead of mixed ones), juvenalization (i.e., reduction of the mean tree age in forest stands), and neophytization (i.e., increasing the contribution of alien species) [14,24]. Even though these practices have already occurred, their effects are still visible due to the longevity of the forests.

Another problem is **habitat alteration** [14,15]. Intentional (or unintentional) habitat disturbance, like human-set fires [14–16,25], may lead to biodiversity loss [15,16]. Although forest fires occur throughout Europe, the biggest problem is in the Mediterranean zone [26]. Habitats (and the forest biodiversity) may be also disturbed by drainage [22,27,28] and the global increasing level of greenhouse gases [14,16].

The fifth problem, **environmental deterioration**, results from industrial and urban emissions and the presence of atmospheric pollutants (sulfur dioxide, ozone, nitrogen oxides, and particulate matter PM_{10} and $PM_{2,5}$) or soil pollutants (heavy metals and acid deposition). It increases stress and causes higher mortality of living organisms [14]. Nitrogen oxides (NO_x) and NH_3 emissions introduce excessive amounts of nitrogen, which leads to eutrophication of the soil and changes in habitats and species diversity and to invasions of new species. NH_3 and NO_x, together with SO_2, contribute to soil acidification, the transformation of habitats, and biodiversity loss. Ground-level O_3 damages forests by reducing their growth rates. The degrees of these types of pollution in Europe depend on the region [29]. Other effects of atmospheric changes are global warming [14,29] or cooling [29] and smog damage to trees, which vary in tolerance to such disturbances. Differential sensitivity may lead to altered competitive relationships between species [14]. Increased weather disturbances (e.g., stronger winds, greater drying) are also effects of environmental deterioration and can cause damage to the ecosystems of urban and suburban forests [14,30].

The presence of cities (built environment) causes the next threat, a mean temperature increase, even up to 3–10 °C for large agglomerations, known as the **urban heat island** (UHI) effect [11,26,31]. The higher temperature increases the concentration of air pollutants and the risk of drought [31].

The seventh threat is related to the **translocation** (introduction) of plants, animals, and microorganisms. They are introduced because of their role as vectors [14], their economic [14,15] or decorative value [14], or accidentally, by human-mediated transport [14]. Invasive alien species are an important global reason for ecosystem change, which can cause a reduction in the local biodiversity by mechanisms that influence species such as competition, herbivory, disease, or predation [14,32,33], or by the modification of environmental conditions, for example, by reduction of the available amount of water [32]. For Europe, there is a list of “100 of The Worst” alien species [34].

Finally, some threats are also related to the **intensive use** of urban and suburban forests by city and town dwellers. For example, the forest of the city of Frankfurt (6000 ha, Germany) has six million visitors every year [35], and the forest “Las Bielański” in Warsaw (150 ha, Poland) has 63,000 visitors per day during the weekends [36]. This creates some problems and threats of both animate and inanimate nature resulting from human-related pressures (e.g., [37,38]).

In the published literature, the above-mentioned problems are presented only narrowly, focusing most often on one or very few aspects. Meanwhile, in practice, it is rare for a given urban or suburban forest to be exposed to only one type of negative pressure. In addition, these negative relations between people and forests are often complex, also creating threats to the people themselves, which is rarely mentioned in the published literature. Therefore, there is no single coherent study in which the said problems have been comprehensively presented.

This review is aimed at presenting, in a comprehensive way, the pressures and threats to nature linked with human use of European urban and suburban forests, in relation to the negative human impacts on them, which are particularly visible [39,40]. In the discussion, the author tries to assess the scale and timeliness of the described problems. Attention is also paid to the multifaceted nature of negative relations between people and urban and suburban forests and to the fact that by contributing to forest threats, people often also threaten their own health and lives. An awareness of all the situations described makes it possible to improve the planning of forest management—they can be used by forest managers/authors of forest management plans as a type of checklist of possible problems to check whether they are important and up-to-date in a particular location. The paper is focused on suburban and urban forests in a narrow sense: only the woodland elements of urban green structures [41], i.e., the areas covered with natural forest vegetation, are considered [42,43], rather than parks, gardens, or trees along the streets.

2. Methods

The main literature review was conducted in April–May 2018. The starting point was a literature search using the search engine on the web page of the Forest Research Institute in Warsaw [44] and the search words (in Polish) “urban forest” (in singular and plural forms). The timeframe of the search was not predefined. This broad preliminary search resulted from the fact that the studied subject was often presented as an aside while discussing another main issue. This yielded a total of 318 articles, but only some of them (47, from 1993 to 2018) met the following criteria for inclusion in the results: location (urban or suburban forest in Europe); type of urban/suburban forest (woodland); the described, or at least mentioned, problem (pressure and threat to nature related to human activities); the quality of the source of information (peer-reviewed articles—international or national ones, items published by known publishing houses or international institutions); and the language of the text or abstract/summary (English, French, or Polish). Additional literature was searched in August 2018, using the Scopus search engine [45] and combining the search words “urban forest” AND “problems” or “urban forest” AND “threats” (the timeframe of the search was also not predefined). After limiting the countries/territories to only European ones, this process yielded 56 articles (and additionally one publication common with the first search), but also only some of them (13, from 2005 to 2018) were of direct interest to the present study (results); these sources of information were selected on the basis of the aforementioned criteria. Some of the articles from the first and second reviews were used to locate supplementary literature using the snowballing method (using the same criteria). It was based on the fact that when important information for the results appeared in the basic source, cited after another source, this second source was also searched and reviewed for this and additional important information. Additionally, some searches were carried out using detailed keywords related to the obtained results (e.g., forest drainage and dogs in Europe) to add a background, to control the scope of literature for selected topics, or to discuss the results. Mainly thanks to the snowballing method, and, to a much lesser extent, thanks to the use of detailed keywords, another 62 literature items were added to the results. Finally, 122 literature items were used to present the main results (Figure 1, Tables 1–4). In the great majority, they refer to individual states, but in some cases, threats and pressures were reported from larger regions like southern Europe, eastern Europe, Nordic countries (including Denmark, Sweden, Iceland, Norway, and Finland), and the (hemi)boreal vegetation zone. There were also some articles that referred to different regions of Europe (in the Results, these are classified as "Europe") or to different regions of the world, including Europe (classified as "globally"). All of these types of locations are included in Tables 1–4 to describe the specific pressures on European urban and peri-urban forests.

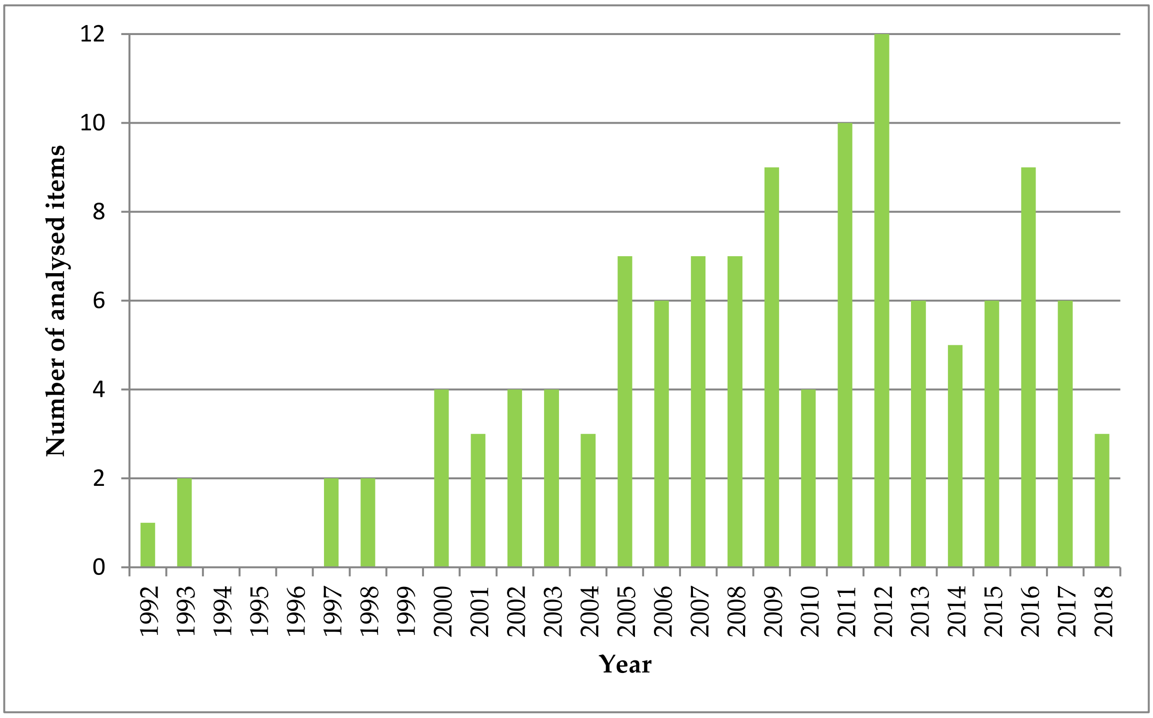

Figure 1. Time distribution of materials concerning the European region, cited in the Results.

The selected sources were carefully studied for information on the negative impact of humans on European urban and suburban forests (woodlands). The selected issues were first classified into general thematic groups, including urban development, fragmentation, and isolation of forests; human pressures on soil and vegetation; human pressures on animals; and other threats and damage. Then, detailed categories were set for them (shown in Tables 1–4), reflecting specific and unique problems, and the regions of Europe in which they were registered are presented. In the discussion of the results, the scale (local, regional, and widespread) and timeliness (is it a current problem or a past problem with current consequences) of the described problems are assessed. As part of the analysis of the results obtained and to get a full picture of the relationship between forests and people, directions of negative relations (DNR) between humans and urban/suburban forests are specified. Four possible directions were distinguished (all possible): "humans to forests" (when people negatively affect forests or their components), "forests to humans" (when forests or their components negatively affect people), "forests to forests" (when some components of the forest have a negative impact on others due to disturbances originating from human activity) and "humans to humans" (when people interact negatively with each other, e.g., by interfering with the functioning of the forest).

3. Results and Discussion

3.1. Urban Development, Fragmentation, and Isolation of Forests

The overall sustainability of biological systems, e.g., of forests, is increased by the presence of relatively intact "core" areas. According to the concept of Kapos et al. [16], the size of an individual core forest area must be at least 100 km^2, covered by continuous forest with a density exceeding 90%. Implementation of those two criteria indicates places with the best conditions for forest species preservation. Conditions are also very good if other forest patches are connected by forest to core forest areas. Such forest patches are more sustainable and of higher biological value than areas of similar forest cover density and overall shape that are not connected to core forest areas [16]. Urban areas are not able to provide such conditions (Table 1). In fragmented woodlands, the negative effects of various disturbances and threats are aggravated [46,47], and the minimum forest size (30–40 ha) to ensure the protection of species associated with the forest interior [48] is not always preserved.

Table 1. Threats and pressures on urban and suburban forests due to urban development, fragmentation, and isolation of forests.

DNR [1]	Threat or Pressure	Region and Citation
HF, HH	Degradation (deforestation) of peri-urban forests	Finland [37,42], Turkey [49], Serbia [50], Europe [1,6,12], Globally [3,51]
HF	Urbanization of the areas adjacent to urban forests especially in regions attractive as holiday resorts	Poland [21,52,53] Poland [54,55]
HF	Transformation of wooded plots into construction plots	Poland [21,52], Turkey [49]
HF, HH	Urban forest decline (forests replaced by roads, buildings, or carparks)	Turkey [49], Poland [21,56], Eastern Europe [57]
HF	Fragmentation of forests by roads, pipelines, and electrical wires	Germany [35], Poland [58,59]
HF	Fragmentation of forests (on a small scale) by tourist routes and trails	Finland [37,60]
HF	Isolation of forest patches gradually surrounded by densely built-up areas	Poland [21,55], Europe [6]
HF	Isolation of forest patches due to road construction or modernization	Poland [55,58], Slovenia [61], Europe [6]
HF, HH	Other threats from roads in urban and suburban forests (e.g., air pollution, noise, decreased the stability of forest stands, and disturbed water conditions)	Poland [55,56,58,59], Slovenia [61], Turkey [49], Europe [6], Globally [62]
HF	Greater proportion of forest edge (reduction of the area of the forest interior, with a specific microclimate)	Poland [58,59], Finland [37,60]

[1] Directions of negative relations: HF—"humans to forests", HH—"humans to humans".

The most visible changes related to the threats and pressures on urban and suburban forests presented in Table 1 (DNR:HF) concern the landscape level of biodiversity. They include **deforestation** (mentioned in the Introduction), **fragmentation**, and the spatial isolation of forest patches, as well as activities which reduce the aesthetic value of the forest landscape, like the construction of houses near the forest (and sometimes even in the forest). Meanwhile, the aesthetic value is very important for people using urban and suburban forests (e.g., [12,13,36]). However, considering only aesthetic values is not always appropriate. Although patches of isolated forests can diversify the landscape, attention should first be paid to the negative aspects of their isolation [32]. At the landscape level, the above-mentioned **fragmentation** can reduce carbon storage (increase carbon emissions) [32,63]. **Deforestation** and **fragmentation** of forests are also the most radical disturbances for forests on the ecosystem, species, and gene levels of biodiversity. The importance of forest **fragmentation** is such that it is considered an indicator of forest degradation [32]. Additionally, roads—crossing and fragmenting forests—are also problematic for people (DNR:HH). Noise from roads may be a danger to health, even at relatively low levels. Long-term environmental noise exposure may cause, for example, chronic stress hormone dysregulations [64]. Actually, the construction or modernization of roads is more noticeable in the countries of central and eastern Europe—after joining the European Union, they obtained funds that allowed the modernization of the communication infrastructure from the socialism period. In turn, the fragmentation of forests at smaller scales by tourist routes and trails may be a more widespread problem because of the ever-increasing significance of forests for society, regardless of the region of Europe [1].

Because of the many regulatory functions of forests [10,11,65], which determine the safety and health of people, **deforestation** (as a negative impact of people on forests) also negatively rebounds on the people themselves (DNR:HH). It should be remembered that urban forests create a specific microclimate, protect against air pollution, have a soothing and healing influence on organisms [1,12,51,66], stabilize the soil, reduce the effects of stormwater runoff (through canopy retention and infiltration) or winter wind, and moderate the urban microclimate [10,67,68]. It is noteworthy that geography, history, and politics are important in driving forest cover change. This process has varied in intensity depending on the part of Europe. Mixed temperate forests were cleared starting from about 6000 years ago, first mostly in northwestern Europe, and later also in north-central Europe. The coniferous forests of northern Europe were cleared only in the last two millennia [17]. In turn, after the collapse of socialism in central and eastern Europe (over the period 1985–2012), the privatization of forest lands increased the forest cover loss due to logging. Such changes have been observed in Estonia, Latvia, Slovakia, Hungary, Slovenia, Lithuania, Romania, Bulgaria, the Czech Republic, and Poland [18]. This phenomenon also applies to urban and suburban forests in Poland [21] and other countries in this region of Europe (Table 1). Actually, it is more noticeable in the case of suburban forests or private urban forests. For other urban forests, it is noteworthy that contemporary city dwellers do not accept logging, especially in case of forests owned by the State Treasury [55]. The **deforestation** of suburban forests is due to the expansion of cities—more and more people want to live in cities, where usually it is easier to earn money and have access to all the achievements of technology and culture.

Urban development to ensure comfortable access to environmental recreation sites preserved for this purpose [69] is now not a standard solution, although there are many countries that protect forests (or even afforest open habitats) in urban and suburban areas ([1], for example, in Belgium [70,71], Denmark [72,73], Sweden [72,74], the United Kingdom [75], Serbia [50], or in Finland [72], Iceland [72], and Norway [72]).

Apart from the dominating negative relations "human to forests" (DNR:HF), presented in Table 1, inverse situations (DNR:FH) have also been noted. These concern people's economic losses due to higher prices of land and real property near/in the forest in Europe [1,39,76,77] (from the perspective of the buyer), but also, for example, in North America [78]. The presence of forests is commonly associated with a high value and naturalness of the environment [55]. As a result, there is a high demand for wooded recreational or construction plots [67] as well as for real estate located close to forests [13,21,42]. As mentioned above, the prices of land (real estate) near forests are higher than in other locations, although some negative effects of forest presence have also been noticed, e.g., shading, danger of falling branches, litter (DNR:FH), and insecurity, for example, the risk of fires or the creation of fear/antisocial behavior (DNR:HH) [1,42,79].

3.2. Human Pressures on Soil and Vegetation

In the absence of disturbance, forest soils are influenced by forest vegetation, bedrock, climate, and other organisms. Soils provide physical support, supply nutrients and moisture for the growth of plants, and (with the forest floor) are habitats for animals and microorganisms [80]. Forest vegetation consists of trees, shrubs, herbaceous vegetation, pteridophytes, and mosses, and the diversity of species and their associations partly depends on the fertility of the habitat and its humidity. The natural dynamics of forests, which is affected by age-dependent mortality and external natural disturbance, is very important for biodiversity and ecosystem functions. It results in a heterogeneous spatial pattern of differently sized patches at different stages of forest development, as well as in the formation of gaps [81]. Although disturbance is one of the natural factors forming the forest ecosystem [63], in the case of urban and suburban forests, human disturbance exerts a particular pressure—too many disturbances and stresses cause the degradation of forests. This can be related to the intensive penetration of forests by society (Table 2). For example, in Poland or in Scandinavian countries, free access to forests owned by the State Treasury as well as the use of their secondary (non-wood) forest products, is guaranteed by law (e.g., [4,72,82–84]). This creates conditions for the common use of those forests by the society (the **intensive use**—mentioned in the Introduction), but also the resultant negative effects of human impact, for example, damage to nature [49,85] due to high-intensity pedestrian, equestrian, and vehicular traffic [54,86,87]. The second important factor is related to the locations of some urban and suburban forests: within or close to industrial zones [84,88], transportation routes, city centers, residential areas heated with fossil fuels [89–92], and under the influence of a specific climate and the management of the urban area.

Table 2. Threats and pressures on the soil and vegetation of urban and suburban forests.

DNR [1]	Threat or Pressure	Region and Citation
HF	Damage to soil (increasing soil density and its erosion, reduced permeability, chemical changes, e.g., in soil pH or fertility, and impoverishment of the soil fauna) due to the high intensity of traffic	The United Kingdom [85,93], Turkey [49], Finland [38,60,94], Germany [35], Slovenia [95], Poland [86,87,96], (hemi)boreal vegetation zone [47]
HF	Damage to the forest floor, litter, or soil due to intensive exploitation of mushrooms	Poland [86], Serbia [97], Globally [98]
HF	Threats to the soil from garbage (source of pollution)	Poland [99]
HF	Mechanical damage to vegetation due to traffic (reduced plant cover, height, and biomass, root injuries)	The United Kingdom [85], Poland [87], Slovenia [95], Finland [37,38,60,100]
HF	Changes in vegetation due to trampling (for example, decrease in species diversity, modification of species composition, and forest regeneration)	Finland [37,38,43,100], The United Kingdom [85]
HF	Large-scale picking of forest fruits (for example, the bilberry, *Vaccinium myrtillus*)	Poland [101,102], the Czech Republic [13], Sweden [4,9], Norway [4], Finland [4,103], Nordic countries [104]
HF, HH	Environmental (especially air) pollution (negative influence on the health and growth increment of trees)	Poland [88,91,105–108], Turkey [49], the United Kingdom [109], Germany [22], Spain [90], France [110], Nordic countries [111], (hemi)boreal vegetation zone [47], Europe [26,112,113], Globally [51]
HF	Dust fall containing nitrogen (increase in soil fertility and modification of the species composition of urban forest stands)	Poland [28], Finland [37], Spain [90]
HF, HH, FF	Affecting the non-anthropogenic factors like wind, diseases, and pests (negative influence on trees, which are exposed to stress caused by human activities)	Germany [35], (hemi)boreal vegetation zone [47], Europe [112–114]
HF, HH	Increase in the mean air temperature in urban areas (negative influence on plant species and their communities)	Poland [115], Germany [35], Europe [112], Globally [31]
HF	Poor living conditions in small forest patches for species associated with the forest interior (for example, drought, insolation that is favorable only for selected woody and herbaceous species)	Finland [37,38,60], Germany [116], Poland [58], (hemi)boreal vegetation zone [47], Nordic countries [111], Europe [6,39], Globally [46]
HF, HH	Disturbance of water relations due to drainage, construction of flood embankments, urban development, and the increasing density of the road network (negative influence on forest habitats)	Poland [28,117], Serbia [22]
HF	Inadequate forest management (or other disturbances) causing changes in forest plant communities, e.g., monotypization, neophytization, homogenization, and the decline of highly specialized species, sometimes leading to substitute communities	Poland [28,118], Germany [116], Finland [37], (hemi)boreal vegetation zone [47], Globally [3]
HF	Invasive alien species (for example, from urban and suburban gardens, illegal garden waste dumping in forests, proximity of roads)	Germany [22,116], France [119], Switzerland [120,121], Poland [122,123], Globally [3,46,124,125]
HF, FF	Lack of hunting due to the vicinity of buildings, frequent visits of inhabitants or protective nature of the forest (the risk of damage from herbivores)	Germany [22], Switzerland [126], (hemi)boreal vegetation zone [47], Europe [39]

[1] Directions of negative relations: HF—"humans to forests", HH—"humans to humans", FF—"forests to forests".

The threats and pressures on the soil and vegetation of urban and suburban forests (DNR:HF), presented in Table 2 have negative impacts on the ecosystem and at the species level of biodiversity. Forest ecosystems depend on soil [63,80], which, in urban and suburban forests, can be disturbed by widespread **environmental pollution** (eutrophication; in other literature also called acidification [29]), **management practices**, trampling [87], incorrect collection of mushrooms [97], and littering.

The above-mentioned **fragmentation** of forests into small patches and microclimatic variation create poor living conditions for forest ecosystems and generate biotic changes [32,37,60,127]. This problem has been noted in many regions of Europe (Table 2) and can be resolved only by afforestation, which is a solution that has been realized in some cases, especially in northern and western Europe (see Section 3.1). Changes in the ecosystem (vegetation, water, and soil) may also be caused by air **(environmental) pollution**, which affects the ecosystem services that it supports and can affect climate change causing, for example, windstorms [29,30]. In Europe, windstorms are a special problem over the British Isles and the north coast of Spain as well as the western and northern coasts of western/central Europe and a lesser problem over Scandinavia, eastern, and southern Europe [128]. It is noteworthy that some recommendations for minimizing wind damage are available [129]. Forest ecosystems in urban and suburban areas are also under the influence of modified temperatures (mean temperature increase [11,26,31], **the UHI effect**, which is expected to deepen throughout Europe by about 1 °C per decade [31]) or water conditions (drainage—a kind of **habitat alteration**, which causes permanent transformations of forest ecosystems [22,27,28,53,117]). In Europe, forest drainage was used in northern and eastern Europe and in the British Isles until about 1985 [130]; however, there are no data on this activity in urban and suburban forests. However, this phenomenon (and construction of flood embankments) is rather widespread and still relevant in all regions of Europe due to the need to adapt habitats to the requirements of urban development. Pinetization, monotypization, juvenalization, and neophytization are examples of the negative effects of **forest management** [3,47,116,118], and like homogenization, they are forms of forest degeneration [24], due to the other previous priorities of forest management [131], especially in central Europe, for example, in Poland [24,118]. Even though those practices have ceased, their effects are still visible due to the longevity of the forests [118]. Another type of pressure at the ecosystem level of biodiversity comes from invasive alien species [34] (mentioned in the Introduction as **translocation/introduction**). They can reduce the local biodiversity [32,33], limit ecosystem services (provision, regulation, cultural, and support systems) [33] and bring about economic losses [32,33]. Invasive alien species, widespread throughout Europe, are a current problem of growing importance [34], requiring scientific research and the implementation of control systems and a reduction of their negative impact.

On the species level of biodiversity, the negative human pressures (DNR:HF) can be divided into subgroups: (1) direct impacts on individuals, and (2) impacts on species habitats.

The direct impacts on plant species include the following:

- Trampling (e.g., [38,60,100]), which may affect species composition [132] and tree regeneration [38] and is rather a widespread problem because of the ever-increasing significance of forests for society [1] (**the intensive use of forests**);
- The large-scale picking of forest fruits using bilberry pickers, which is more regional but still is a current problem, for example in Slavic and Nordic countries (Table 2) (**the intensive use of forests**);
- The widespread **pollution** in Europe, which damages leaves, reducing growth rates and the reproductive ability, causing chronic injury and the death of trees [26,29,133,134];
- Invasive alien species [32–34] (**translocation/introduction**)—a widespread and increasingly significant problem;
- Herbivores—due to the lack of larger predators or possibilities of hunting [126]; however, hunting itself is not an effective tool for reducing damage caused, for example, by deer [135]. This problem is more local, depending on the state of the game.

The above-mentioned air **pollution** depends on the region of Europe. For example, the highest concentrations of PM_{10} particulate matter occur in Poland, Italy, and Bulgaria, while the highest concentrations of $PM_{2,5}$ particulate matter occur in Poland and Italy. Ozone (O_3) is much more widespread, and its highest concentrations are recorded in Poland, the Czech Republic, Germany, Austria, Slovenia, Italy, France, and Spain. Regarding the concentrations of NO_2, the worst situations are in Germany and Italy [29]. The scale of threats to forest vegetation associated with air **pollution** may depend on the selection of tree species for planting in urban and suburban forests; however, no tree species are absolutely resistant to pollution [26]. According to literature from the USA, trees that are more tolerant to ozone include, for example, silver birch (*Betula pendula*), Norway spruce (*Picea abies*), and common oak (*Quercus robur*), and those more tolerant to SO_2 include, for example, small-leaved lime (*Tilia cordata*), gingko (*Gingko biloba*), and red oak (*Quercus rubra*) [133]; however, the latter two species are not native to Europe.

The second subgroup of negative human pressures on species includes impacts on species habitats which lead to their devastation or transformation. Habitat devastation is related, for example, to the abovementioned **deforestation** [63] and **fragmentation**, which threaten the interior forest species [16,32,136], and isolation, which is troublesome for the dispersal of individuals [16,32]. Habitat transformation is due to the size of the forest patch (small patches have fewer microhabitats and resources and increased proportions of forest edge and invasive species [16,32,38]); changes in fertility (eutrophication—changes in species diversity and to invasions of new species [26,29]), humidity (changes in species diversity and the growth of trees—observations from Europe and North America [24,27,117,137]), or pH (acidification—loss of species [26,29]); and forest works (changes in species diversity and distribution—observations from Europe and other regions [16,24,27,138–141]).

It is noteworthy that, in the analyzed materials, the negative impact of humans at the gene level of biodiversity—in the case of plants (DNR:HF)—has rarely been studied. Meanwhile, according to research in the USA, the genetic diversity of forest plants can be affected by **deforestation**, **fragmentation**, **inappropriate forest management**, **habitat alteration**, **environmental deterioration (pollution)**, and the **translocation** of plants [14].

The threats and pressures presented in Table 2 refer primarily to the negative impacts of humans on the vegetation of urban and suburban forests. However, it should be noted that the opposite may also happen (DNR:FH "forests to humans"). Inappropriate landscape designs, tree selection, and tree maintenance in urban forests can increase pollen production and chemical emissions from trees and maintenance activities (air pollution) and can also increase, for example, water consumption. This has been described not only in Europe, but also, for example, in North America [10,26,39,142]. Emissions from trees in urban and suburban forests may be a threat to people's health and lives. The volatile organic compounds may worsen the quality of air by enhancing air **pollution** during heat waves [26], while pollen may cause allergic reactions [10], especially pollen from trees belonging to the following widespread orders: Fagales, Lamiales, Proteales, and Pinales. It is noteworthy that tree pollen allergies are mainly a problem of industrialized societies within the temperate climate zones [143]. Falling trees or branches may also cause injury or kill people (5–6 persons yearly in the United Kingdom [144]), especially during windstorms [30], which are more often noted in western Europe. The presented negative impacts on health have a big influence on human wellbeing (health is one of its constituents) [145].

It should be noted, that some negative impacts of people on forests (DNR:HF), presented in Table 2, rebound on people themselves (DNR:HH). Air **pollution** is responsible, for example, for heart disease and stroke, lung diseases, lung cancer, and disorders in neural development [29]. In 2014, about 44% of the European population was exposed to an annual average concentration of PM_{10} above the World Health Organization (WHO) norm, and 83% of the European population in case of $PM_{2,5}$ [29]. In Europe (data for 32 countries), 18.2% of people in cities and 12.4% of people in towns and suburbs live in areas with **pollution**, grime, or other environmental problems. The cities with the worst situations are in Malta (40%), Greece (36.3%), Germany (32.5%), Belgium (27.5%), and Italy (25.9%). The cities with the best situations are in Norway (5.5%), Ireland (6.6%), the United Kingdom (8.9%), and Croatia (9.7%). The case towns and suburbs with the worst situation are found in Greece (24.9%), Luxembourg (20.7%), Germany (20.3%), and Malta (18.9%), and the best are found in Ireland (2.8%), Denmark (3.7%), Croatia (4.5%), and the United Kingdom (5.2%) [5]. The second threat, the increasing mean temperature in cities (**the UHI effect**), makes the climate change impact even stronger. Until the end of this century, further increases in both the number of heat-wave (HW) days and the maximum HW temperature are projected for 571 European cities. However, the presented simulation does not take into account possible changes in the surfaces of urban and suburban forests [146]. The third problem is disturbances of water relations (**habitat alteration**). Floods are a threat to people's lives and property [146], and in Europe, there is a continuing increase in reported floods exceeding severity and magnitude thresholds [147], which will get deeper in the years 2051–2100 in northern Europe [146]. Droughts weaken or destroy vegetation in cities and can lead to wildfires, and until the end of this century, drought conditions are expected to intensify, especially in southern European cities [146].

Although damage to forest plants from pests, diseases, and herbivores (DNR:FF) occurs naturally in forest ecology, in urban and suburban forests such factors can be modified by human activity, as there may be interactions between biotic and abiotic factors that affect plants [148]. The impacts of pests and diseases have increased, because of the increased susceptibility of plants due to the above-mentioned air **pollution**, specific climate (dry, warm—**the UHI effect**), and disturbance of water relations (**habitat alteration**) [148], which are current and widespread problems in European cities. An additional problem is the lack of possibility (or limited possibility) of using certain control methods due to the constant presence of people in the area [112]. Herbivores can deeply change the structure, spatial heterogeneity, and dynamics of the forest, affecting seedlings, saplings, ground vegetation, soils, and fauna by grazing and trampling or digging [149]. The intensity of these problems depends on the conditions of the animal population development such as the forest size, intensity of human disturbance, the presence of wild predators or rather unleashed dogs [55,150], and also hunting (in suburban forests) and how synanthropic species—for example, wild boars—are more synanthropic than roe deer, so the presence of people is less disturbing for them [151].

3.3. Human Pressures on Animals

Forest animals are a very diverse group of organisms, ranging from microscopic invertebrates to large mammals. Their local diversity depends on the environmental conditions but also on the forest size, for example, large mammals and top carnivores require large habitat patches [16]. A necessary condition for the survival of animals is the presence of shelters in the forest [152], food, water, and tranquility, especially during breeding. Urban development and increasing traffic, as well as the intensification of the human use of urban and suburban forests, strongly affect wildlife (Table 3), causing decreases in animal diversity, distribution, and the composition of communities [56,124,153–156].

Table 3. Threats and pressures on animals in urban and suburban forests.

DNR [1]	Threat or Pressure	Region and Citation
HF	Barriers to migration due to residential areas, reaching the forest borders and the transportation routes	Poland [21,52,55,58,59], Slovenia [61]
HF	Isolation of local populations (negative influence on gene flow, genetic diversity, and even extinction of population)	Poland [56,59,157], Portugal [158], Globally [14,124]
HF	Poor living conditions in small forest patches (effect of fragmentation) for species associated with the forest interior	Poland [56], Portugal [158], Europe [6,39], Globally [124]
HF	Lack of foraging sites due to urban development	Poland [55,151]
HF	Expansion of some animal species to urban areas in search of safety and food (e.g., wild boars *Sus scrofa*, foxes *Vules vulpes*, roe deer *Capreolus capreolus*, European elks *Alces alces*, or beavers *Castor fiber*) due to, for example, a lack of foraging sites	Poland [55,59,151,159], (hemi)boreal vegetation zone [47]

Table 3. *Cont.*

DNR [1]	Threat or Pressure	Region and Citation
HF, FH	Wildlife losses (collisions with vehicles or urban obstacles that are invisible to them, such as fences or noise barriers)	Poland [53,59,151], Globally [160]
HF	Threats to animals from the garbage in forests (for example, as a trap)	Poland [99]
HF, HH	Scaring wild animals by noise from the simultaneous presence of many people and sometimes their vehicles (even at night)	Germany [35], Poland [54,161]
HF	Scaring wild animal in their refuges (urban and suburban nature reserves, national parks)	Poland [21,36,56,162–165], Austria [166]
HF, HH	Frequent presence of dogs accompanying the visitors (especially unleashed dogs), which can scare and attack wild animals (high losses of animals recorded in winter when the snow cover is thick)	the United Kingdom [93], Croatia [57], Switzerland [126], Bosnia and Herzegovina [57], Austria [166–169], Montenegro [57], the Czech Republic [13], Macedonia [57], Denmark [73], Poland [36,55,59,86,162]
HF	Poaching	Poland [23], The United Kingdom [12]
HF	Limited availability of safe shelters and nesting sites due to the penetration of forests by people	Poland [55]
HF	Limited availability of safe shelters and food due to forest works (for example, thinning of the undergrowth)	Poland [154], Sweden [138], Finland [139]

[1] Directions of negative relations: HF—"humans to forests", HH—"humans to humans", FH—"forests to humans".

The negative human pressures on animals in urban and suburban forests (DNR:HF), similarly to the abovementioned plant species, can be divided into subgroups: (1) direct impacts on specimens, and (2) impacts on species habitats. Direct impacts on animals include road collisions [53,170], especially with amphibians and mammals, like wild boar [151], "urban" carnivores (worldwide observations [160]), and in suburban regions, especially with deer (observations from the USA [171]). In the case of poaching [23,102,172,173], even if its scale is not large everywhere, the basic problem of inhumane methods of catching animals remains [174]. In Poland, for example, the number of poaching cases is decreasing [102], and environmental education has played an important role in this phenomenon. Scaring wild animals by noise leads to negative changes both for single species and their ecological communities (observations mostly from North America [62,89,175–177]) and by the presence of dogs, especially free-range (feral) dogs, which leads to stress, harassment, and sometimes killing the animals [150]. It could even be said that the visiting of irresponsibly behaving people and dogs is a kind of (mentioned in the Introduction) **translocation/introduction** in the forest ecosystem, but most often, it is only of a temporary nature. It is also related to another problem—the **intensive use** of forests. There are no comprehensive data on animal losses caused by dogs in European urban and suburban forests, but it is a rather serious problem because of the large number of dogs. In Europe, in 2017, there were approximately 85 million dogs (about 10 million more than in 2010), more than half of them found in Germany, the United Kingdom, Poland, France, Italy, and Spain [178]. Dogs in forests are negative stimuli (as predators, they evoke a dramatic response among wildlife) and disturbing agents (they are present year-round, and sometimes harass wildlife). Flightless species or specimens, ground-dwelling, and especially ground-nesting birds are most likely to interact with dogs. Most mammals are limited to terrestrial escape and are, therefore, more affected by dogs, which are able to capture and kill a variety of them [150]. Particularly high losses caused by animals are recorded in winter when the snow cover is thick [55]. Annually, on the scale of, for example, Poland, more than 186,000 animals are mortally wounded or killed by dogs, on average [59], but these data are only available for the country as a whole, not for only urban and suburban forests. Knowing the scale of this phenomenon may be helpful for determining rules for the presence of dogs in forests, and it will be necessary to enforce these rules. It would be also valuable to conduct broader research into the awareness of urban residents about the negative impacts of their dogs on nature. The results of such research may, for example, help in defining the priorities of ecological education for society.

The second subgroup of the negative human pressures on animals (DNR:HF) includes impacts on their habitats, which, in Europe, is the most important cause of the decreased prevalence of some animals [170]. Similarly to the case of plants, habitat devastation is related to **deforestation** [63,170] and **fragmentation** [16,32,136] but also to urbanization close to/in the forest, the lack of foraging sites, and isolation, which is troublesome both for the movement and dispersal of individuals [16,32]. This is why wildlife corridors are necessary, especially in urban and suburban areas [3,50,56,61,179]. On the European Union scale, the protection of ecological corridors is planned in the Natura 2000 network; however, from the point of view of the needs of species associated with urban and suburban forests, this may be insufficient. Habitat transformation is due to the small size of forest patches, corresponding to fewer microhabitats and resources and the increased proportion of forest edge [16,32]), and forest works as a result of **forest management** (changes in species diversity and distribution, availability of shelters and food [16,24,27,78,138–141,154]), of which the intensity is bigger in suburban compared with urban forests.

It is noteworthy that in the analyzed materials, the impact of **water disturbances** (in urban and suburban forests) on animals was not described. Meanwhile, changes in habitat humidity may generate changes in species diversity [27]. The same applies to the negative impact of pollution. **Environmental pollution**, especially industrial air pollution, has a negative effect on diverse groups of animals [170]. In the case of birds and mammals, it includes, for example, physiological stress, bioaccumulation, direct mortality, and even decreases in local animal populations or changes in their distributions [10,180]. Birds and mammals are often consumers of higher trophic levels, and harmful substances are deposited in their bodies [181]. Although there are currently strict rules in Europe regarding the use of chemicals and, additionally, the air quality is gradually improving in general [29], in this regard, urban and suburban forests are located in unfavorable places. It would be interesting to explore how this situation affects the health and behaviors of animals.

Regardless of the place in the world or the type of forest, at the gene level of biodiversity, the most extreme form of genetic diversity reduction (DNR:HF) is species extinction due to **deforestation** [14]. In turn, the **fragmentation** of forests leads to genetic isolation [32]. In small patches, small populations of species may lose genetic diversity (inbreeding and drift) and have worse chances of survival, leading to possible extinction [14,16]. Barriers to migration impede the flow of genes, reduce recombination, and limit responses to multiple stresses. It is noteworthy that local extinction is more probable than population divergence [14]. Bridging barriers to migration, in turn, may result in the appearance of invasive alien species (**translocation/introduction**), which may lead to the extinction of native species or to hybridization with them [14,33,34]. However, in the studied literature, the impact of invasive alien species on native animal species was not described. Meanwhile, invasive alien species may have negative impacts on animals through competition, disease, and predation, affecting habitats or hybridizing [32–34,170]. Understanding these issues in urban and suburban forests seems to be important due to the presence of various additional anthropogenic disturbances and pressures that are conducive to the spread of invasive species.

It should be noted that there are also some negative impacts of wild animals on humans and their surroundings (DNR:FH). The presence of wild animals (mammals) in urban areas creates many threats to people and domestic animals, like direct attacks, wounds, or bites by these animals; the transmission of diseases (rabies, tuberculosis, and parasites [160]); and traffic collisions. These threats are sometimes also deadly to people [59,151], regardless of the region of the world [171,182]. For example, an estimated 1.5 million deer–vehicle collisions occur each year on USA roads [182]; however, these data do not apply only to urban and suburban forests. The number of crashes (especially with deer) in which vehicle occupants die is systematically growing: in 1993–1997, the annual average of such crashes was 119; in 1998–2002, it was 155; and in 2003, there were 201 fatal crashes [182]. However, these statistics concern the entire country area, not only urban and suburban forests. In Europe, the full toll of ungulates killed annually on roads is close to 1 million. During these collisions, about 30,000 people are injured. There are also human fatalities, from a few to around 20 per year in individual European countries [183]. In the studied literature, there were no similar statistics for European urban and suburban forests. Knowledge of such statistics may be useful for managing animal populations and determining traffic rules in these locations.

Wild animals (larger vertebrates) searching in urban areas for safety and food [160] can also cause damage to the infrastructure of residential areas (destruction of vegetation and constructions, flooding from beavers) [59,151,159] (DNR:FH). These problems are also common, for example, in North America [78]. All of this results in a reduced sense of security (some species are disliked or arouse fear) [55,151,184] and generates repair costs related to the damage caused by collisions [55,159] or restoration of damaged urban nature or infrastructure [55,159], not only in Europe (e.g., [160,185]). The cost of damage due to collisions, for example, in the USA, amounts to at least 1.1 billion USD annually [182]. These costs are most often unknown on the scale of individual European cities and all the more so on the scale of Europe as a whole. It is noteworthy that people are sometimes surprised by the presence of wild animals, e.g., wild boars, in the city and feed them [151]. To reduce human–wildlife conflicts, the control of wildlife populations, frequent evaluation of arising problems, and appropriate management techniques are needed [185,186].

Mosquitoes, ticks, and ants also lower the quality of recreation in urban and suburban forests [36], because they are perceived as a danger. For example, adult ticks can transmit Lyme disease bacteria [187,188] and viruses with a fatality rate in Europe from 0.5% to circa 30% [189]. Native mosquitos are still able to transmit pathogens eliminated from Europe as well as new, imported pathogens [190]. In turn, the invasive Asian tiger mosquito (*Aedes albopictus*), present in western and southern Europe, is a potential vector of, for example, dangerous viruses like dengue and West Nile virus [34,190]. It is noteworthy, that venomous snakes, not mentioned in the reviewed literature, which in Europe occur mainly in the southern region, cause an average of four deaths annually [191].

3.4. Other Threats and Types of Damage

Damage in urban and suburban forests is also caused by large-scale picking of mushrooms, littering, acts of vandalism/illegal use of forest, and intentional or unintentional ignition (Table 4).

Table 4. Other threats and types of damage due to human activities in urban and suburban forests.

DNR [1]	Threat or Damage	Region and Citation
HF	Large-scale picking of forest mushrooms	Poland [101,102], Switzerland [192], the Czech Republic [13], Sweden [4,9], Norway [4], Finland [4,103], Nordic countries [104]
HF	Damage to the mycelium and fruit body of fungi during mushroom collection	Switzerland [192], Globally [98,193]
HF	Illegal use of forests (for example, illegal entry by cars, straying away from tourist routes in protected areas for mushroom picking)	Poland [54,55,102,163,164]
HF	Littering (for example, as a threat to landscape quality)	Poland [23,36,54,86,162], Croatia [57], the United Kingdom [93], Bosnia and Herzegovina [57], Turkey [49], Finland [76], Serbia [57], Germany [22,35], Austria [167], Montenegro [57], Sweden [194], Slovenia [95], The United Kingdom [12], Macedonia [57]
HF	Vandalism towards natural objects (for example, breaking of branches, young trees, damage to forest plantations, cutting of tree bark, destroying bird nests and other animal shelters)	the United Kingdom [93], Bosnia and Herzegovina [57], Serbia [57], Poland [23,36,52,54,55,162], Finland [76], Croatia [57], Austria [167,168], Montenegro [57], Slovenia [95], Macedonia [57], Europe [113]
HH	Vandalism towards technical objects, mainly recreational infrastructure (for example, cases of theft, broken benches, damaged roofs/shelters, information boards and signs, or playground equipment)	
HF, HH	Intentional or unintentional ignition (the higher population density near forests and the number of visitors, the higher the risk of fire, which may threaten nature, soil, people, and their property)	Poland [23,52,54,55,86,102], Germany [35], Portugal [25], Turkey [195], Greece [196], (hemi)boreal vegetation zone [47], South Europe [26], Europe [197]

[1] Directions of negative relations: HF—"humans to forests", HH—"humans to humans".

The most visible changes related to the above-mentioned threats and pressures on urban and suburban forests (Table 4—DNR:HF) concern the landscape level of biodiversity. They include forest fires (**habitat alteration**), but also activities, like littering, that reduce the aesthetic value of the forest landscape (related to the **intensive use** of forests). Large-scale forest fires may destroy the forest landscape in a given area but can also cause a series of effects including the spoilage of water resources, air pollution, desertification, and disasters like floods, avalanches, and landslips [195]. On the ecosystem level of biodiversity, fires are also important. For example, they cause changes in trophic structures and reduce the resilience of ecosystems [32]. Fire may also affect all forest species, both through direct mortality [198], **habitat alteration** [26], and changes in food resources [198]. Fires can also change the succession [26] and affect the species composition of the forest. Because of their importance, forest fires are an indicator of forest degradation [32]. Although forest fires occur throughout Europe, the biggest problem is in the south of Europe, especially in France, Greece, Italy, Portugal, and Spain, where the summers are warm and dry (Mediterranean climate) (Table 4, [26]). It is noteworthy that in Spain, Italy, and Poland, deliberate fires (i.e., caused intentionally by people) are the most frequent cause of fire. In other countries, fires are also an effect of human activities but are unintentional [197].

Forest fires also have negative impacts on people, their lives, and property (DNR:HH). The development of extensive Wildland–Urban Interfaces (WUI—urban settlements encroaching into or bordering forested areas) increases the forest fire risk. This is particularly evident in the south of Europe [26,197]. For example, in Greece, in 2007, a series of fires burned down 270,000 ha of forest, agricultural land, and some WUI, causing the destruction of >3000 homes and the deaths of 80 people [197]. It is noteworthy that the fire risk may increase in the future due to global warming [32].

The second very widespread and current problem in European urban and suburban forests is littering (Table 4), which is related to the **intensive use** of forests. For example, from all forests managed by state forests in Poland (about 7 million ha, from which about 0.6 million are suburban forests), about 120,000 m^3 of rubbish is removed every year [102]. Solving this problem requires continuous environmental education of European society, as in the case of the also widespread vandalism towards natural and technical objects or intentional/unintentional ignition (Table 4).

Vandalism is an important factor that reduces the abundance or diversity of forest species, whether it is plants [93], animals [151], or fungi [97,192]. In the case of mushrooms, direct impacts on species include intensive harvesting (**intensive use**) [97], especially digging up the ground and leaving it (picking and cutting have no negative impacts on forest fungi [192]), and the reduction of fruit body numbers by trampling [97,192]. Mushroom hunting is a form of recreation or earning money, especially in nations with a significant local tradition of using wild edible fungi [192,199]. Primarily, this includes Slavic countries, for example, the Czech Republic [13,199], Poland [101,199], Serbia [97,199], Slovenia, Croatia, Belarus, and Bulgaria [199]. Edible mushrooms are also collected in parts of Finland [103,104,199], in Norway [4,104,199], Switzerland [192,199], Sweden [9,104], Latvia, Hungary, Romania, Italy, and in parts of Spain [199]. Thus, problems related to mushroom picking are rather regional, but because of the traditional aspect of this practice, they are still current.

Apart from the dominating negative relations of "humans to forests" (DNR:HF) presented in Table 4, there are also some negative impacts of nature on humans (DNR:FH "forests to humans"). This concerns mushrooms as when the mushroom picker lacks sufficient knowledge, the consumption of privately collected fruit bodies may lead to mushroom poisoning [98,199,200], which may lead to mild gastrointestinal symptoms or major cytotoxic effects resulting in organ failure and death (the mortality rate, for example, in Turkey is from 1.0% to 21.4%) [200]. The problem of mushroom poisoning in Europe is rather regional, because of the above-mentioned regional tradition of mushroom picking.

4. Conclusions

In this article, about 120 sources of information were used to determine the pressures and threats to nature related to human activities in European urban and suburban forests. The presented problems, as well as the complexity of the negative relations between people and forests (also creating threats to the people themselves) are up-to-date and their importance in Europe will grow as the percentage of people living in cities increases. They can be used as a type of checklist of possible problems to check their importance and timeliness in a particular location. This list may be expanded if there are any further described negative pressures and relations in the human–forest system.

The differences in the intensity of publishing research works (depending on the country [3]) may affect the identification of the actual range of described problems. In the discussion, this range (and the timeliness of problems) was sometimes identified based on other sources of information. Therefore, for their full recognition, a review of the literature published in nationally ranked journals is needed (in this article it was done for Poland), especially for countries not described in this review. It is noteworthy that, according to Pauleit et al. [6], there is an urgent need to promote the exchange of current scientific knowledge and best practice about European urban/suburban forests and to translate useful information into English. This would make it possible to create a valuable database of experiences, problems, and their solutions, which would allow at least partial avoidance of errors and improvement of the management of the described forests.

Depending on the problem described, preventive or remedial actions are needed at different scales of impact. International (but also national and local) effort should be made to reduce pollution (**environmental deterioration**) and threats from invasive species (**translocation/introduction**); national (and local) effort should be made to reduce **deforestation**, **fragmentation** of forests, and **habitat alteration**; and local effort should be made to reduce the **UHI effect** and the negative impacts of the **intensive use** of urban and suburban forests. There are some general indications for solving the presented problems. In the case of **deforestation**, there may be two solutions—stopping deforestation (through stricter laws or better enforcement [21]) or afforestation [70,71]. In this last case, e.g., in Belgium, a methodology based on three stages (the excluding stage, the suitability stage, and the feasibility stage) with additional groups of criteria, has been proposed [71]. The limitation of forest **fragmentation,** for example, by roads, may depend on changes in the law (legal restriction of this possibility), but also on improving the quality of cooperation between forest managers and the city land-use planners. For example, in the urban boreal forests of Scandinavia, the construction of roads is limited [72]. **Fragmentation** of forests on a small scale—by tourist routes and trails—may be limited by careful planning of tourism management of the forest (the appropriate infrastructure aimed at directing recreational and tourist traffic [4]), especially of the forest edge zone, where recreational traffic is usually the most intensive [82,179]. In the case of forests disturbed by inadequate forest management (e.g., monotypization), restructuring is needed with respect to species composition and spatial structure [55]. To limit **habitat alteration** by fires, monitoring and controlling fire risk in the most hazardous areas is recommended, but the education of society, appropriate legislation, and land-use planning are also required [26,47]. Education is also recommended to limit **environmental deterioration** by littering. For example, Clean Up the World actions (or similar), considered as one of the forms of environmental education, are organized in many countries, e.g., in Serbia [22], the Czech Republic [13], and in Poland [84]. **Environmental deterioration** by pollution is a more difficult problem to solve. Although in Europe there are currently strict rules regarding the use of chemicals, it should be remembered that urban and suburban forests are located in unfavorable places. Apart from attempts to reduce pollution within a given city, it is also worth paying attention to planting trees that are more resistant to pollution [133]. In order to reduce the **UHI effect**, it is advisable to introduce more trees and forests into cities [26]. In turn, the attempt to reduce the invasion of alien species (problem: **translocation/introduction**) is much more difficult. To define and monitor forest degradation, the area of forest change due to an invasive species may be mapped every 3–5 years using aerial photographs or satellite imagery or by using ground or aerial surveys [32]. It may also be necessary to undertake radical measures to eradicate or limit the expansion of problematic species, for example, the expansion of the raccoon dog (*Nyctereutes procyonoides*) in the Nordic countries [33]. The problem of the **intensive use** of forests (with its negative consequences) may be resolved, for example, by having the appropriate above-mentioned infrastructure to direct recreational and tourist traffic [4] and by providing environmental education to society [54,164]. In practice, the search for solutions to the presented problems should take into account their specificity as well as scale and should refer to local conditions. Public participation in urban forest management can also impact accepted solutions [20]. Undoubtedly, there will be resource issues and therefore trade-offs between what forest managers are able to achieve.

The directions of negative relations between people and forests shown in this review draw attention to the high complexity of the discussed issues. Awareness of this complexity (when planning and implementing forest management) can limit or counteract conflicts arising from the use of urban and suburban forests by people. This is of particular importance in the era of progressing urbanization and the evolution of human needs regarding the use of forests.

Funding: The costs of translation of the manuscript into English and of its publishing in open access were covered by the Faculty of Forestry, Warsaw University of Life Sciences (SGGW).

Acknowledgments: The author wishes to thank the anonymous reviewers for their comments, which greatly helped to improve the paper.

Conflicts of Interest: The author declares no conflict of interest. The founding sponsor had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

References

1. Konijnendijk, C.C. A decade of urban forestry in Europe. *For. Policy Econ.* **2003**, *5*, 173–186. [CrossRef]
2. Konijnendijk, C.C.; Nielsen, A.B.; Schipperijn, J.; Rosenblad, Y.; Sander, H.; Sarv, M.; Mäkinen, K.; Tyrväinen, L.; Donis, J.; Gundersen, V.; et al. Assessment of urban forestry research and research needs in Nordic and Baltic countries. *Urban For. Urban Green.* **2007**, *6*, 297–309. [CrossRef]
3. Krajter Ostoić, S.; Konijnendijk van den Bosch, C.C. Exploring global scientific discourses on urban forestry. *Urban For. Urban Green.* **2015**, *14*, 129–138. [CrossRef]
4. Aasetre, J.; Gundersen, V.; Vistad, O.I.; Holtrop, E.J. Recreational preferences along a naturalness-development continuum: Results from surveys in two unequal urban forests in Europe. *J. Outdoor Recreat. Tour.* **2016**, *16*, 58–68. [CrossRef]
5. EUROSTAT 2016. Urban Europe—Statistics on Cities, Towns and Suburbs—Green Cities (MS Excel: Green Cities: Tables and Figures). Available online: https://ec.europa.eu/eurostat/statistics-explained/index.php/Urban_Europe_-_statistics_on_cities,_towns_and_suburbs_-_green_cities (accessed on 28 August 2018).
6. Pauleit, S.; Jones, N.; Nyhuus, S.; Pirnat, J.; Salbitano, F. Urban Forest Resources in European Cities. In *Urban Forests and Trees*; Konijnendijk, C.C., Nilsson, K., Randrup, T., Schipperijn, J., Eds.; Springer: Berlin/Heidelberg, Germany, 2005; pp. 49–80. ISBN 978-3-540-25126-2.
7. Gälzer, R. *Vergleich der Grünsysteme Europäischer Großstädte Mit Jenem von Wien (Comparison of the Green Systems of Major European Cities with the System of Vienna)*; Magistratsabteilung: Wien, Austria, 1987; Volume Beiträge zur Stadtforschung, Stadtentwicklung und Stadtgestaltung. (In German)
8. Casalegno, S. Urban and Peri-Urban Tree Cover in European Cities: Current Distribution and Future Vulnerability Under Climate Change Scenarios. In *Global Warming Impacts—Case Studies on the Economy, Human Health, and on Urban and Natural Environments*; Casalegno, S., Ed.; InTech: Rijeka, Croatia, 2011; pp. 93–108. ISBN 978-953-307-785-7.
9. Eriksson, L.; Nordlund, A.; Olsson, O.; Westin, K. Beliefs about urban fringe forests among urban residents in Sweden. *Urban For. Urban Green.* **2012**, *11*, 321–328. [CrossRef]
10. Nowak, D.J.; Dwyer, J.F. Understanding the Benefits and Costs of Urban Forest Ecosystems. In *Urban and Community Forestry in the Northeast*; Kuser, J.E., Ed.; Springer: Berlin/Heidelberg, Germany, 2007; pp. 25–46. ISBN 978-1-4020-4288-1.
11. Sanesi, G.; Mariani, L.; Parisi, S.; Cola, G. The Urban Heath Island (UHI). How trees can mitigate the UHI and heat peaks; experiences from different latitudes. In *Urban and Periurban Forests Management, Monitoring and Ecosystem Services—EMoNFUr LIFE+ Project Experiences*; Barbante, E., Calvo, E., Eds.; Pares: Lombardy, Italy, 2014; pp. 146–149, ISBN 978-88-87553-20-8. Available online: www.emonfur.eu (accessed on 21 September 2018).

12. Hunter, I.R. What do people want from urban forestry?—The European experience. *Urban Ecosyst.* **2001**, *5*, 277–284. [CrossRef]
13. Vítková, M. How do Czechs see urban forests? *J. For. Sci.* **2006**, *52*, 565–579. [CrossRef]
14. Ledig, F.T. Human Impacts on Genetic Diversity in Forest Ecosystems. *Oikos* **1992**, *63*, 87–108. [CrossRef]
15. Newton, A.C.; Cayuela, C.; Echeverría, C.; Armesto, J.J.; Del Castillo, R.F.; Golicher, D.; Geneletti, D.; Gonzalez-Espinosa, M.; Huth, A.; López-Barrera, F.; et al. Toward integrated analysis of human impacts on forest biodiversity: Lessons from Latin America. *Ecol. Soc.* **2009**, *14*, 2. [CrossRef]
16. Kapos, V.; Lysenko, I.; Lesslie, R. *Assessing Forest Integrity and Naturalness in Relation to Biodiversity*; Forest Resources Assessment Programme, Working Paper 54; Forestry Department FAO: Rome, Italy, 2002.
17. Roberts, N.; Fyfe, R.M.; Woodbridge, J.; Gaillard, M.-J.; Davis, B.A.S.; Kaplan, J.O.; Marquer, L.; Mazier, F.; Nielsen, A.B.; Sugita, S.; et al. Europe's lost forests: A pollen-based synthesis for the last 11,000 years. *Sci. Rep.* **2018**, *8*. [CrossRef]
18. Alix-Garcia, J.; Munteanu, C.; Zhao, N.; Potapov, P.V.; Prishchepov, A.V.; Radeloff, V.C.; Krylov, A.; Bragina, E. Drivers of forest cover change in Eastern Europe and European Russia, 1985–2012. *Land Use Policy* **2016**, *59*, 284–297. [CrossRef]
19. Kaplan, J.O.; Krumhardt, K.M.; Zimmermann, N. The prehistoric and preindustrial deforestation of Europe. *Quat. Sci. Rev.* **2009**, *28*, 3016–3034. [CrossRef]
20. Nordström, E.-M.; Eriksson, L.O.; Öhman, K. Multiple criteria decision analysis with consideration to place-specific values in participatory forest planning. *Silva Fenn.* **2011**, *45*, 253–265. [CrossRef]
21. Siembida, A. Lasy na obszarach zurbanizowanych: Potrzeby, problemy, wizja rozwoju [Forests in urban areas: Needs, problems, vision of development]. In *Rozwój. Lasy i Gospodarka Leśna Jako Instrumenty Ekonomicznego i Społecznego Rozwoju Kraju [Development. Forests and Forest Management as Instruments of Economic and Social Development of the Country]*; Kaliszewski, A., Rykowski, K., Eds.; IBL: Sękocin Stary, Poland, 2014; pp. 162–180, ISBN 978-83-62830-44-2. (In Polish)
22. Gudurić, I.; Tomićević, J.; Konijnendijk, C.C. A comparative perspective of urban forestry in Belgrade, Serbia and Freiburg, Germany. *Urban For. Urban Green.* **2011**, *10*, 335–342. [CrossRef]
23. Młynarski, W.; Kaliszewski, A. The current state of forest management in cities and associated problems in the Mazowieckie Province. *For. Res. Pap.* **2013**, *74*, 315–321. [CrossRef]
24. Pedrotti, F. Types of Vegetation Maps. In *Plant and Vegetation Mapping*; Springer: Berlin/Heidelberg, Germany, 2013; pp. 103–181. ISBN 978-3-642-30234-3.
25. Nunes, A.N.; Lourenço, L.; Meira, A.C.C. Exploring spatial patterns and drivers of forest fires in Portugal (1980–2014). *Sci. Total Environ.* **2016**, *573*, 1190–1202. [CrossRef]
26. Sieghardt, M.; Mursch-Radlgruber, E.; Paoletti, E.; Couenberg, E.; Dimitrakopoulus, A.; Rego, F.; Hatzistathis, A.; Randrup, T.B. The Abiotic Urban Environment: Impact of Urban Growing Conditions on Urban Vegetation. In *Urban Forests and Trees*; Konijnendijk, C., Nilsson, K., Randrup, T., Schipperijn, J., Eds.; Springer: Berlin/Heidelberg, Germany, 2005; pp. 281–323. ISBN 978-3-540-25126-2.
27. Faulkner, S. Urbanization impacts on the structure and function of forested wetlands. *Urban Ecosyst.* **2004**, *7*, 89–106. [CrossRef]
28. Solińska-Górnicka, B.; Namura-Ochalska, A.; Symonides, B. Long-term dynamics of a relict ancient forest in an urban area. *Fragm. Florist. Geobot.* **1997**, *42*, 423–474.
29. European Environment Agent (EEA). *Air Quality in Europe—2017 Report*; EEA Report No 13/2017; Publications Office of the European Union: Luxembourg, 2017; ISBN 978-92-9213-921-6. [CrossRef]
30. Lopes, A.; Oliveira, S.; Fragoso, M.; Andrade, J.A.; Pedro, P. Wind Risk Assessment in Urban Environments: The Case of Falling Trees During Windstorm Events in Lisbon. In *Bioclimatology and Natural Hazards*; Střelcová, K., Mátyás, C., Kleidon, A., Lapin, M., Matejka, F., Blaženec, M., Škvarenina, J., Holécy, J., Eds.; Springer: Dordrecht, The Netherlands, 2009; pp. 55–74. ISBN 978-1-4020-8875-9.
31. Organisation for Economic Co-Operation and Development (OECD). *Cities and Climate Change*; OECD: Paris, France, 2010; ISBN 978-92-64-06366-2.
32. Thompson, I.D.; Guariguata, M.R.; Okabe, K.; Bahamondez, C.; Nasi, R.; Heymell, V.; Sabogal, C. An operational framework for defining and monitoring forest degradation. *Ecol. Soc.* **2013**, *18*, 20. [CrossRef]

33. European Environment Agency; Scalera, R.; Genovesi, P.; Essl, F.; Rabitsch, W. *The Impacts of Invasive Alien Species in Europe*; EEA Technical Report No 16/2012; Publications Office: Luxembourg, 2012; ISBN 978-92-9213-345-0.
34. 100 of The Worst. Available online: http://www.europe-aliens.org/speciesTheWorst.do (accessed on 26 September 2018).
35. Jestaedt, M. Experiences in the Management of Urban Recreational Forests in Germany. In *Ecology, Planning, and Management of Urban Forests*; Carreiro, M.M., Song, Y.-C., Wu, J., Eds.; Springer: New York NY, USA, 2008; pp. 301–311, ISBN 978-0-387-71424-0.
36. Gołos, P. The recreational functions of Warsaw's urban and suburban forests. *For. Res. Pap.* **2013**, *74*, 57–70. [CrossRef]
37. Malmivaara, M.; Löfström, I.; Vanha-Majamaa, I. Anthropogenic effects on understorey vegetation in Myrtillus type urban forests in southern Finland. *Silva Fenn.* **2002**, *36*, 367–381. [CrossRef]
38. Lehvävirta, S.; Vilisics, F.; Hamberg, L.; Malmivaara-Lämsä, M.; Kotze, D.J. Fragmentation and recreational use affect tree regeneration in urban forests. *Urban For. Urban Green.* **2014**, *13*, 869–877. [CrossRef]
39. Tyrväinen, L.; Pauleit, S.; Seeland, K.; de Vries, S. Benefits and Uses of Urban Forests and Trees. In *Urban Forests and Trees*; Konijnendijk, C., Nilsson, K., Randrup, T., Schipperijn, J., Eds.; Springer: Berlin/Heidelberg, Germany, 2005; pp. 81–114, ISBN 978-3-540-25126-2.
40. Kupka, I. Recreational load as a driving variable for urban forests. *J. For. Sci.* **2006**, *52*, 324–328. [CrossRef]
41. Konijnendijk, C.C. Urban Forestry in Europe: A Comparative Study of Concepts, Policies and Planning for Forest Conservation, Management and Development in and around Major European Cities. Ph.D. Thesis, Faculty of Forestry, University of Joensuu, Joensuu, Finland, 1999.
42. Tyrväinen, L. Economic valuation of urban forest benefits in Finland. *J. Environ. Manag.* **2001**, *62*, 75–92. [CrossRef]
43. Lehvävirta, S.; Rita, H.; Koivula, M. Barriers against wear affect the spatial distribution of tree saplings in urban woodlands. *Urban For. Urban Green.* **2004**, *3*, 3–17. [CrossRef]
44. Bibliographic Database of the Forest Research Institute in Warsaw. Available online: http://weblis.ibles.pl/libcat/index.html (accessed on 15 April 2018).
45. Scopus (Abstract and Citation Database of Peer-Reviewed Literature). Available online: www.scopus.com (accessed on 2 August 2018).
46. Golivets, M. Ecological and biological determination of invasion success of non-native plant species in urban woodlands with special regard to short-lived monocarps. *Urban Ecosyst.* **2014**, *17*, 291–303. [CrossRef]
47. Lehvävirta, S. Non-anthropogenic dynamic factors and regeneration of (hemi)boreal urban woodlands – synthesising urban and rural ecological knowledge. *Urban For. Urban Green.* **2007**, *6*, 119–134. [CrossRef]
48. Hladnik, D.; Pirnat, J. Urban forestry—Linking naturalness and amenity: The case of Ljubljana, Slovenia. *Urban For. Urban Green.* **2011**, *10*, 105–112. [CrossRef]
49. Atmiş, E.; Özden, S.; Lise, W. Urbanization pressures on the natural forests in Turkey: An overview. *Urban For. Urban Green.* **2007**, *6*, 83–92. [CrossRef]
50. Vasiljević, N.; Radić, B.; Gavrilović, S.; Šljukić, B.; Medarević, M.; Ristić, R. The concept of green infrastructure and urban landscape planning: A challenge for urban forestry planning in Belgrade, Serbia. *iForest-Biogeosci. For.* **2018**, *11*, 491–498. [CrossRef]
51. Kuchelmeister, G.; Braatz, S. Nouveau regard sur la foresterie urbaine. *Unasylva* **1993**, *173*, 3–12. (In French)
52. Jaszczak, R. Uwarunkowania leśnictwa miejskiego i funkcje lasów miejskich w Polsce [Determinants of urban forestry and functions of urban forests in Poland]. In *Komunikacja Społeczna w Leśnictwie [Social Communication in Forestry]*; Grzywacz, A., Ed.; PTL: Cetniewo k. Władysławowa, Poland, 2016; pp. 131–146, ISBN 978-83-9414444-4-9. (In Polish)
53. Orzechowski, M. Ochrona przyrody i zabytków w rezerwacie Las Natoliński w Warszawie [Protection of environment and monuments in Las Natoliński reserve in Warsaw]. *Stud. Mater. Cent. Edukac. Przyr.-Leśnej* **2007**, *16*, 254–266. (In Polish)
54. Mikoś, J.; Matyja, W. Problemy związane z rekreacją i wypoczynkiem na terenach leśnych w Nadleśnictwie Wejherowo [Problems related to recreation and leisure in forest areas in the Wejherowo Forest District]. In *Komunikacja Społeczna w Leśnictwie [Social Communication in Forestry]*; Grzywacz, A., Ed.; PTL: Cetniewo k. Władysławowa, Poland, 2016; pp. 21–32, ISBN 978-83-9414444-4-9. (In Polish)

55. Pleskot, A. Wyzwania dla gospodarki leśnej Nadleśnictwa Gdańsk—Problemy, konflikty, współpraca [Challenges for forest management Gdańsk Forest District—Problems, conflicts, cooperation]. In *Komunikacja Społeczna w Leśnictwie [Social Communication in Forestry]*; Grzywacz, A., Ed.; PTL: Cetniewo k. Władysławowa, Poland, 2016; pp. 33–42, ISBN 978-83-9414444-4-9. (In Polish)
56. Gryz, J.; Lesiński, G.; Krauze-Gryz, D.; Stolarz, P. Woodland reserves within an urban agglomeration as important refuges for small mammals. *Folia For. Pol.* **2017**, *59*, 3–13. [CrossRef]
57. Krajter Ostoić, S.; Konijnendijk van den Bosch, C.C.; Vuletić, D.; Stevanov, M.; Živojinović, I.; Mutabdžija-Bećirović, S.; Lazarević, J.; Stojanova, B.; Blagojević, D.; Stojanovska, M.; et al. Citizens' perception of and satisfaction with urban forests and green space: Results from selected Southeast European cities. *Urban For. Urban Green.* **2017**, *23*, 93–103. [CrossRef]
58. Miścicki, S.; Stępień, E. Szkody powodowane w lasach przez autostrady [Damage caused to forests by motorways]. *Sylwan* **2000**, *144*, 73–78. (In Polish)
59. Klimaszewski, K. Szlaki komunikacyjne i inne bariery antropogeniczne a funkcjonowanie populacji zwierząt [Communications routes and other anthropogenic barriers for animals populations functioning]. *Ann. Wars. Univ. Life Sci. SGGW Anim. Sci.* **2011**, *50*, 19–28. (In Polish)
60. Malmivaara-Lämsä, M.; Hamberg, L.; Haapamäki, E.; Liski, J.; Kotze, D.J.; Lehvävirta, S.; Fritze, H. Edge effects and trampling in boreal urban forest fragments—Impacts on the soil microbial community. *Soil Biol. Biochem.* **2008**, *40*, 1612–1621. [CrossRef]
61. Pirnat, J. Conservation and management of forest patches and corridors in suburban landscapes. *Landsc. Urban Plan.* **2000**, *52*, 135–143. [CrossRef]
62. Shannon, G.; McKenna, M.F.; Angeloni, L.M.; Crooks, K.R.; Fristrup, K.M.; Brown, E.; Warner, K.A.; Nelson, M.D.; White, C.; Briggs, J.; et al. A synthesis of two decades of research documenting the effects of noise on wildlife: Effects of anthropogenic noise on wildlife. *Biol. Rev.* **2016**, *91*, 982–1005. [CrossRef]
63. Pan, Y.; Birdsey, R.A.; Phillips, O.L.; Jackson, R.B. The Structure, Distribution, and Biomass of the World's Forests. *Annu. Rev. Ecol. Evol. Syst.* **2013**, *44*, 593–622. [CrossRef]
64. Ising, H.; Kruppa, B. Health effects caused by noise: Evidence in the literature from the past 25 years. *Noise Health* **2004**, *6*, 5–13. [PubMed]
65. Gómez-Baggethun, E.; Barton, D.N. Classifying and valuing ecosystem services for urban planning. *Ecol. Econ.* **2013**, *86*, 235–245. [CrossRef]
66. Murray, S. Gérer les influences forestières dans les zones urbaines et périurbaines. *Unasylva* **1996**, *185*, 38–44. (In French)
67. Gołos, P. Społeczne znaczenie publicznych funkcji lasu—Pożądany dla rekreacji i wypoczynku model drzewostanu i lasu [Social importance of public forest functions—Desirable for recreation model of tree stand and forest]. *For. Res. Pap.* **2010**, *71*, 149–164. (In Polish) [CrossRef]
68. Jones, K. Strategic Planning for Urban Woodlands in North West England. In *Ecology, Planning, and Management of Urban Forests*; Carreiro, M.M., Song, Y.-C., Wu, J., Eds.; Springer: New York, NY, USA, 2008; pp. 199–218, ISBN 978-0-387-71424-0.
69. Koppen, G.; Sang, Å.O.; Tveit, M.S. Managing the potential for outdoor recreation: Adequate mapping and measuring of accessibility to urban recreational landscapes. *Urban For. Urban Green.* **2014**, *13*, 71–83. [CrossRef]
70. Van Elegem, B.; Embo, T.; Lust, N.; Kerkhove, G.; Houthaeve, R. Criteria for the location of urban forests in densely populated and scarsely wooded areas. *Silva Gandav.* **1997**, *62*, 51–73. [CrossRef]
71. Van Elegem, B.; Embo, T.; Muys, B.; Lust, N. A methodology to select the best locations for new urban forests using multicriteria analysis. *Forestry* **2002**, *75*, 13–23. [CrossRef]
72. Gundersen, V.; Frivold, L.H.; Löfström, I.; Jørgensen, B.B.; Falck, J.; Øyen, B.-H. Urban woodland management—The case of 13 major Nordic cities. *Urban For. Urban Green.* **2005**, *3*, 189–202. [CrossRef]
73. Nielsen, A.B.; Jensen, R.B. Some visual aspects of planting design and silviculture across contemporary forest management paradigms—Perspectives for urban afforestation. *Urban For. Urban Green.* **2007**, *6*, 143–158. [CrossRef]
74. Olsson, O. Changed availability of urban fringe forests in Sweden in 2000–2010. *Scand. J. For. Res.* **2013**, *28*, 386–394. [CrossRef]

75. Johnston, M. The development of urban forestry in Northern Ireland. *Irish For.* **1998**, *55*, 37–58.
76. Tyrväinen, L.; Mäkinen, K.; Schipperijn, J. Tools for mapping social values of urban woodlands and other green areas. *Landsc. Urban Plan.* **2007**, *79*, 5–19. [CrossRef]
77. Zygmunt, R.; Gluszak, M. Forest proximity impact on undeveloped land values: A spatial hedonic study. *For. Policy Econ.* **2015**, *50*, 82–89. [CrossRef]
78. Clark, K.E. Attracting and Managing for Wildlife. In *Handbook of Urban and Community Forestry in the Northeast*; Kuser, J.E., Ed.; Springer: Boston, MA, USA, 2000; pp. 397–409. ISBN 978-1-4613-6880-9.
79. Davies, H.J.; Doick, K.J.; Hudson, M.D.; Schreckenberg, K. Challenges for tree officers to enhance the provision of regulating ecosystem services from urban forests. *Environ. Res.* **2017**, *156*, 97–107. [CrossRef] [PubMed]
80. Boyle, J.R.; Powers, R.F. Forest Soils. In *Reference Module in Earth Systems and Environmental Sciences*; Elsevier: Amsterdam, The Netherlands, 2013; ISBN 978-0-12-409548-9.
81. Hauck, M.; Jacob, M.; Dittrich, S.; Bade, C.; Leuschner, C. Natürliche Walddynamik und ihr Wert für Biodiversität und Ökosystemfunktionen: Ergebnisse einer Fallstudie aus dem Harz. *Forstarchiv* **2013**, *84*, 75–80. [CrossRef]
82. Gundersen, V.; Tangeland, T.; Kaltenborn, B.P. Planning for recreation along the opportunity spectrum: The case of Oslo, Norway. *Urban For. Urban Green.* **2015**, *14*, 210–217. [CrossRef]
83. Ode, Å.K.; Fry, G.L.A. Visual aspects in urban woodland management. *Urban For. Urban Green.* **2002**, *1*, 15–24. [CrossRef]
84. Jaszczak, R. Las i gospodarka leśna w zasięgu oddziaływania miast w Polsce [Forest and forest economy within the range of influence of towns and cities in Poland]. *Stud. Mater. Cent. Edukac. Przyr.-Leśnej* **2008**, *19*, 152–171. (In Polish)
85. Littlemore, J.; Barker, S. The ecological response of forest ground flora and soils to experimental trampling in British urban woodlands. *Urban Ecosyst.* **2001**, *5*, 257–276. [CrossRef]
86. Ważyński, B. *Urządzanie i Rekreacyjne Zagospodarowanie Lasu. Poradnik Leśnika [Planning and Recreational Management of the Forest. Guide for a Forester]*, 1st ed.; PWRiL: Warsaw, Poland, 2011; ISBN 978-83-09-01068-5. (In Polish)
87. Skłodowski, J.; Bartosz, S.Z.; Dul, Ł.; Grzybek, D.; Jankowski, S.Z.; Kajetanek, M.; Kalisz, P.; Korenkiewicz, U.; Mazur, G.; Myszek, J.; et al. Próba oceny wpływu szerokości szlaków turystycznych na otaczające je środowisko lasu [An attempt to assess the effect of tourist trail width on adjacent forest environment]. *Sylwan* **2009**, *153*, 699–709. (In Polish) [CrossRef]
88. Magiera, T.; Strzyszcz, Z.; Rachwal, M. Mapping particulate pollution loads using soil magnetometry in urban forests in the Upper Silesia Industrial Region, Poland. *For. Ecol. Manag.* **2007**, *248*, 36–42. [CrossRef]
89. Forman, R.T.T.; Alexander, L.E. Roads and their major ecological effects. *Annu. Rev. Ecol. Syst.* **1998**, *29*, 207–231. [CrossRef]
90. García-Gómez, H.; Aguillaume, L.; Izquieta-Rojano, S.; Valiño, F.; Àvila, A.; Elustondo, D.; Santamaría, J.M.; Alastuey, A.; Calvete-Sogo, H.; González-Fernández, I.; et al. Atmospheric pollutants in peri-urban forests of Quercus ilex: Evidence of pollution abatement and threats for vegetation. *Environ. Sci. Pollut. Res.* **2016**, *23*, 6400–6413. [CrossRef] [PubMed]
91. Greszta, J.; Gruszka, A. Wpływ soli i chlorowodoru na lasy miejskie oraz zieleń miejską [The influence of salts and hydrogen chloride on forests and urban green]. *Sylwan* **2000**, *144*, 33–43. (In Polish)
92. Świerk, D.; Krzyżaniak, M.; Walerzak, M.T.; Urbański, P. Wpływ zmiennych środowiskowych na stan zdrowotny klonu pospolitego (*Acer platanoides* L.) w wybranych parkach i lasach komunalnych Poznania [Effect of environmental variables on health condition of Acer platanoides L. in urban parks and forests of the city of Poznań]. *Sylwan* **2015**, *159*, 236–245. (In Polish) [CrossRef]
93. Coles, R.W.; Bussey, S.C. Urban forest landscapes in the UK—Progressing the social agenda. *Landsc. Urban Plan.* **2000**, *52*, 181–188. [CrossRef]
94. Malmivaara-Lämsä, M.; Fritze, H. Effects of wear and above ground forest site type characteristics on the soil microbial community structure in an urban setting. *Plant Soil* **2003**, *256*, 187–203. [CrossRef]
95. Verlič, A.; Arnberger, A.; Japelj, A.; Simončič, P.; Pirnat, J. Perceptions of recreational trail impacts on an urban forest walk: A controlled field experiment. *Urban For. Urban Green.* **2015**, *14*, 89–98. [CrossRef]

96. Hołowiecka, B.; Grzelak-Kostulska, E. Atrakcyjność turystyczna lasów w kontekście nowych tendencji i trendów w turystyce [Forests tourist attractiveness in the context of the new tendencies and trends in tourism]. *Stud. Mater. Cent. Edukac. Przyr.-Leśnej* **2013**, *37*, 111–117. (In Polish)
97. Ivancević, B.; Matavulj, M.; Vukojević, J.; Karaman, M. Fungi in the legislation of the Republic of Serbia. *Zb. Matice Srp. prir. Nauk.* **2012**, *123*, 51–64. [CrossRef]
98. Boa, E. Local Communities and Edible Ectomycorrhizal Mushrooms. In *Edible Ectomycorrhizal Mushrooms*; Zambonelli, A., Bonito, G.M., Eds.; Springer: Berlin/Heidelberg, Germany, 2012; Volume 34, pp. 307–315, ISBN 978-3-642-33822-9.
99. Skłodowski, J. Zagrożenie mezofauny powodowane turystycznym zaśmiecaniem lasów [Danger to invertebrate mezofauna caused by the tourism related forest littering]. *Sylwan* **2011**, *155*, 261–268. (In Polish) [CrossRef]
100. Hauru, K.; Niemi, A.; Lehvävirta, S. Spatial distribution of saplings in heavily worn urban forests: Implications for regeneration and management. *Urban For. Urban Green.* **2012**, *11*, 279–289. [CrossRef]
101. Gołos, P.; Zając, S. Delimitacja rekreacyjnej funkcji lasów i gospodarki leśnej na terenach zurbanizowanych [Assignment of recreational function to forests and forest management in urban areas]. *For. Res. Pap.* **2011**, *72*, 83–94. (In Polish) [CrossRef]
102. Leśnictwo [Forestry]. Statistical Yearbook 2017. Available online: http://stat.gov.pl/obszary-tematyczne/rolnictwo-lesnictwo/lesnictwo/lesnictwo-2017,1,13.html (accessed on 12 April 2018).
103. Cai, M.; Pettenella, D.; Vidale, E. Income generation from wild mushrooms in marginal rural areas. *For. Policy Econ.* **2011**, *13*, 221–226. [CrossRef]
104. Edwards, D.; Jay, M.; Jensen, F.S.; Lucas, B.; Marzano, M.; Montagné, C.; Peace, A.; Weiss, G. Public preferences for structural attributes of forests: Towards a pan-European perspective. *For. Policy Econ.* **2012**, *19*, 12–19. [CrossRef]
105. Beker, C. Wpływ poziomu imisji przemysłowych na stan zdrowotny drzewostanów sosnowych Nadleśnictwa Doświadczalnego Zielonka [The influence of the level of industrial immissions on the health condition of pine stands of the Forest District Zielonka]. In *Zagrożenia Ekosystemów Leśnych Przez Człowieka: Rozpoznanie—Monitoring—Przeciwdziałanie [Threats of Forest Ecosystems by Man: Recognition—Monitoring—Counteraction]*; Mazur, S., Tracz, H., Eds.; SGGW: Warsaw, Poland, 2008; pp. 153–157, ISBN 978-83-7244-916-0. (In Polish)
106. Walna, B.; Kurzyca, I. Skład chemiczny opadów atmosferycznych jako miara presji antropogenicznej na terenie Wielkopolskiego Parku Narodowego [Chemical composition of atmospheric precipitation as a mesure of human impact on Wielkopolski National Park]. In *Trwałość i Efektywność Ochrony Przyrody w Polskich Parkach Narodowych [The Durability and Efficiency of Nature Protection in Polish National Parks]*; Andrzejewska, A., Lubański, A., Eds.; KPN: Izabelin, Poland, 2009; pp. 115–124, ISBN 978-83-7585-070-3. (In Polish)
107. Staszewski, T.; Kubiesa, P.; Łukasik, W.; Uziębło, A.K. Reakcja borów sosnowych na antropopresję w różnych typach siedlisk w Kampinoskim Parku Narodowym [Response of pine forests to anthropopression in different habitat types in Kampinoski National Park]. In *Trwałość i Efektywność Ochrony Przyrody w Polskich Parkach Narodowych [The Durability and Efficiency of Nature Protection in Polish National Parks]*; Andrzejewska, A., Lubański, A., Eds.; KPN: Izabelin, Poland, 2009; pp. 289–298, ISBN 978-83-7585-070-3. (In Polish)
108. Cedro, A.; Cedro, B. Wpływ warunków klimatycznych i zanieczyszczenia powietrza na reakcję przyrostową sosny zwyczajnej (*Pinus sylvestris* L.) rosnącej w Lasach Miejskich Szczecina [Influence of climatic conditions and air pollution on radial growth of Scots pine (*Pinus sylvestris* L.) in Szczecin's city forests]. *For. Res. Pap.* **2018**, *79*, 105–112. [CrossRef]
109. Beckett, K.P.; Freer-Smith, P.H.; Taylor, G. Urban woodlands: Their role in reducing the effects of particulate pollution. *Environ. Pollut.* **1998**, *99*, 347–360. [CrossRef]
110. Selmi, W.; Weber, C.; Rivière, E.; Blond, N.; Mehdi, L.; Nowak, D. Air pollution removal by trees in public green spaces in Strasbourg city, France. *Urban For. Urban Green.* **2016**, *17*, 192–201. [CrossRef]
111. Sæbø, A.; Benedikz, T.; Randrup, T.B. Selection of trees for urban forestry in the Nordic countries. *Urban For. Urban Green.* **2003**, *2*, 101–114. [CrossRef]
112. Tello, M.-L.; Tomalak, M.; Siwecki, R.; Gáper, J.; Motta, E.; Mateo-Sagasta, E. Biotic Urban Growing Conditions—Threats, Pests and Diseases. In *Urban Forests and Trees*; Konijnendijk, C., Nilsson, K., Randrup, T., Schipperijn, J., Eds.; Springer: Berlin/Heidelberg, Germany, 2005; pp. 325–365. ISBN 978-3-540-25126-2.

113. Benedikz, T.; Ferrini, F.; Garcia-Valdecantos, J.L.; Tello, M.-L. Plant Quality and Establishment. In *Urban Forests and Trees*; Konijnendijk, C., Nilsson, K., Randrup, T., Schipperijn, J., Eds.; Springer: Berlin/Heidelberg, Germany, 2005; pp. 231–256, ISBN 978-3-540-25126-2.
114. Hérard, F.; Maspero, M. History of discoveries and management of the citrus longhorned beetle, Anoplophora chinensis, in Europe. *J. Pest Sci.* **2018**. [CrossRef]
115. Adamczyk, A.B. Zróżnicowanie termiczne obszarów zalesionych w otoczeniu Warszawy [Differentiation of thermal condition of woodlands around Warsaw Agglomeration]. In *Trwałość i Efektywność Ochrony Przyrody w Polskich Parkach Narodowych [The Durability and Efficiency of Nature Protection in Polish National Parks]*; Andrzejewska, A., Lubański, A., Eds.; KPN: Izabelin, Poland, 2009; pp. 189–198, ISBN 978-83-7585-070-3. (In Polish)
116. Kowarik, I. On the Role of Alien Species in Urban Flora and Vegetation. In *Urban Ecology*; Marzluff, J.M., Shulenberger, E., Endlicher, W., Alberti, M., Bradley, G., Ryan, C., Simon, U., ZumBrunnen, C., Eds.; Springer: Boston, MA, USA, 2008; pp. 321–338, ISBN 978-0-387-73411-8.
117. Stefańska-Krzaczek, E. Bogactwo gatunkowe osuszonych lasów łęgowych w środowisku miejskim Wrocławia [Species richness of drained riparian forests in the urban area of Wrocław]. *Sylwan* **2013**, *157*, 366–375. (In Polish) [CrossRef]
118. Dyderski, M.K.; Gdula, A.K.; Wrońska-Pilarek, D. Wpływ antropopresji na leśne zbiorowiska roślinne w warunkach aglomeracji miejskiej na przykładzie Doliny Bogdanki w Poznaniu [The influence of the anthropopressure on forest plant communities in the big city on example of Bogdanka River valley in Poznań]. *Stud. Mater. Cent. Edukac. Przyr.-Leśnej* **2015**, *42*, 84–94. (In Polish)
119. Motard, E.; Muratet, A.; Clair-Maczulajtys, D.; Machon, N. Does the invasive species Ailanthus altissima threaten floristic diversity of temperate peri-urban forests? *C. R. Biol.* **2011**, *334*, 872–879. [CrossRef] [PubMed]
120. Rusterholz, H.-P.; Wirz, D.; Baur, B. Garden waste deposits as a source for non-native plants in mixed deciduous forests. *Appl. Veg. Sci.* **2012**, *15*, 329–337. [CrossRef]
121. Gaggini, L.; Rusterholz, H.-P.; Baur, B. Settlements as a source for the spread of non-native plants into Central European suburban forests. *Acta Oecol.* **2017**, *79*, 18–25. [CrossRef]
122. Rutkowski, L. Inwazja roślin obcego pochodzenia w naszych lasach [Invasion of alien plants in Polish woods]. *Zarz. Ochr. Przyr. Lasach* **2014**, *8*, 199–205. (In Polish) [CrossRef]
123. Otręba, A.; Mędrzycki, P. Inwazja czeremchy amerykańskiej (*Prunus serotina* Ehrh.) w Kampinoskim Parku Narodowym jako efekt działalności człowieka i ekspansywnych cech gatunku [The invasion of the black cherry (*Prunus serotina* Ehrh.) in Kampinos National Park as a result of human activity and expansive features of the species]. In *Trwałość i Efektywność Ochrony Przyrody w Polskich Parkach Narodowych [The Durability and Efficiency of Nature Protection in Polish National Parks]*; Andrzejewska, A., Lubański, A., Eds.; KPN: Izabelin, Poland, 2009; pp. 259–270, ISBN 978-83-7585-070-3. (In Polish)
124. Alvey, A.A. Promoting and preserving biodiversity in the urban forest. *Urban For. Urban Green.* **2006**, *5*, 195–201. [CrossRef]
125. McKinney, M.L. Urbanization as a major cause of biotic homogenization. *Biol. Conserv.* **2006**, *127*, 247–260. [CrossRef]
126. Seeland, K.; Moser, K.; Scheuthle, H.; Kaiser, F.G. Public acceptance of restrictions imposed on recreational activities in the peri-urban Nature Reserve Sihlwald, Switzerland. *Urban For. Urban Green.* **2002**, *1*, 49–57. [CrossRef]
127. Chen, J.; Saunders, S.C.; Crow, T.R.; Naiman, R.J.; Brosofske, K.D.; Mroz, G.D.; Brookshire, B.L.; Franklin, J.F. Microclimate in Forest Ecosystem and Landscape Ecology. *BioScience* **1999**, *49*, 288–297. [CrossRef]
128. Della-Marta, P.M.; Mathis, H.; Frei, C.; Liniger, M.A.; Kleinn, J.; Appenzeller, C. The return period of wind storms over Europe. *Int. J. Clim.* **2009**, *29*, 437–459. [CrossRef]
129. Quine, C.; Coutts, M.; Gardiner, B.; Pyatt, G. *Forests and Wind: Management to Minimise Damage*; Forestry Commission Bulletin 114; HMSO: London, UK, 1995.
130. Skaggs, R.W.; Tian, S.; Chescheir, G.M.; Amatya, D.M.; Youssef, M.A. Forest Drainage. In *Forest Hydrology: Processes, Management and Assessment*; Amatya, D., Williams, T., Bren, L., de Jong, C., Eds.; CAB International: Boston, MA, USA, 2016; pp. 124–140, ISBN 978-1-78064-660-2.
131. Raum, S.; Potter, C. Forestry paradigms and policy change: The evolution of forestry policy in Britain in relation to the ecosystem approach. *Land Use Policy* **2015**, *49*, 462–470. [CrossRef]

132. Roovers, P.; Baeten, S.; Hermy, M. Plant species variation across path ecotones in a variety of common vegetation types. *Plant Ecol.* **2004**, *170*, 107–119. [CrossRef]
133. Oswalt, C.M.; Clatterbuck, W.K. *Impacts of Air Pollution on the Urban Forest*; SP 657; University of Tennessee Extension Publication: Knoxville, TN, USA, 2005.
134. Sett, R. Responses in Plants Exposed to Dust Pollution. *Hortic. Int. J.* **2017**, *1*, 53–56. [CrossRef]
135. Kuijper, D.P.J. Lack of natural control mechanisms increases wildlife–forestry conflict in managed temperate European forest systems. *Eur. J. For. Res.* **2011**, *130*, 895–909. [CrossRef]
136. Keinath, D.A.; Doak, D.F.; Hodges, K.E.; Prugh, L.R.; Fagan, W.; Sekercioglu, C.H.; Buchart, S.H.M.; Kauffman, M. A global analysis of traits predicting species sensitivity to habitat fragmentation: Species sensitivity. *Glob. Ecol. Biogeogr.* **2017**, *26*, 115–127. [CrossRef]
137. Reily, P.W.; Johnson, W.C. The effects of altered hydrologic regime on tree growth along the Missouri River in North Dakota. *Can. J. Bot.* **1982**, *60*, 2410–2423. [CrossRef]
138. Heyman, E.; Gunnarsson, B.; Stenseke, M.; Henningsson, S.; Tim, G. Openness as a key-variable for analysis of management trade-offs in urban woodlands. *Urban For. Urban Green.* **2011**, *10*, 281–293. [CrossRef]
139. Tyrväinen, L.; Silvennoinen, H.; Kolehmainen, O. Ecological and aesthetic values in urban forest management. *Urban For. Urban Green.* **2003**, *1*, 135–149. [CrossRef]
140. del Castillo, R.F.; Argueta, S.T.; Sáenz-Romero, C. Pinus chiapensis, a keystone species: Genetics, ecology, and conservation. *For. Ecol. Manag.* **2009**, *257*, 2201–2208. [CrossRef]
141. Bergstedt, J.; Milberg, P. The impact of logging intensity on field-layer vegetation in Swedish boreal forests. *For. Ecol. Manag.* **2001**, *154*, 105–115. [CrossRef]
142. Churkina, G.; Kuik, F.; Bonn, B.; Lauer, A.; Grote, R.; Tomiak, K.; Butler, T.M. Effect of VOC Emissions from Vegetation on Air Quality in Berlin during a Heatwave. *Environ. Sci. Technol.* **2017**, *51*, 6120–6130. [CrossRef] [PubMed]
143. Asam, C.; Hofer, H.; Wolf, M.; Aglas, L.; Wallner, M. Tree pollen allergens-an update from a molecular perspective. *Allergy* **2015**, *70*, 1201–1211. [CrossRef] [PubMed]
144. Agricultural Safety Section. *Management of the Risk from Falling Trees*; SIM 01/2007/05; Health and Safety Executive: Nottingham, UK, 2014. Available online: http://www.hse.gov.uk/foi/internalops/sims/ag_food/010705.htm (accessed on 1 October 2018).
145. Barua, M.; Bhagwat, S.A.; Jadhav, S. The hidden dimensions of human–wildlife conflict: Health impacts, opportunity and transaction costs. *Biol. Conserv.* **2013**, *157*, 309–316. [CrossRef]
146. Guerreiro, S.B.; Dawson, R.J.; Kilsby, C.; Lewis, E.; Ford, A. Future heat-waves, droughts and floods in 571 European cities. *Environ. Res. Lett.* **2018**, *13*, 034009. [CrossRef]
147. Kundzewicz, Z.W.; Pińskwar, I.; Brakenridge, G.R. Large floods in Europe, 1985–2009. *Hydrol. Sci. J.* **2013**, *58*, 1–7. [CrossRef]
148. Sæbø, A.; Borzan, Ž.; Ducatillion, C.; Hatzistathis, A.; Lagerström, T.; Supuka, J.; García-Valdecantos, J.L.; Rego, F.; Van Slycken, J. The Selection of Plant Materials for Street Trees, Park Trees and Urban Woodland. In *Urban Forests and Trees*; Konijnendijk, C., Nilsson, K., Randrup, T., Schipperijn, J., Eds.; Springer: Berlin/Heidelberg, Germany, 2005; pp. 257–280, ISBN 978-3-540-25126-2.
149. Hester, A.J.; Edenius, L.; Buttenschon, R.M.; Kuiters, A.T. Interactions between forests and herbivores: The role of controlled grazing experiments. *Forestry* **2000**, *73*, 381–391. [CrossRef]
150. Weston, M.A.; Stankowich, T. Dogs as agents of disturbance. In *Free-Ranging Dogs and Wildlife Conservation*; Gompper, M.E., Ed.; Oxford University Press: Oxford, UK; New York, NY, USA, 2014; pp. 94–116, ISBN 978-0-19-966321-7.
151. Dudek, K.; Jerzak, L.; Tryjanowski, P. *Zwierzęta Konfliktowe w Miastach [Conflict Animals in Cities]*, 1st ed.; RDOŚ: Gorzów Wielkopolski, Poland, 2016; ISBN 978-83-63564-02-5. (In Polish)
152. Beisiegel, B. de M. Shelter availability and use by mammals and birds in an Atlantic forest area. *Biota Neotropica* **2006**, *6*. [CrossRef]
153. Luniak, M. Fauna of the Big City—Estimating Species Richness and Abundance in Warsaw Poland. In *Urban Ecology*; Marzluff, J.M., Shulenberger, E., Endlicher, W., Alberti, M., Bradley, G., Ryan, C., Simon, U., ZumBrunnen, C., Eds.; Springer US: Boston, MA, USA, 2008; pp. 349–354. ISBN 978-0-387-73411-8.
154. Orłowski, K.; Martini, K.; Martini, M. Avian responses to undergrowth removal in a suburban wood. *Pol. J. Ecol.* **2008**, *56*, 487–495.

155. Goszczyński, J.; Jabłoński, P.; Lesiński, G.; Romanowski, J. Variation in diet of Tawny Owl Strix aluco L. along an urbanization gradient. *Acta Ornithol.* **1993**, *27*, 113–123.
156. McKinney, M.L. Effects of urbanization on species richness: A review of plants and animals. *Urban Ecosyst.* **2008**, *11*, 161–176. [CrossRef]
157. Ratkiewicz, M. Wpływ barier genetycznych i środowiskowych oraz czynników historycznych na przepływ genów i strukturę populacji u zwierząt [Historical events, genetic and environmental barriers—Their impact on gene flow and population structure in animals]. *Kosmos* **2006**, *55*, 165–176. (In Polish)
158. Gomes, V.; Ribeiro, R.; Carretero, M.A. Effects of urban habitat fragmentation on common small mammals: Species versus communities. *Biodivers. Conserv.* **2011**, *20*, 3577–3590. [CrossRef]
159. Kamieniarz, R. Dynamika liczebności zwierzyny a gospodarka łowiecka [The dynamics of the number of game and the hunting economy]. In *Problemy Współczesnego Łowiectwa w Polsce [Problems of Modern Hunting in Poland]*; Gwiazdowicz, D.J., Ed.; Oficyna Wydawnicza G&P: Poznań, Poland, 2012; pp. 64–78, ISBN 978-83-7272-275-1. (In Polish)
160. Bateman, P.W.; Fleming, P.A. Big city life: Carnivores in urban environments. *J. Zool.* **2012**, *287*, 1–23. [CrossRef]
161. Lesiński, G.; Gryz, J.B. How protecting a suburban forest as a natural reserve effected small mammal communities. *Urban Ecosyst.* **2012**, *15*, 103–110. [CrossRef]
162. Janeczko, E.; Woźnicka, M. Zagospodarowanie rekreacyjne lasów Warszawy w kontekście potrzeb i oczekiwań mieszkańców stolicy [Development of urban forest recreation of Warsaw in the context of the needs and expectations of the residents of the capital]. *Stud. Mater. Cent. Edukac. Przyr.-Leśnej* **2009**, *23*, 131–139. (In Polish)
163. Cieszewska, A. Ocena ruchu turystycznego w Kampinoskim Parku Narodowym w latach 2005-2006 [Evaluation of touristic traffic in Kampinos National Park in the years 2005-2006]. In *Trwałość i Efektywność Ochrony Przyrody w Polskich Parkach Narodowych [The Durability and Efficiency of Nature Protection in Polish National Parks]*; Andrzejewska, A., Lubański, A., Eds.; KPN: Izabelin, Poland, 2009; pp. 99–112, ISBN 978-83-7585-070-3. (In Polish)
164. Matuszewska, D. Uwarunkowania, stan i perspektywy użytkowania turystycznego Wielkopolskiego Parku Narodowego w opiniach mieszkańców Puszczykowa [Conditions and prospects of tourist use of the Wielkopolski National Park in the opinions of the inhabitants of Puszczykowo]. In *Studia nad Turystyką. Prace Geograficzne i Regionalne [Studies on Tourism. Geographical and Regional Works]*; Kurek, W., Faracik, R., Eds.; IGiGP UJ: Kraków, Poland, 2007; pp. 157–167, ISBN 978-83-88424-35-9. (In Polish)
165. Górecka, A. Funkcja rekreacyjna warszawskiego Lasu Bielańskiego [Recreation function of Warsaw Bielański Forest]. *Stud. Mater. Cent. Edukac. Przyr.-Leśnej* **2009**, *23*, 172–179. (In Polish)
166. Arnberger, A.; Aikoh, T.; Eder, R.; Shoji, Y.; Mieno, T. How many people should be in the urban forest? A comparison of trail preferences of Vienna and Sapporo forest visitor segments. *Urban For. Urban Green.* **2010**, *9*, 215–225. [CrossRef]
167. Arnberger, A.; Eder, R. Exploring coping behaviours of Sunday and workday visitors due to dense use conditions in an urban forest. *Urban For. Urban Green.* **2012**, *11*, 439–449. [CrossRef]
168. Arnberger, A. Recreation use of urban forests: An inter-area comparison. *Urban For. Urban Green.* **2006**, *4*, 135–144. [CrossRef]
169. Arnberger, A.; Haider, W. Social effects on crowding preferences of urban forest visitors. *Urban For. Urban Green.* **2005**, *3*, 125–136. [CrossRef]
170. Temple, H.J.; Terry, A. *The Status and Distribution of European Mammals*; Office for Official Publications of the European Communities: Luxembourg, 2007; ISBN 92-79-04815-9.
171. Lao, Y.; Zhang, G.; Wu, Y.-J.; Wang, Y. Modeling animal–vehicle collisions considering animal–vehicle interactions. *Accid. Anal. Prev.* **2011**, *43*, 1991–1998. [CrossRef] [PubMed]
172. Griffiths, H.I.; Thomas, D.H. The status of the Badger Meles meles (L., 1758) (Carnivora, Mustelidae) in Europe. *Mammal Rev.* **1993**, *23*, 17–58. [CrossRef]
173. HIRSCHFELD, A.; HEYD, A. Mortality of migratory birds caused by hunting in Europe: Bag statistics and proposals for the conservation of birds and animal welfare. *Ber. Vogelschutz* **2005**, *42*, 47–74.
174. Lorenzini, R. DNA forensics and the poaching of wildlife in Italy: A case study. *Forensic Sci. Int.* **2005**, *153*, 218–221. [CrossRef] [PubMed]

175. Buxton, R.T.; McKenna, M.F.; Mennitt, D.; Fristrup, K.; Crooks, K.; Angeloni, L.; Wittemyer, G. Noise pollution is pervasive in U.S. protected areas. *Science* **2017**, *356*, 531–533. [CrossRef] [PubMed]
176. Lynch, E.; Joyce, D.; Fristrup, K. An assessment of noise audibility and sound levels in U.S. National Parks. *Landsc. Ecol.* **2011**, *26*, 1297–1309. [CrossRef]
177. Francis, C.D.; Ortega, C.P.; Cruz, A. Noise Pollution Changes Avian Communities and Species Interactions. *Curr. Biol.* **2009**, *19*, 1415–1419. [CrossRef]
178. Statistics on Dogs in Europe. Available online: www.statista.com (accessed on 4 May 2019).
179. Pourias, J. Un aperçu des problématiques d'actualité en foresterie urbaine: L'exemple des forêts urbaines nantaises. *Rev. For. Fr.* **2009**, *5*, 513–520. (In French) [CrossRef]
180. Newman, J.R. Effects of industrial air pollution on wildlife. *Biol. Conserv.* **1979**, *15*, 181–190. [CrossRef]
181. Henny, C.J.; Nelson, M.W. Decline and Present Status of Breeding Peregrine Falcons in Oregon. *Murrelet* **1981**, *62*, 43. [CrossRef]
182. Insurance Institute for Highway Safety. Human deaths in crashes with animals can be cut even if crashes aren't. *Status Rep.* **2005**, *40*. Available online: http://web.archive.org/web/20180823222732/http://www.iihs.org/iihs/sr/statusreport/article/40/1/2 (accessed on 3 September 2019).
183. Langbein, J.; Putman, R.; Pokorny, B. Traffic collisions involving deer and other ungulates in Europe and available measures for mitigation. In *Ungulate Management in Europe*; Putman, R., Apollonio, M., Andersen, R., Eds.; Cambridge University Press: Cambridge, UK, 2011; pp. 215–259, ISBN 978-0-511-97413-7.
184. Bjerke, T.; Østdahl, T. Animal-related attitudes and activities in an urban population. *Anthrozoös* **2004**, *17*, 109–129. [CrossRef]
185. Soulsbury, C.D.; White, P.C.L. Human–wildlife interactions in urban areas: A review of conflicts, benefits and opportunities. *Wildl. Res.* **2015**, *42*, 541. [CrossRef]
186. Delahay, R.J.; Davison, J.; Poole, D.W.; Matthews, A.J.; Wilson, C.J.; Heydon, M.J.; Roper, T.J. Managing conflict between humans and wildlife: Trends in licensed operations to resolve problems with badgers Meles meles in England. *Mammal Rev.* **2009**, *39*, 53–66. [CrossRef]
187. Méha, C.; Godard, V.; Moulin, B.; Haddad, H. La borréliose de Lyme: Un risque sanitaire émergent dans les forêts franciliennes? *Cybergeo* **2012**. [CrossRef]
188. Cayol, C.; Koskela, E.; Mappes, T.; Siukkola, A.; Kallio, E.R. Temporal dynamics of the tick Ixodes ricinus in northern Europe: Epidemiological implications. *Parasites Vectors* **2017**, *10*. [CrossRef]
189. Charrel, R.N.; Attoui, H.; Butenko, A.M.; Clegg, J.C.; Deubel, V.; Frolova, T.V.; Gould, E.A.; Gritsun, T.S.; Heinz, F.X.; Labuda, M.; et al. Tick-borne virus diseases of human interest in Europe. *Clin. Microbiol. Infect.* **2004**, *10*, 1040–1055. [CrossRef]
190. Calzolari, M. Mosquito-borne diseases in Europe: An emerging public health threat. *Rep. Parasitol.* **2016**, *5*, 1–12. [CrossRef]
191. Chippaux, J.-P. Epidemiology of snakebites in Europe: A systematic review of the literature. *Toxicon* **2012**, *59*, 86–99. [CrossRef]
192. Egli, S.; Peter, M.; Buser, C.; Stahel, W.; Ayer, F. Mushroom picking does not impair future harvests – results of a long-term study in Switzerland. *Biol. Conserv.* **2006**, *129*, 271–276. [CrossRef]
193. Toussaint-Samat, M. *A History of Food*, New Expanded ed.; Wiley-Blackwell: Chichester, UK; Malden, MA, USA, 2009; ISBN 978-1-4051-8119-8.
194. Heyman, E. Analysing recreational values and management effects in an urban forest with the visitor-employed photography method. *Urban For. Urban Green.* **2012**, *11*, 267–277. [CrossRef]
195. Bakirci, M. Negative impacts of forest fires on ecological balance and environmental sustainability: Case of Turkey. *Rev. Geogr. J. Geogr.* **2010**, *5*, 15–32.
196. Stefanidis, S. Estimation of the mean annual sediment discharge in fire affected watersheds. *Silva Balc.* **2011**, *12*, 91–96.
197. Tedim, F.; Xanthopoulos, G.; Leone, V. Forest Fires in Europe: Facts and Challenges. In *Wildfire Hazards, Risks and Disasters*; Shroder, J.F., Paton, D., Eds.; Elsevier: Amsterdam, The Netherlands, 2015; pp. 77–99, ISBN 978-0-12-410434-1.
198. Jhariya, M.K.; Raj, A. Effects of wildfires on flora, fauna and physico-chemical properties of soil-An overview. *J. Appl. Nat. Sci.* **2014**, *6*, 887–897. [CrossRef]

199. Boa, E.R. *Wild Edible Fungi: A Global Overview of Their Use and Importance to People (ANNEX 1 Summary of the Importance of Wild Edible Fungi by Region and Country)*; Non-Wood Forest Products; Food and Agriculture Organization of the United Nations: Rome, Italy, 2004; ISBN 978-92-5-105157-3.
200. Eren, S.H.; Demirel, Y.; Ugurlu, S.; Korkmaz, I.; Aktas, C.; Güven, F.M.K. Mushroom poisoning: Retrospective analysis of 294 cases. *Clinics* **2010**, *65*, 491–496. [CrossRef] [PubMed]