

## TRAFFIC POLLUTION IN THE CITIES: ECOLOGICAL ASPECT OF URBAN SAFETY\*

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*Urban safety represents a complex and multifaceted term, and its ecological aspect is becoming increasingly important due to constant increase in pollution level, particularly in rapidly expanding urban areas. Traffic is recognized as one of the most significant sources of the emissions of pollutants in urban zones across the world, including the cities in Serbia as well. That is the reason why the authors of this paper explain the link between environment quality and protection on the one hand and urban safety, on the other, with special focus on traffic as the source of pollution in urban areas. Moreover, the authors explore actual reaction of the society to this problem, through the analysis of reports and legal and strategic framework relevant to the prevention and minimization of pollution in urban areas caused by traffic. On the grounds of experiences from other countries, the authors also make recommendations for decision and public policy makers in the sphere of traffic and ecology, with the aim to improve this aspect of urban safety in Serbia.*

**KEY WORDS:** *traffic pollution / urban safety / ecological safety / environment*

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## INTRODUCTION

The topic of this paper is focused on the issue of urban safety and security in the context of increasing traffic and its negative impacts on environmental pollution and human health. The authors approach this topic from a legal, environmental and security standpoint. Through the analysis of the most important problems related to traffic generated pollution in urban areas and current legislative and strategic documents dealing with this issue, the authors highlight key challenges in this field in Serbia and attempt to offer suggestions and recommendations for their overcoming in the future in accordance with international standards. When discussing the reactions of the society to the problems of environmental pollution in urban areas caused by traffic, the authors of this paper start from reports on the condition of environment in urban areas in Serbia in order to recognize key sources and consequences of traffic pollution. After that, the authors critically analyze Sustainable Urban Mobility Plan for the City of Belgrade, as a framework for sustainable and safe organization of traffic, since it is the largest city in Serbia and in the region. However, the authors question the sustainability and the applicability of this strategic document because the practice confirms that there are numerous obstacles for its appropriate and full implementation in accordance with international environmental and safety standards.

### 1. ECOLOGICAL SAFETY AS AN ASPECT OF URBAN SAFETY

Today, more than one half of the world's population is inhabited in urban areas, and it is estimated that this number might exceed 70% of the population by 2050 (Krefis et al., 2018: 1). Rapid population growth and the process of urbanization, which are causing worldwide increase in urban population, are making urban quality of life an increasingly relevant topic (Mouratidis, 2021: 1). It is therefore not surprising that a multitude of research papers discuss the issues of well-being and health in urban areas from the aspects of various disciplines such as: public health, urban planning, meteorology, epidemiology etc. (Krefis et al., 2018: 1). In this paper, the authors also discuss the topic of well-being and health in urban areas from the aspect of ecology, law, safety, and security.

The multi-faceted nature of the term "well-being" implies that it can be assessed and approached from various perspectives (Dodge *et al.*, 2012: 224 according to Krefis *et al.*, 2018: 2). However, there is no doubt that the well-being of persons inhabited in urban areas is closely related to their individual physical and mental health in the context of urban specific environment, including a variety of factors: such as level of income, crime rates, but also ecological factors such as air pollution and noise in the cities (Krefis *et al.*, 2018: 2). The planning, design, development and management of urban settlements directly affect human health, well-being and opportunities, but also

the safety and security of urban population (McMichael, 2000: 1117-1126 according to Siri, Capon, 2015: 2).

Nevertheless, facing all the security challenges in urban areas cannot be appropriately addressed without taking into consideration several links between the cities and the environment. Namely, it is estimated that the environment has a direct impact on the cities and their population, as well as that approximately one third of the population inhabits the cities that are at risk of cyclones, floods, droughts, earthquakes, landslides, or volcanic eruptions (UN DESA, 2018). Extreme weather conditions such as very high or very low temperatures, can also be added to the list of these factors (UN Habitat, 2007). At the same time, cities are considered as key drivers of environmental change because spreading of urban areas transforms landscapes, which affects ecosystems and biodiversity, as well as because they are responsible for almost three quarters of global greenhouse gas emissions (UNEP). Also, urban areas tend to generate significant amounts of waste (which is often inappropriately disposed and managed) and they also represent “hot spots” of air pollution due to transportation and production patterns (Ritchie, Roster, 2017). Close links between urban areas and environment suggest that cities depend on the environment on the one hand, whereas the environment is susceptible to negative environmental impacts of cities, on the other. This refers to numerous aspects of life, including safety in urban areas as well.

There are several aspects of urban safety, and ecological or environmental aspect, which is in the focus of this paper is one of them. Namely, urban safety represents a complex term, derived from a series of factors, and related to a specific territory of an inhabited area (Rastyapina, Korosteleva, 2016: 2043). According to Vilner, urban safety refers to the safety of environmental resources of a settlement in urban territory (Vilner, 2013: 25-27, according to Rastyapina, Korosteleva, 2016: 2043). Olenkov describes urban safety as the state in which population feels safe and in which the facilities that form the environment and other inhabited areas are not exposed to environmental impacts (Olenkov, 2007, according to Rastyapina, Korosteleva, 2016: 2043).

When defining urban safety, the accent is placed on the synergy of several factors (including urbanization, architecture, and ecology) creating a living environment that can be considered favorable and safe (Rastyapina, Korosteleva, 2016: 2043). The term “*favorable*” is used to describe the environment that manages to meet all contemporary standards of engineering and ecology without producing negative consequences on the following: 1) people, 2) buildings, 3) facilities and 4) nature-made objects, whereas the term “*safe*” implies that urbanized environment has got the capacity to sustain and resist the factors that affect its architecture and ecology (Rastyapina, Korosteleva, 2016: 2043). The aforementioned suggests that urban safety is closely interrelated with the quality of the environment (Rastyapina, Korosteleva, 2016: 2043). In urban areas, this particularly refers to the quality of air, as an important aspect of the environment, since the state of air quality in cities across the world is far

below acceptable standards (Joldžić, Batrićević, Stanković, 2017: 43). The reason for that is air pollution coming from various sources, including traffic, which is in the focus of this paper, as both – the source of pollution as well as the potential cause of environmental hazards in urban areas. Nevertheless, it should be noted that traffic is also considered as one of the factors that contribute to the pollution of soil in urban areas, although it has a much larger share in the pollution of air (compare with: Batrićević, 2016: 78).

## 2. TRAFFIC POLLUTION AS A FACTOR CONTRIBUTING TO URBAN UNSAFETY

In urban areas, the exposure to air pollutants causes particular concern due to the density of populations exposed to it, as well as because of the co-existence of various emission sources with multifaceted chemical patterns (Reche, Tobias, Viana, 2022). A series of negative health impacts such as: chronic obstructive pulmonary disease, acute lower respiratory illness, cerebrovascular disease, ischemic heart disease, lung cancer, respiratory tuberculosis and diabetes mellitus are related to air pollution (Reche, Tobias, Viana, 2022). In urban areas across the world, vehicular traffic is considered one of the greatest sources of air pollution and it is becoming the predominant source of the following air pollutants: 1) carbon monoxide (CO), 2) carbon dioxide (CO<sub>2</sub>), 3) volatile organic compounds (VOCs) or hydrocarbons (HCs), 4) nitrogen oxides (NO<sub>x</sub>), and particulate matter (PM), especially carbonaceous particles, contributing with approximately 11% to PM<sub>2.5</sub> concentrations in European countries and 28% to Black Carbon (Reche, Tobias, Viana, 2022).

Various environmental and safety issues that are related to traffic air pollution are also present in larger cities in Serbia: the number of registered vehicles in Serbia is increasing and car traffic (especially parking) is taking more and more public space, often from the spaces that are used by pedestrians and cyclers (Danilović, Đorić, 2020: 5). For example, according to Sustainable Urban Mobility Plan for Belgrade, adopted in 2020 (hereinafter: SUMP) in Belgrade, the number of registered cars per inhabitant in 2017 was around 300 cars per 1000 inhabitants, which is approximately 60% more than in 2000 (SUMP, 2020: 44). The predictions are that this number will grow and achieve the number of 440 cars per 1000 inhabitants in the next 15 years (Danilović, Đorić, 2020: 5). In 2020, there were around 650 000 cars in Belgrade, which is considered too much for the city of this size<sup>1</sup>.

Although traffic does not represent the most predominant source of pollution in urban areas in Serbia, latest reports on the condition of the environment (published by Environmental Protection Agency of the Republic of Serbia<sup>2</sup>) confirm that traffic does

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<sup>1</sup> Energetski portal, 21.12.2020., Beograd dobio plan održive urbane mobilnosti, <https://energetskiportal.rs/beograd-dobio-plan-odrzive-urbane-mobilnosti/>, accessed on 31.03.2023.

<sup>2</sup> Environmental Protection Agency, Ministry of Environmental Protection of the Republic of Serbia,

produce a significant number of pollutants, especially in urban areas. In urban areas in Serbia, traffic is responsible for around 40% of all emissions of Carbon Dioxide in the atmosphere, as well as for the emission of other pollutants produced by car engines, all of which have negative impacts on human health (Danilović, Đorić, 2020: 4). Noise coming from urban traffic and traffic congestions additionally contributes to the negative effects of traffic in urban areas (Danilović, Đorić, 2020: 4).

Road traffic contributes to the emission of several types of pollutants, including Nitrogen Oxides (Parunović, Redžić, Veljković, 2022: 14). Reports also confirm that the emission of Sulphur and Nitrogen Oxides are primarily caused by the processes of fuel combustion for the purpose of production of electricity and heating, but they also show that road traffic also contributes to the emission of these pollutants) (Parunović, Redžić, Veljković, 2022: 72). For example, in 2021 Nitrogen Dioxide, a pollutant that most frequently emerges from traffic, exceeded its annual limit value (40 µg/m<sup>3</sup>) in Belgrade on two measuring spots – Mostar and Despota Stefana Street, whereas it exceeded its daily limit (85 µg/m<sup>3</sup>) in Belgrade – Despota Stefana (for 33 days) and Mostar (for 5 days) Bor (for 4 days), Smederevo (for 10 days) and Valjevo (for 1 day) (Parunović, Redžić, Veljković, 2022: 16).

Traffic and activities related to the reconstruction of roads also represent the sources of suspended particles PM<sub>10</sub> and PM<sub>2.5</sub> - complex pollutants with significant negative impacts on human health that may contain a certain amount of cancerogenic heavy metals and persistent organic compounds (Parunović, Redžić, Veljković, 2022: 28). What makes these particles especially harmful is their capacity of resuspension, i.e., the fact that, after being released and then deposited on the ground, they can be returned to the atmosphere through wind but also through the activities such as traffic (Parunović, Redžić, Veljković, 2022: 28).

The results of measuring conducted in the Republic Serbia in 2021 show that average annual concentrations of suspended particles PM<sub>10</sub> exceeded acceptable level (which is 40 µg/m<sup>3</sup>) on 14% of measuring spots, whereas the overpass of acceptable number of days (which is 35) with concentrations exceeding 50 µg/m<sup>3</sup> was detected on 80% of measuring spots (Parunović, Redžić, Veljković, 2022: 28). The highest number of days during which the acceptable limit was exceeded were noted in Valjevo (174 days), Novi Pazar (151 days), Smederevo (146 days), Zaječar (140 days) and Popovac (128 days). When it comes to suspended particles PM<sub>2.5</sub>, the results of measuring show that their annual limit (which is 25 µg/m<sup>3</sup>) was surpassed in 2021 on 7 measuring spots, which is 29% of all valid measuring spots. The highest levels of these particles were detected in Novi Pazar (48 µg/m<sup>3</sup>), Valjevo (37 µg/m<sup>3</sup>), Pančevo (33 µg/m<sup>3</sup>), Subotica (29 µg/m<sup>3</sup>), Smederevo (29 µg/m<sup>3</sup>) and Niš (29 µg/m<sup>3</sup>) (Parunović, Redžić, Veljković, 2022: 28).

Zones with high traffic frequency in larger cities such as Belgrade, Kruševac and Čačak are also detected as the sources of the following elements: Zinc, Copper, Nickel, Chromium, Mercury, and Arsenic) (Parunović, Redžić, Veljković, 2022: 53-54). Moreover, increased road traffic is also the source of emission of acid gasses that are responsible for the shift in chemical balance of the environment (Parunović, Redžić, Veljković, 2022: 75). In 2020, the most significant contribution to the overall quantity of acid gases in Serbia came from the production and distribution of energy, but also from road traffic (Parunović, Redžić, Veljković, 2022: 75).

Traffic is also the second largest consumer of fossil fuels in Serbia, straight after households (Parunović, Redžić, Veljković, 2022: 136). In addition, traffic contributes to the increase of oil derivatives consumption, which appears as the direct consequence of the increase of the number of vehicles and the population mobility (Parunović, Redžić, Veljković, 2022: 139).

Another set of pollutants produced by traffic are nitrogen oxides and volatile organic compounds, the reactions of which generate a secondary contaminant known as ground-level Ozone. High concentrations of ground-level Ozone have harmful effects on human health and environment and most frequently emerge during the summer in the cities with high intensity of traffic (Parunović, Redžić, Veljković, 2022: 33-34). Evaluations from 2021 confirm that the highest number of days when the acceptable levels of these pollutants were exceeded occurred in July on the following locations: Pančevo (18 days), Kikinda (14), Belgrade (13 days), Novi Sad (12 days) etc. (Parunović, Redžić, Veljković, 2022: 33-34).

In larger cities, inhabitants are exposed to both – industrial and traffic components that pollute the air and, what is also specific is the fact that microscopic particles of allergenic pollen bond to these air pollutants, causing chemical reactions that have negative impacts on medical condition of sensitive persons (Knežević *et al.*, 2022: 82). That is the reason why there is a larger number of persons suffering from allergies in urban environments, where there are less plants (and, hence, less pollen) in comparison to rural environments (Knežević *et al.*, 2022: 82).

Apart from the pollution caused by traffic, there is another type of risks for the environment and human health that can be caused by traffic – the risk of environmental and health disasters due to accidents in which hazardous substances may be spilt inside of or near to urban settlements. For example, in Serbia there have been two serious accidents from the end of 2022 and the beginning of 2023, where ammonia was split from train near Piroć<sup>3</sup> and tank near Pančevo<sup>4</sup>, causing severe negative consequences on the health of the inhabitants of these cities and the environment in these entire areas. These examples are of particular importance since

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<sup>3</sup> Izlivanje amonijaka i Piroć: Kako otrovni gas utiče na zdravlje ljudi, BBC News na srpskom, 26.12.2022. <https://www.bbc.com/serbian/lat/svet-64094739>, accessed on 05.04.2023.

<sup>4</sup> Srbija i nesreće: Iscurio amonijak kod Pančeva, nema opasnosti - kaže gradonačelnik, BBC News na srpskom, 13.01.2023. <https://www.bbc.com/serbian/lat/svet-64259838>, accessed on 05.04.2023.

the global impact of disasters seems to be especially severe in urban surroundings because of higher density of the population, complexity of infrastructure and frequent location of cities in coastal areas (DCAF, 2019: 3).

### 3. CRIMINAL AND/OR JUST ECOLOGICALLY UNACCEPTABLE BEHAVIOR?

In Article 3, Paragraph 1, Point 1, Law on Environmental Protection (Official Gazette of the Republic of Serbia, No. 135/2004, 36/2009, 36/2009, 72/2009, 43/2011, 14/2016, 76/2018, 95/2018 and 95/2018) defines environment as the totality of natural and human-made values, the complex relations of which comprise the surrounding, i.e., the space and conditions for human life. Various human activities and behaviors that represent actual or potential harm for the environment and, as such, are considered the violations of environmental regulations are known as ecological delicts (see also: Marinković, 2015: 219). Ecological delicts are a segment of the entire delinquency in one society and their specific characteristic is the fact that they are directed against healthy living environment, i.e., the fundamental human right to healthy living conditions (Jovašević, 2009: 131; see also: Batričević, 2013: 115). Three types of ecological or environmental delicts can be distinguished: 1) criminal offences, 2) economic offences and 3) administrative offences and environmental criminal offences are classified as the most serious ecological delicts for which the strictest punishments are prescribed (Joldžić, Jovašević, 2012: 181).

There are three types of environmental criminal offences: 1) genuine environmental criminal offences (in the narrow sense), 2) environmental criminal offences in the broader sense and 3) additional environmental criminal offences (Joldžić, Jovašević, 2012: 181). Genuine (or environmental criminal offences in the narrow sense) are prescribed within Chapter 24 of Criminal Code of the Republic of Serbia (*Official Gazette of the Republic of Serbia* No. 85/2005, 88/2005, 107/2005, 72/2009, 111/2009, 121/2012, 104/2013, 108/2014, 94/2016 and 35/2019) (hereinafter: CCRS), which is dedicated to environmental protection (compare with: Rakočević, 2014: 43-65). They are designed to protect either the environment as a whole or its essential elements such as: water, air, soil, flora, fauna etc. (Joldžić, Jovašević, 2012: 181). On the other hand, environmental criminal offences in the broader sense are classified within other chapters of the Criminal Code and their aim is to protect some other values alongside with environment, such as, for example the safety of persons and property, safety of public traffic, constitutional order and safety, state bodies, humanity and other values protected by international law (Joldžić, Jovašević, 2012: 273-274; see also: Batričević, 2013: 116). Additional environmental criminal offences are not prescribed by the Criminal Code but are systematized within special or additional criminal legislation, i.e., penal provisions of some environmental laws (Jovašević, 2009: 132; see also: Batričević, 2013: 116).

When genuine environmental criminal offences are concerned, it seems that some of them can be committed in the context of traffic, especially in urban areas, causing serious negative consequences on the health of humans, flora, fauna and the pollution of air, soil, and water. This primarily refers to: Environmental Pollution (Article 260, CCRS), Failure to undertake Environmental Protection Measures (Article 261, CCRS), and Damaging the Environment (Article 264). The descriptions of these environmental criminal offences suggest that various vehicles that are used in road traffic can actually be the sources of pollution and represent potential or actual harm for the environment (See also: Joldžić, Stanković, 2016: 60-61). However, what causes equal amount of concern as occasional accidents, is the fact that most activities related to traffic cause environmental pollution and serious environmental damage gradually, over time, without fulfilling the conditions to be considered as and, hence, prosecuted as criminal offences.

#### 4. RESPONSES TO THE CHALLENGES OF TRAFFIC POLLUTION IN URBAN ENVIRONMENT

The combination of various factors and problems that modern cities are facing makes a difference between urban areas on the one hand and rural, national or international environment, on the other (Paraušić, 2020: 95). That is the reason why providing safety and reacting to security threats in the cities requires responses and reactions designed specifically for urban areas, as well as cooperation and coordination of relevant stakeholders acting in urban environment (Paraušić, 2020: 95). The aforementioned also refers to the issue of unsafety in urban areas caused by traffic pollution.

The way in which the society responds to the problems related to traffic pollution primarily depends on the policy regulating the means of traffic as well as the shift from private to public transport (Parunović, Redžić, Veljković, 2022: 150). Nevertheless, it should be highlighted that the issue of air pollution of urban areas that is caused by traffic has to be observed and addressed from a holistic perspective (Reche, Tobias, Viana, 2022). Policies that are designed to reduce traffic emissions include the following measures: 1) reducing the number of vehicles (which is achieved either by congestion charges or parking restrictions), 2) the progressive intensification of so-called active transport (such as cycling and walking), 3) the use of electric vehicles, 4) the establishment of low emission zones and/or special limit reduction (Reche, Tobias, Viana, 2022). The question is whether these local policies are effective when it comes to the reduction of pollution, but, despite the scarcity and diversity of studies dedicated to this issue, their results seem to be encouraging (Reche, Tobias, Viana, 2022). Namely, there is no doubt that traffic primary emissions are well explained and studied and that, due to technological advancement in vehicle engines and fuels, their contribution to PM<sub>2.5</sub> concentration is efficiently decreasing (Reche, Tobias, Viana, 2022). However, there seem to be other organic and inorganic fractions of secondary



aerosol that need to be understood in a more detailed and quantitative manner to further improve the situation in this area (Reche, Tobias, Viana, 2022).

Furthermore, it should be mentioned that there are studies suggesting the shape of a city as well as the land use distribution can determine not only the location of the sources of emission but also the pattern of urban traffic that is affecting the quality of air in a particular urban area (Reche, Tobias, Viana, 2022). Namely, urban configuration has long been known as the most important cause of poor air quality and previous research has also confirmed the link between sprawl indicators, including street network and density, and the quality of air (Reche, Tobias, Viana, 2022). Nevertheless, it should be underlined that the precise relationship between the development patterns of urban areas and the quality of air is considered rather elusive, as well as that demographic factors and the level of urbanization also represent relevant factors determining the level of pollutants and air quality (Reche, Tobias, Viana, 2022).

Another approach when it comes to the response of the society to the pressure coming from the emissions of pollutants in the air is reflected in the prescription of a maximum acceptable level of Nitrogen Oxides in gases generated from internal combustion engine (Parunović, Redžić, Veljković, 2022: 150). The progress in the field of energetic efficiency depends on the final energy consumption as well as on the consumption of energy in separate sectors such as: industry, traffic, households, and public and commercial sector (Parunović, Redžić, Veljković, 2022: 182). Energetic efficiency and energy consumption are linked in the sense that the minimization of energy consumption as the result of progress in the area of energy efficiency and changes in behavior can significantly minimize the pressures on the environment emerging from the energy sector (Parunović, Redžić, Veljković, 2022: 182). What is encouraging is the fact that in the Republic of Serbia, the best results in the field of energy saving in the period between 2010 and 2018 were achieved in the area of traffic (Parunović, Redžić, Veljković, 2022: 182).

European cities have been facing negative impacts of traffic on the quality of life and environment much before than the cities in the Republic of Serbia and started resolving traffic related issues in a strategic manner (Danilović, Đorić, 2020: 4). As the result, the general conclusion has been made – that the change in the attitudes and habits of their inhabitants represents the genuine solution when it comes to the exaggerated use of private vehicles for transportation in urban areas (Danilović, Đorić, 2020: 4). Alternative ways of mobility have been systematically encouraged in European cities for years, and they predominantly rely on the use of non-motorized vehicles, by which they minimize the use of fossil fuels and environment pollution (Danilović, Đorić, 2020: 4). The results that European cities have achieved in the field of sustainable urban mobility are visible for both – their inhabitants as well as their visitors and they include: decrease in the level of air pollution, minimization of noise in city centers, increase in the general appeal of urban complexes and other benefits that they provide for local economy and citizens (Danilović, Đorić, 2020: 5).

In Europe, in the past 15 years, relevant stakeholders have been working on the intensive change in the planning of traffic in the cities through the concept of Sustainable Urban Mobility Plans (Danilović, Đorić, 2020: 13). Some of the best examples of the application of these plans are the cities of Ljubljana, Slovenia and Vienna, Austria, that have managed to improve the quality of life of their inhabitants and to adjust the infrastructure and traffic to relevant environmental standards (Danilović, Đorić, 2020: 14)

Sustainable Urban Mobility Plan of the City of Belgrade, adopted in 2020, recognizes traffic and traffic infrastructure on the territory of Belgrade as an important issue due to the fact that the infrastructure is not sufficiently developed and does not have the capacities that are required for the future development of the capital city (SUMP, 2020: 40). SUMP highlights several flaws of current traffic infrastructure of the city of Belgrade, including: the lack of subway, insufficiently developed railway traffic, minimum use of river traffic, as well as the disbalance between the increasing degree of motorization and the limited capacities of traffic infrastructure, especially when it comes to parking (SUMP, 2020: 44-45). This document also recognizes the pollution in the capital city as one of its most important ecological issues, particularly when it comes to the emissions of pollutants that come from traffic, such as Nitrogen Dioxide and ground-level Ozone (SUMP, 2020: 83). Moreover, it also draws attention to the issue of excessive noise, the most important source of which is traffic, which is detected at several measuring points in the city of Belgrade (SUMP, 2020: 83).

To resolve these issues, SUMP provides a set of goals and measures that are designed for their achievement in the upcoming period. It is important to mention that some of the goals, enumerated by SUMP, include: the increase of pedestrian's mobility, the increase of the use of alternative and ecologically acceptable vehicles such as bicycles, improvement and more frequent use of public transport, minimization of the use of cars, minimization of harmful emissions and the promotion of the use of electronic vehicles, i.e., eco-mobility and electro-mobility (SUMP, 2020: 137-138). The measures for the achievement of these goals are also prescribed by the SUMP, and some of them, particularly those referring to the increase in the use of bicycles as alternative and ecologically accepted means of transport, are highlighted as the most urgent ones (SUMP, 2020: 140). These measures include: the improvement of existing pedestrian and cycling infrastructure, the development of cycling network, the improvement of public transport network, the development of e-mobility services, the improvement of pedestrian and bicycle paths within existing green areas, parks, forests, and protected areas etc. When green areas are concerned, it should be mentioned here that greening of urban areas can play an important role not only in the prevention of environmental harm, but also in crime prevention in general, but only if it is applied in cooperation with city authorities, architects, urbanists, police and citizens (Pavićević, 2019: 60).

Other measures that are relevant to the minimization of negative environmental impacts of transport in Belgrade, which are not classified as urgent, include the implementation of public bicycles system (bike sharing), the facilitation of transportation of bicycles in public transport vehicles, the introduction of electronic vehicles in the communal traffic system and the promotion of the use of electronic vehicles by taxi services providers (SUMP: 2020: 140-142).

## CONCLUSIONS AND RECOMMENDATIONS

The concept of urban safety encompasses ecological safety as well. Therefore, it should be emphasized that the issues of environmental protection are often interpreted only as issues of ecological importance. Unfortunately, this approach leads to the situation in which ecological safety is treated as less significant and pushed to the “green margin” instead of being considered as the issue of key importance for safe and healthy life in urban zones. This particularly refers to traffic, as one of the more important factors with the impact on environmental pollution and, through that, on ecological safety.

Traffic is recognized as one of the key sources of emissions of pollutants in urban zones across the world, including cities in Serbia. Traffic organization and management at the local level should be designed in the way that is the least harmful for the preservation of human life and health, as well as the environment. Therefore, certain priorities in this area should be highlighted since all goals and tasks cannot be fulfilled at the same time. That is the reason why it is so important to understand the connection between air quality and environmental protection, on the one hand, and urban safety, on the other, with special focus on traffic as the source of pollution in urban areas. Finally, having in mind the experiences of other countries, it can be concluded that decision makers and public policy creators in the fields of traffic and ecology should apply holistic approach when determining the priorities in the aforementioned areas to improve this aspect of urban safety in Serbia.

The consequences of ecological delicts are so harmful for human health and the environment that the punishment of their perpetrators is not the only solution to this problem. Namely, in these cases, prevention is far more important because the punishment cannot repair the long-term damage caused to human health and nature. For that reason, the focus should be on prevention, particularly in the area such as traffic that can be controlled and organized in accordance with ecological principles if there is the will of relevant stakeholders.

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## ZAGAĐENJE OD SAOBRAĆAJA U GRADOVIMA: EKOLOŠKI ASPEKT URBANE BEZBEDNOSTI

*Urbana bezbednost predstavlja složen i višeslojan pojam, a njen ekološki aspekt postaje sve značajniji zahvaljujući konstantom porastu stepena zagađenja, naročito u urbanim oblastima koje se ubrzano šire. Saobraćaj je prepoznat kao jedan od najvažnijih izvora emisije zagađujućih materija u urbanim zonama širom sveta, uključujući tu i gradove u Srbiji. Zbog toga autori u ovom radu objašnjavaju vezu između kvaliteta i zaštite životne sredine, sa jedne strane, i urbane bezbednosti sa druge, sa posebnim fokusom na saobraćaj kao izvor zagađenja u urbanim oblastima. Potom, autori istražuju postojeću društvenu reakciju na ovaj problem, analizirajući izveštaje, kao i pravne i strateške okvire relevantne za prevenciju i smanjenje zagađenja izazvanog saobraćajem u urbanim oblastima. Na osnovu iskustava drugih zemalja, autori takođe iznose preporuke za donosiocima odluka i kreatore javnih politika u sferi saobraćaja i ekologije, sa namerom da unaprede ovaj aspekt urbane bezbednosti u Srbiji.*

**KLJUČNE REČI:** zagađenje od saobraćaja / urbana bezbednost / ekološka bezbednost / životna sredina