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AIR QUALITY STUDY IN THE CORONAVIRUS PANDEMIC

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Abstract: *This work develops a theme of global interest, namely "air quality". Every inhabitant of our planet must contribute to protecting and preserving the environment for our health, flora and fauna, in order to leave a clean environment for future generations. Car transport proves that, for comfort, man has created and continues to exploit anthropogenic sources that have strong negative effects even on himself. A study of air quality during the Coronavirus Pandemic was conducted and conclusions for this period when car traffic was restricted were drawn. We are studying the air quality in 1096 days, in the city of Craiova in Romania, during the pandemic period, 2019-2021, as other countries have done.*

Key words: *Car pollution, air quality, COVID-19.*

1. INTRODUCTION

Pollution is a current topic, of global interest, with a dynamic character. It is a theme about the life of the environment and people. Knowing the negative effects of pollution, we must take responsibility to inform ourselves what air we breathe, what water we drink and learn to protect ourselves and the environment (soil, air, water).

The negative effects of pollution act: on the health of the population; on plants and animals; on the environment.

Environmental protection involves: environmental protection - through legislated actions and conservation - through the rational and efficient use of environmental resources.

Pollution is produced by: natural sources (for example, volcanic eruptions); anthropogenic sources (due to human activities), which prevail.

In Romania, Law no. 104 of June 15, 2011, updated in 2024, regarding the quality of the surrounding air, protects the health of people and the environment.

Ever since the time of Hippocrates, considered the "father of medicine", air pollution has been considered to affect people's health. Since the 18th century, the decrease in air quality in urban and industrial centers has increased, due to the chemical characteristics of gases and particles. The industrial revolution amplified the effect of emissions. We remember the great smog of 1952 in London [1], [2].

The main atmospheric pollutants and the contribution of transport in their production:

• Sulfur dioxide SO_2 (to a lesser extent, they are found in emissions from Diesel engines).

• Nitrogen oxides NO_x (NO / NO_2) (most often they are the result of road traffic).

• Ozone O_3 (formed through a reaction involving nitrogen oxides and volatile organic compounds).

• Carbon monoxide CO (road traffic is an anthropogenic source of CO production).

• Benzene C_6H_6 (90% of the amount of benzene in the ambient air comes from road traffic).

• Particles in suspension PM_{10} and $PM_{2.5}$ (road traffic contributes to dust pollution produced by car tires both when stopping and due to incomplete combustion).

• Lead (Pb) and other toxic metals Cadmium (Cd), Arsenic (As), Nickel (Ni) and Mercury (Hg) (toxic metals come from the combustion of coal, fuels, household waste, etc. and from certain industrial processes).

• Polycyclic aromatic hydrocarbons PAH (formed from 4 to 7 benzene nuclei and resulted from the combustion of fossil materials - Diesel engines, in its gaseous form of particles).

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Pollution caused by road transport manifests itself :

A. In the stage of construction of transport infrastructures generating: air pollution, water pollution, soil pollution, noise pollution.

B. Continuously during their operation and maintenance. Car transport is a major air pollutant, which produces economic consequences, Fig. 1 and Fig. 2.

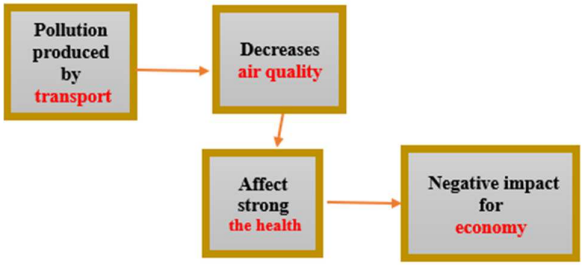


Fig. 1. The effects of pollution produced by transport.

Fig. 2. The correlation between the increase in the number of cars and the increase in social costs.

In 2019, the EEA found that tropospheric ozone (O_3), which damages agricultural crops and forests: reduced wheat production by 5%, meaning huge economic losses, 1 billion Euros; has the effect of decreasing the average life expectancy by 4-5 years in the urban environment with infernal car traffic, compared to the rural environment with low traffic; - has strong effects on public health, Fig. 3.

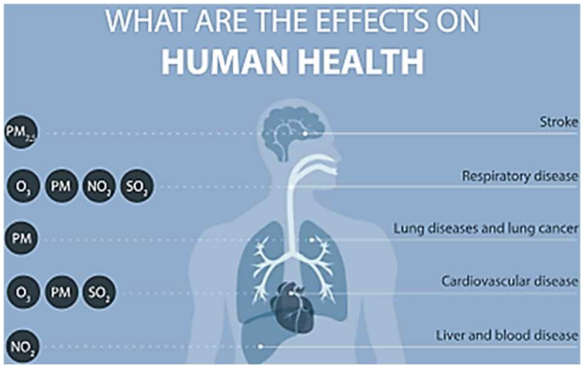


Fig. 3. Effects of atmospheric pollutants PM, NO_2, SO_2 and O_3 on health [3]

The pollution produced by transport affects the social costs for health: costs for medical leaves, absenteeism at work, low productivity.

2. QUALITY INDICES

Government agencies have created an indicator called the Air Quality Index (AQI), to identify the level of air pollution and possible risks to human health and the environment [4]: Level 1 Good (0-50), Level 2 Moderate (51-100), Level 3 Unhealty for Sesitive Groups (101-150), Level 4 Unhealthy (151-200), Level 5 Very Unhealthy (201-300), Level 6 Hazardous (301-500).

3. PUBLIC INFORMATION IN DOLJ COUNTY ABOUT AIR QUALITY

The Dolj Environmental Protection Agency, under the PHARE RO2002/000-586.04.12.03 contract, put into operation an automatic air quality monitoring system, Table 1.

Table 1

Automatic air quality monitoring stations in Dolj county [5]

Station ID/ Localization and type	**Station Coordinates**	**Monitored pollutants**
DJ-1 station, Calea Bucureşti (area type - urban, type of emissions traffic)	Latitude: 44.3185692º Longitude: 23.8062382º Altitude: 118 m	C_6H_6. CO, Etilbenzen, m-Xilen, NO, NO_2, NO_x, o-Xilen, p-Xilen, PM_{10}, SO_2
DJ-2 Station, City Hall (area type - urban, type of emissions –fund)	Latitude: 44.3266373º Longitude: 23.7967072º Altitude: 113 m	C_6H_6, CO, Etilbenzen, m-Xilen, NO, NO_2, NO_x, o-Xilen, PM_{10}, $PM_{2.5}$, SO_2
DJ-3 Station, Billa (area type - urban, type of emissions – industrial)	Latitude: 44.3267708º Longitude: 23.8044415º Altitude: 83 m	NH_3, NO, NO_2, NO_x, O_3, PM_{10}, SO_2
DJ-7 Station, Filiaşi (area type - urban, type of emissions –fund)	Latitude: 44.5596848º Longitude: 23.5272427º Altitude: 125 m	NO, NO_2, NO_x, O_3, SO_2
DJ-5 Station, Breasta – Jiu area (area type- rural, type of emissions –fund)	Latitude: 44.3422203º Longitude: 23.7197227º Altitude: 85 m	CO, NO, NO_2, NO_x, O_3, PM_{10}, SO_2
DJ-6 Station, Calafat (rural,	Latitude: 43.9970474º	CO, NO, NO_2, NO_x, O_3,

type of emissions – traffic)	Longitude: 22.9531860	PM_{10}, $PM_{2.5}$, SO_2

Two stations DJ-1 and DJ-6 are used for traffic-type emissions, evaluating the influence of traffic on air quality within a radius of the representative area of 10-100m.

Below are some sources of online information for the public in Dolj, for AQI, in real time:

- "AccuWeather" Craiova, Dolj, (reveals the air quality forecast for 24 hours).
- "Ce respir" (Eng. "What I breathe" [6]), which provides information on Air quality in Romania, recorded by the uRADMonitor network with 700 sensors.

According to the color legend, on Mesteacănului street, Malu Mare, the maximum level, red - 5, has been reached for air quality. The warning on the right was displayed.

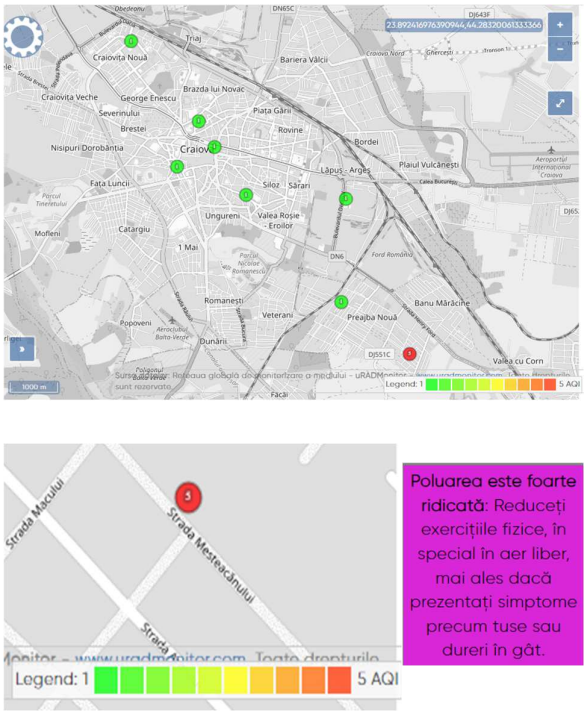


Fig. 4. AQI=5, Dolj, 09.07.2024, [6].

- "Poluarea aerului în Craiova: Hartă vizuală a indicelui calității aerului în timp real " (Eng. "Air pollution in Craiova: Visual map of the air quality index in real time") [7], Figs. 5 and 6.

The air quality monitoring station, in Mesteacănului street, Malu Mare, had a maximum degree of pollution, RISK, in the 9-th of July 2024.

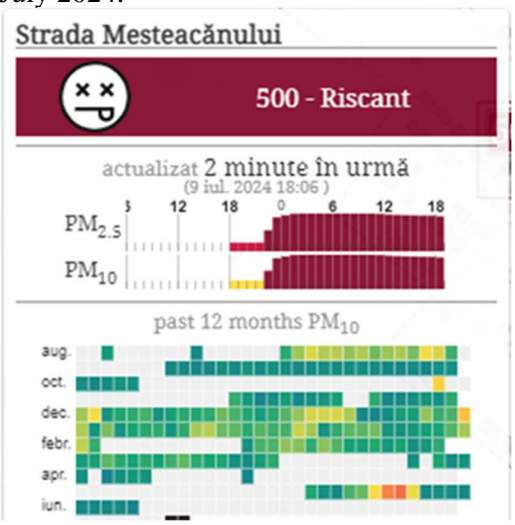
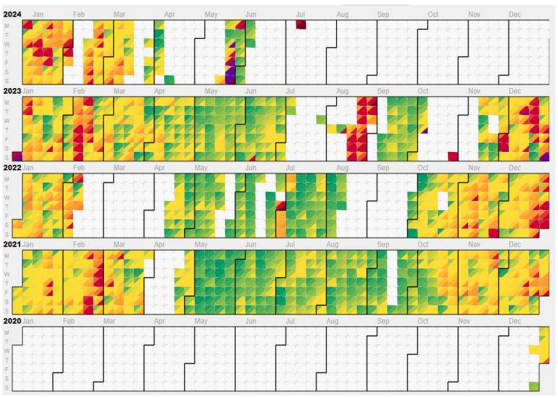


Fig. 5. Health alert at the station in Malu Mare, for AQI=500, RISK, [7].



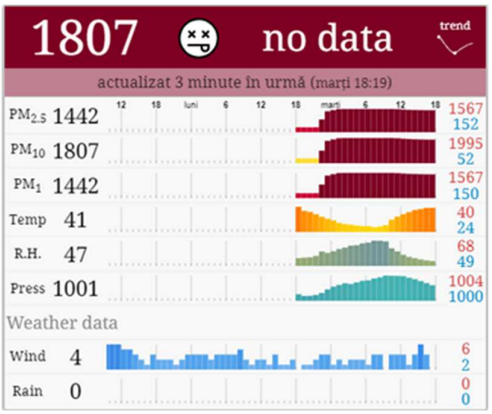


Fig. 6. AQI=RISCANT, Dolj, for PM_1, $PM_{2.5}$ and PM_{10}, 09.07.2024, [7].

- "Calitatea aerului" (eng. "Air Quality")

APM Dolj uses an information site available to citizens. Fig. 7 provides information after

selecting: ”Buletine calitate aer”, anul: 2020, luna 03, ziua: 20” (eng. Air quality bulletins, Year: 2020, Month 03, Day 20), Fig. 8.

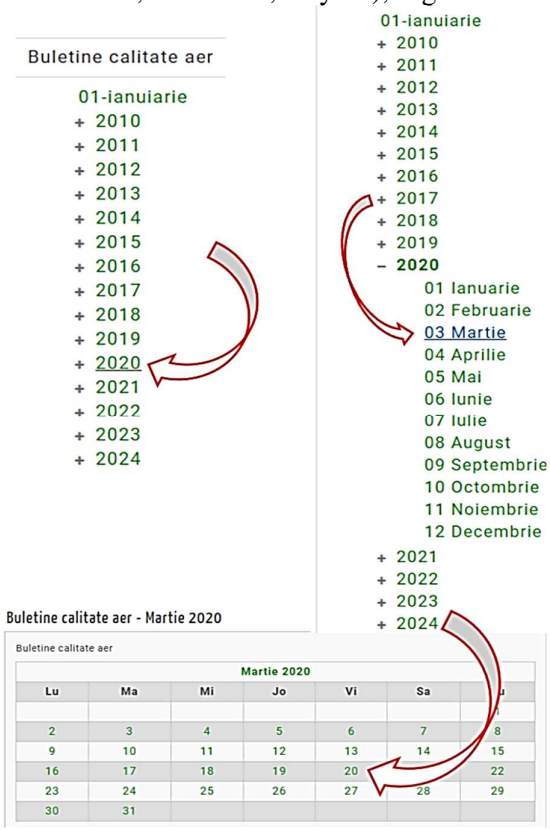


Fig. 7. Selection of the Air Quality Bulletin, Year: 2020, Month 03, Day 20 [8].

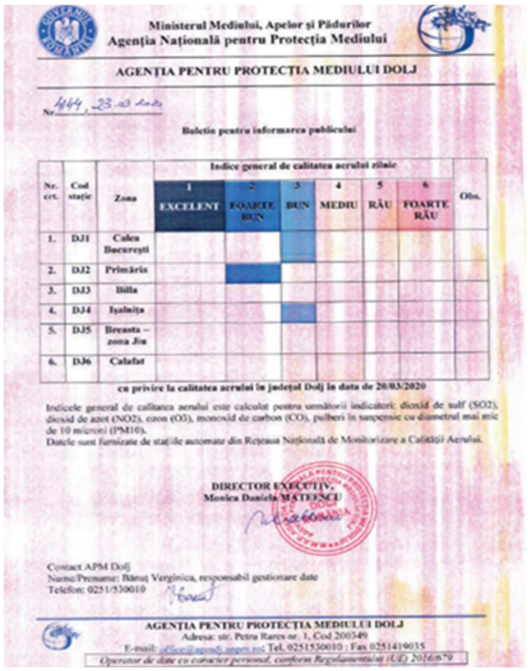


Fig. 8. Bulletin for public information on air quality in Dolj county (Year: 2020, Month 03, Day 20) [9].

4. THE CORRELATION BETWEEN AIR QUALITY AND COVID-19, IN DOLJ COUNTY

The impact of the spread of COVID-19 on air quality has been of global interest [10, 11].

The results of a study carried out at Station DJ-3 for air quality monitoring, during the COVID-19 period, are presented in this section.

It was found that also in Craiova the mobility restrictions introduced after March 16, 2020, due to the COVID-19 pandemic, influenced the air pollution.

Regarding the main aspects addressed in this paper, it should be noted that the reduction of motorized transport was a beneficial regulation, as air quality was increased in the period March-2020-April 2020, compared to the period March 2019-April 2019. Subsequently, in the period May 2020-June 2020, when activity resumed, the values recorded for the contribution of targeted emissions increased compared to the period May 2019-June 2019.

From this point on, one presents an original study performed by using the data acquired at the automatic air quality monitoring station from Craiova, Calea București, traffic station DJ-1, during the COVID-19 pandemic.

This study is based on 1096 bulletins, containing data covering a three-year time frame (2019...2021). The data mentioned above were meant to inform the public about the air quality in the Romanian County named Dolj. They were made available to the public through the official website of the Dolj Environmental Protection Agency, on station DJ-1.

The data was centralized at the day level and are gathered by these tables. The symbol “*” denotes “missing data” cases.

The values for AQI gathered by the Tables 2…4 are as follows: “1” is used for the range 0-50; “2” is used for the range 51-100; “3” is used for the range 101-150; “4” is used for the range 151-200; “5” is used for the range 201-300; “6” is used for values higher than 300.

With the 1096 data extracted from the Information Bulletins posted daily for the DJ-1 Calea București Craiova monitoring station, on the website of the Dolj Environmental Protection Agency, the graphs from Figs. 9…11 were drawn.

Table 2

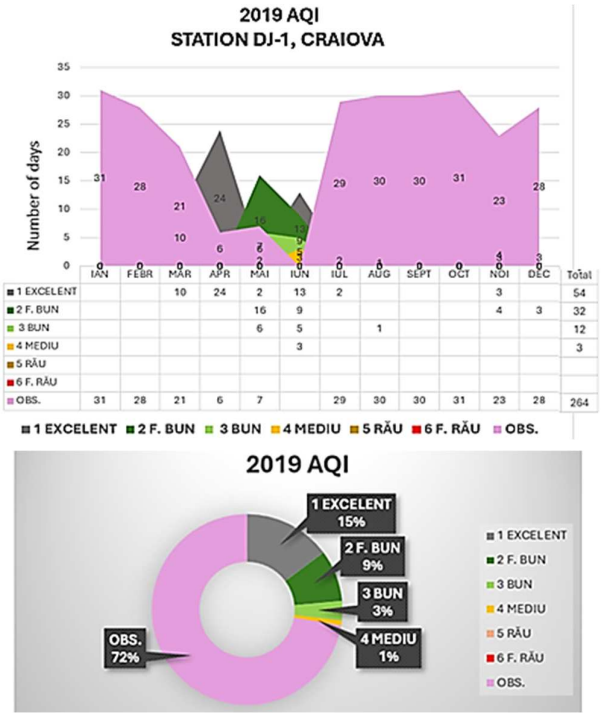
General AQI recorded on a daily basis in 2019, at DJ-1

Month / Day	1	2	3	4	5	6	7	8	9	10	11	12
1	*	*	*	1	*	2	1	*	*	*	*	2
2	*	*	*	1	*	2	1	*	*	*	*	2
3	*	*	*	1	*	2	*	*	*	*	*	2
4	*	*	*	1	*	2	*	*	*	*	*	*
5	*	*	*	1	*	2	*	*	*	*	*	*
6	*	*	*	1	*	2	*	*	*	*	*	*
7	*	*	*	1	*	3	*	*	*	*	*	*
8	*	*	*	1	2	3	*	*	*	*	*	*
9	*	*	*	1	3	3	*	*	*	*	*	*
10	*	*	*	1	2	2	*	*	*	*	*	*
11	*	*	*	1	2	2	*	*	*	*	*	*
12	*	*	*	1	2	2	*	*	*	*	*	*
13	*	*	*	1	2	1	*	*	*	*	*	*
14	*	*	*	1	3	4	*	*	*	*	*	*
15	*	*	*	1	2	4	*	*	*	*	*	*
16	*	*	*	1	3	4	*	*	*	*	*	*
17	*	*	*	1	2	3	*	*	*	*	*	*
18	*	*	*	1	3	3	*	*	*	*	*	*
19	*	*	*	1	3	1	*	*	*	*	*	*
20	*	*	1	1	2	1	*	*	*	*	*	*
21	*	*	1	1	1	1	*	3	*	*	*	*
22	*	*	1	1	1	1	*	*	*	*	1	*
23	*	*	1	1	2	1	*	*	*	*	1	*
24	*	*	1	1	2	1	*	*	*	*	1	*
25	*	*	*	*	2	1	*	*	*	*	2	*
26	*	*	*	*	2	1	*	*	*	*	2	*
27	*	*	1	*	3	1	*	*	*	*	2	*
28	*	*	1	*	2	1	*	*	*	*	*	*
29	*		1	*	2	1	*	*	*	*	*	*
30	*		1	*	2	1	*	*	*	*	2	*
31	*		1		2		*	*		*		*

Table 3

General AQI recorded on a daily basis in 2020, at DJ-1

Month / Day	1	2	3	4	5	6	7	8	9	10	11	12
1	3	2	3	2	2	1	2	*	2	2	2	2
2	2	1	3	1	2	1	1	*	2	3	2	2
3	3	1	2	2	1	2	2	2	2	2	2	1
4	3	2	1	2	2	2	2	2	2	3	2	2
5	2	1	2	2	2	2	2	2	2	3	2	2
6	2	*	2	1	2	2	2	2	2	3	2	2
7	4	2	2	2	2	2	2	1	2	2	2	1
8	4	2	2	2	2	2	2	1	3	2	2	2
9	4	3	2	2	2	2	2	1	3	2	2	2
10	3	4	2	3	2	2	2	2	3	3	2	2
11	4	2	2	2	2	2	2	2	2	3	2	2
12	4	2	3	2	2	2	2	2	2	3	2	2
13	4	4	2	2	2	2	2	2	2	2	2	2
14	4	3	2	2	2	2	2	3	3	2	3	2
15	4	2	2	2	2	2	2	2	2	2	2	3
16	2	4	2	2	2	2	2	2	2	3	2	2
17	2	4	2	2	2	2	2	2	3	2	2	2
18	2	3	3	2	2	2	2	2	2	2	2	2
19	2	2	3	2	2	2	2	2	2	3	2	2
20	2	2	3	2	2	2	2	2	2	3	2	2
21	2	3	3	2	2	2	2	2	2	3	2	2
22	2	2	2	1	2	1	2	2	2	4	3	3
23	2	2	2	1	2	1	2	2	2	4	3	3
24	4	1	2	2	2	1	2	2	3	4	4	3
25	3	2	2	2	1	1	2	2	*	4	4	2
26	3	3	2	2	1	2	2	2	3	4	5	2
27	3	2	4	2	2	2	2	2	2	3	4	1
28	2	2	3	2	2	2	2	2	1	2	3	2
29	2	2	2	2	1	2	2	2	2	2	4	2
30	2		2	2	2	2	2	2	2	1	4	2
31	2		1		1		2	2		2		3



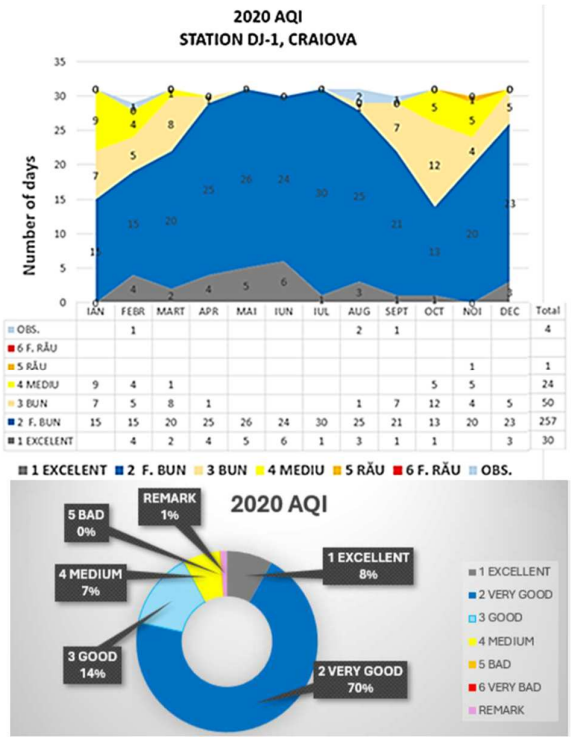


Fig. 9. Daily AQI in 2019, at DJ-1 station.

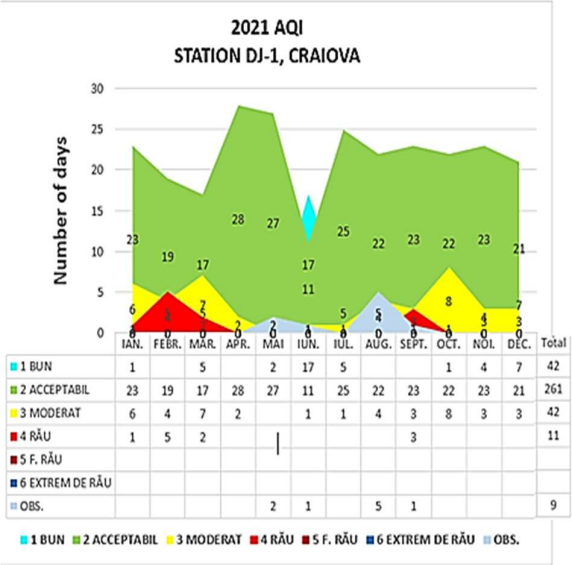


Fig. 10. Daily AQI in 2020, at DJ-1 station.

Table 4

General AQI recorded on a daily basis in 2021, at DJ-1.

Month / Day	1	2	3	4	5	6	7	8	9	10	11	12
1	3	2	2	2	2	2	1	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2	2	2	2
3	2	2	3	2	2	2	1	2	2	3	2	2
4	2	2	4	2	2	2	2	2	3	3	2	1
5	2	2	3	2	2	2	2	3	2	3	2	2
6	2	3	2	2	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2	2	2	2	2
8	2	2	3	2	2	2	2	2	2	2	2	1
9	2	2	2	2	2	1	2	2	2	2	1	3
10	2	3	1	2	2	1	2	2	2	3	2	2
11	1	2	2	2	2	1	2	2	2	1	2	2
12	2	2	3	2	2	1	2	2	4	2	3	1
13	2	2	3	2	2	1	2	2	4	2	2	2
14	2	2	3	2	2	1	1	2	3	2	2	2
15	2	2	2	2	2	1	1	2	4	2	2	2
16	2	2	2	2	2	1	2	2	3	2	2	2
17	2	2	1	2	2	1	2	2	*	2	2	2
18	2	2	2	2	2	2	2	2	2	2	2	2
19	2	2	2	2	2	1	2	2	2	2	2	2
20	2	3	1	2	2	1	2	3	2	3	1	1
21	4	4	1	3	2	1	2	3	2	2	2	2
22	3	2	2	3	2	*	2	2	2	2	2	2
23	3	4	2	2	2	1	2	2	2	2	3	3
24	3	4	1	2	2	2	2	2	2	2	2	3
25	2	4	2	2	1	3	2	2	2	2	2	2
26	2	4	2	2	1	1	2	3	2	3	2	1
27	2	3	4	2	*	1	2	*	2	3	3	1
28	2	2	3	2	*	2	3	*	2	3	2	2
29	3		2	2	2	1	2	*	2	2	1	1
30	3		2	2	2	1	2	*	2	2	1	2
31	2		2		2		1	*		2		2

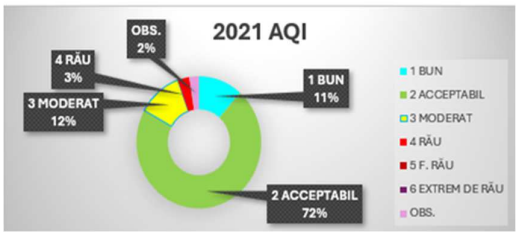


Fig. 11. Daily AQI in 2021, at DJ-1 station.

A data interpretation based on percentages was also performed.

In Fig. 12 – Fig. 16, line graphs were drawn to highlight the changes in air quality recorded during March 2019 - July 2019, 2020 and 2021, at DJ-1 Station, Calea București. This period is analyzed throughout Europe through satellite data derived from the Copernicus Sentinel-5P satellite data and ground data.

It can be seen that air pollution values varied in the Calea București area, during the analyzed period, recording AQI values from 1 - GOOD to 4 - BAD, revealing a worrying situation.

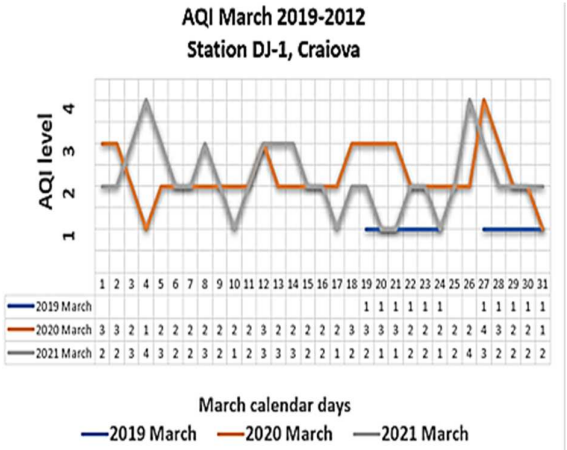


Fig. 12. Daily AQI for March 2019- 2021, DJ-1.

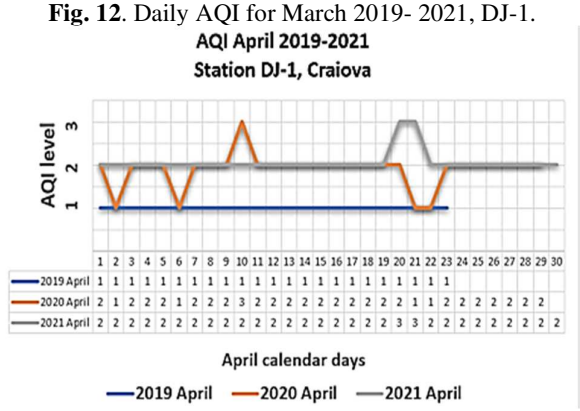


Fig. 13. Daily AQI for April 2019- 2021, DJ-1.

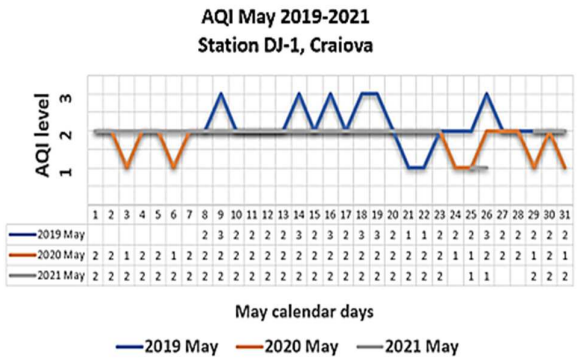


Fig. 14. Daily AQI for May 2019- 2021, DJ-1.

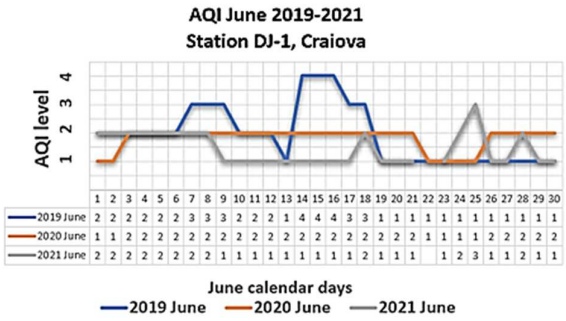


Fig. 15. Daily AQI for June 2019- 2021, DJ-1.

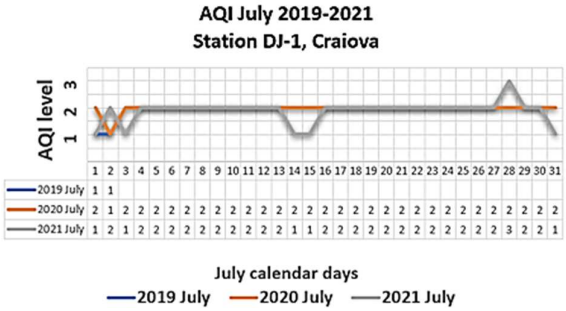


Fig. 16. Daily AQI for July 2019- 2021, DJ-1.

At DJ-1, during the analyzed period, it was found that the data used for the evaluation is quite often missing due to technical problems, such as the failure of automatic sampling systems and problems related to the power supply.

Based on the data from the "Total" column in Figures 9…11, the graph depicted in Fig. 17 was plotted, to compare the contribution of each level of the AQI in the 3 years of study.

The results at the DJ1 traffic station in Craiova were influenced by the lack of recordings for technical reasons in 2019.

Processing the data from the graph presented in Fig. 17, for the DJ-1 Craiova station, we can outline the air quality in the years studied 2019-2021, Fig. 18, for the 1096 days recorded. It is worth noting the level 2 Moderate (AQI=51-100) recorded in a percentage of 57%.

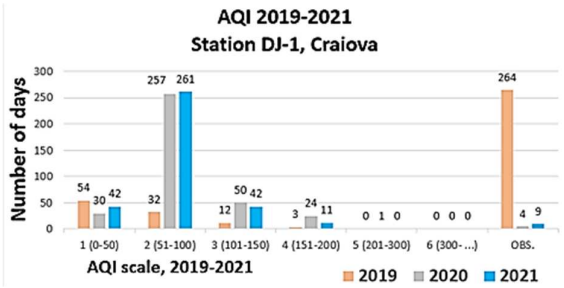


Fig. 17. AQI for the period 2019-2021, expressed in number of days with the same value, DJ-1.

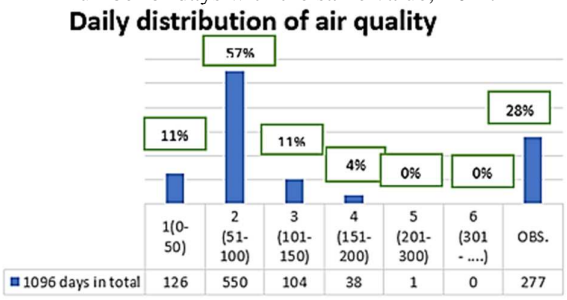


Fig. 18. Daily distribution of AQI (2019-2021, DJ-1).

Even though transport intensity was officially reduced, many disruptive factors intervened that marked the increase in specific indices, which led to an increase in the General Air Quality Index.

5. CONCLUSION

One of the most serious problems for the security of the environment and life on Earth is air pollution. One in 8 deaths in Europe is due to air pollution.

The global isolation caused by COVID-19 has had drastic effects in the social and economic fields, but with a positive effect on the natural environment.

Low air quality due to intensive transport is a serious environmental problem with negative effects on the health of the citizens of Craiova. The conclusions from the study carried out at the DJ-1 Calea București Traffic Station, Craiova, about air quality during the COVID-19 period are based on the AQI values.

These values, made public by the Dolj Environmental Protection Agency, result from

measurements carried out on the ground, at the DJ-1 automatic station for monitored pollutants: sulfur dioxide (SO_2), nitrogen oxides (NO/NO_2), Benzene (C_6H_6), carbon monoxide (CO), ozone (O_3) and from suspended dust PM_{10}. Starting with November 9, 2020, $PM_{2.5}$ suspended powders were also added to the list.

Very useful information for the conducted study was provided by "Annual reports on air quality in Dolj county - 2019 [12], - 2020 [13], - 2021 [14]", data taken from the Dolj Environmental Protection Agency.

The complexity of the set of factors that influenced the values recorded in the period 2019-2021, for establishing the level of the AQI, was revealed. This general AQI Index is coded on 6 levels: level 1 (0-50) - GOOD, level 2 (51-100) - ACCEPTABLE, level 3 (101-150) - MODERATE, level 4 (151-200) - BAD, level 5 (201-300) – VERY BAD, level 6 (higher than 300) – EXTREMELY BAD. As the AQI level increases, air quality decreases and pollution increases.

The following list of factors that affected the values recorded for the indicators monitored at "DJ-1 Calea București", Craiova can be considered (Calea București boulevard is an important artery of traffic):

• Noxious emissions, caused by:

- the intensity of transport, which was significantly reduced during the period March 16 - May 14, 2020, during the State of Emergency in Romania (the intensity of transport was relaxed when the state of alert was entered starting on May 15, 2020);
- private households; the noxious emissions were generated by heating, the individual thermal plants having a specific influence depending on the season. As many citizens worked online from home, heating at home intensified and this led to increased levels of NO_x, CO, $PM_{2.5}$, PM_{10};
- industry: even if there are no industrial centers in the analyzed area, but these noxious emissions could have been moved by the wind from other areas.

• Weather conditions:

- wind speed and direction: the pollution level can decrease, when the wind is strong and disperses the pollutants, or the pollution level can increase, when the wind is weak and the pollutants accumulate in an area;
- high atmospheric humidity: contributes to the capture and elimination process of atmospheric pollutants and the level of pollution decreases. Yet, high humidity or fog can contribute to increasing the level of pollution because it favors the formation of fine liquid particles that attract polluting particles $PM_{2.5}$ and PM_{10};
- precipitation and snow can wash away harmful gases from the air and $PM_{2.5}$ and PM_{10} particles, which reach the soil and water, and the air quality increases and, implicitly, air pollution decreases;
- Saharan dust that is characteristic of summer, but due to increasing climate change, it can also be found in cold seasons. During the analyzed period, in Romania Saharan dust was noticed in: April 2019; May and June 2020; February, May and June 2021;
- thermal inversions: the level of pollution increases through the accumulation of pollutants at ground level; the contaminated, warmer air is blocked from rising by the layer of cold air that is denser and is above it.
- "Index 4 (for BAD level of air quality, i.e. increased pollution) assigned to the DJ-1 station (30.11.2020) is caused by the increased concentration of the PM_{10} indicator, due to the accumulation of the pollutant from combustion for domestic heating, traffic, industry, the resuspension of dust near the stations, in climatic conditions unfavorable to the dispersion of pollutants (high pressure, atmospheric calm, lack of precipitation) and insufficient sanitation." [15];

• Errors created by the lack of records at the DJ-1 station due to insufficient data to establish the daily general index.

• Errors created by framing AQI in large intervals of 50/100 units. The general index displayed and updated hourly is the largest of the specific indices, which are updated hourly for each monitored pollutant. The pollutants monitored at DJ-1 are: sulfur dioxide, nitrogen dioxide, ozone, suspended dust PM_{10} - with a diameter smaller than 10 μm and from September 9, 2020 the list was completed by dust in suspension $PM_{2.5}$ - with a diameter smaller than 2.5 μm.

At DJ-1 during the analyzed period, in many

cases the necessary data for evaluation were missing due to technical problems such as the failure of the automatic sampling systems and the existence of problems with the electrical supply.

Even though the intensity of transport has officially been reduced, many disturbing factors intervened, marking the increase of specific indices, which led to the increase of the General AQI.

We conclude this study on air quality during the Coronavirus Pandemic with important observations:

- Pollution increased the risk of contracting the COVID-19 virus.
- In urban areas, where air quality was lower than in rural areas, the population was more likely to contract severe forms of the new epidemic.
- The effects of the impact of air quality on the health of the population and the environment since COVID-19 are long-lasting.

6. REFERENCES

[1] Fowler, D., et.al., *A chronology of global air quality*. Philosoph. Trans. of the Royal Society A: Mathematical, Physical and Engineering Sciences, 378(2183), p. 20190314, 2020. https://doi.org/10.1098/rsta.2019.0314

[2] Godzinski, D.A. and Castillo, M.S., *Disentangling the effects of air pollutants with many instruments*, Journal of Environmental Economics and Management, 109, p.102489, 2021. https://doi.org/10.1016/j.jeem.2021.102489

[3] Niemenmaa, V., Happach, B., Kubat, J., Otto, J., Pirelli, L., Simeonova, R., Zalega, A., Wisniewska-Danek, K., Radecka-Moroz, K., Wojciechowski, J. and Soblet, F., *Air pollution: Our health still insufficiently protected*, Public Health Reports, 2018.

[4] New Jersey Department of Environmental Protection, *Air Quality Index*, 2016. https://www.njaqinow.net/App_Files/2016/2016%20Air%20Quality%20Report.pdf, (accessed 22.04.2024).

[5] Romanian Agency for Environment Protection, *Plan to maintain the air quality in Dolj County 2020-2025*, *Project PMCA 2020-2025 Dolj*, pp. 26-28. https://www.cjdolj.ro/portal/siteweb/documente%202020/Proiect%20PMCA%202020%20-2025%20Dolj.pdf, (accessed 22.03.2024).

[6] Network for environment monitoring in Romania uRADMonitor, *Quality of Air in Romania*, https://www.cerespir.ro (accessed: 25.04.2024).

[7] The project "World Air Quality Index", *Air pollution in Craiova: Visual map of the air quality index in real time*, https://aqicn.org/map/craiova/ro/ro/ (accessed: 25.06.2024).

[8] Romanian Ministry of the Environment, National Agency for Environment Protection, *Air Quality*, http://www.anpm.ro/web/apm-dolj/buletine-calitate-aer, (accessed: 25.06. 2024).

[9] Agency for Environmental Protection Dolj County, *Public information bulletin*, No. 1444/23.03.2024, http://www.anpm.ro/ documents/19431 /47798314/APMDJ_BCA_ 2020-03-20.pdf/ 579a5d5f-cfd0-4b11-a3e1-6cf50f5a5e1d, (accessed: 25.03.2024).

[10] Skirienė, A.F. and Stasiškienė, Ž., *COVID-19 and air pollution: Measuring pandemic impact to air quality in five European countries,* Atmosphere, 12(3), p. 290, 2021. https://doi.org/10.3390/atmos12030290

[11] Isphording, I.E. and Pestel, N., *Pandemic meets pollution: poor air quality increases deaths by COVID-19.* Journal of Environmental Economics and Management, 108, p.102448, 2021. https://doi.org/10.1016/j.jeem.2021.102448

[12] Romanian Ministry of the Environment, National Agency for Environment Protection, *Environment state. Air Quality 2019 Dolj: Annual report on air quality in Dolj County – 2019,* No. 4555/31.03.2020. http://www.anpm.ro/documents/19431/2077598/RapCalitAerDolj2019.pdf/507c61fc-fc78-4d73-968f-6da25b713c01, (accessed: 27.03.2024).

[13] Romanian Ministry of the Environment, National Agency for Environment Protection, *Environment state. Air Quality 2020 Dolj:*

Annual report on air quality in Dolj County – 2020, No. 3472/31.03.2021. http://apmdj-old.anpm.ro/upload/172616_APM%20Dolj%20Raport%20calitate%20aer%202020.pdf, (accessed: 27.03.2024).

[14] Romanian Ministry of the Environment, National Agency for Environment Protection, *Environment state. Air Quality 2021 Dolj: Annual report on air quality in Dolj County – 2021,* No. 3631/31.03.2022. http://www.anpm.ro/documents/19431/2718867/DJ_RaportCalitateAer-2021.pdf/0c9e4bf8-03c4-4c5d-be1f-a9f983bcad89, (accessed: 27.03.2024).

[15] Romanian Ministry of Environment, Waters and Forests, National Agency for Environmental Protection Dolj. *Bulletin for public information,* No. 1254/02.12.2020. http://apmdj-old.anpm.ro/upload/151532_APMDJ_BCA_2020-11-30.pdf, (accessed: 27.03.2024).

Studiu despre calitatea aerului in Pandemia de Coronavirus

Abstract: Lucrarea dezvoltă o temă de interes global si anume calitatea aerului. Fiecare locuitor al planetei noastre trebuie sa-si aducă contributia la protejarea si conservarea mediului pentru sănătatea noastră, a mediului, a florei si faunei, pentru a lăsa viitoarelor generații un mediu curat. Transportul auto demonstrează că pentru confort, omul a creat si exploatează in continuare surse antropice care au efecte negative puternice chiar asupra sa. Facem un studiu despre calitatea aerului in perioada Pandemiei de Coronavirus si tragem concluzii asupra corelatiei calitate aer versus Pandemie cand circulatia auto a avut restrictii. Studiem calitatea aerului in 1096 de zile, in orasul Craiova din Roamania, in perioada pandemică, 2019-2021, asa cum au facut si alte tari.

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