



## GLOBE Investigation

**Gozo College Sir Arturo Mercieca Rabat Primary School 2022-2023**

# **“Can a tiny island in the Middle of the Mediterranean have Air Pollution?”**

<b>Organization:</b>	Gozo College Sir Arturo Mercieca Rabat Primary School
<b>Student(s):</b>	GLOBE/Eco-Schools/LEAF team
<b>Grade Level:</b>	Grades K-2, ages 5-8
<b>GLOBE Teacher:</b>	Josephine Jesse Mercieca
<b>Report Type(s):</b>	International Virtual Science Symposium Report
<b>Protocols:</b>	Atmosphere
<b>Presentation Type:</b>	Poster
<b>Optional Badges:</b>	I make an Impact, I am a Data Scientist, I am a STEM Storyteller

## Summary

There are many islands/countries in the Mediterranean. We live on the second largest island in the country of Malta called Gozo. So, being a small island in the Mediterranean (Fig. 1), you must wonder if there is air pollution here? The fact that many of our classmates suffer from asthma and respiratory illnesses made us investigate if pollution could be the reason. We then asked ourselves, “Do we really know what air quality is and what are acceptable levels for us?” These questions were posed by our participating group of 24 GLOBE students.

Malta is an archipelago consisting of 3 main islands: Malta, Gozo and Comino with other smaller islands. The 3 main islands are populated with over 490,000 inhabitants occupying an area of 316 square kilometres (web, n.d.).



Figure 1: Map of the Maltese Islands in Europe



## Research Question

We decided to investigate air pollution by first researching this topic. We found that air pollution is the discharge of pollutants into the air (Mackenzie & Turrentine, 2021). We then wanted to know what pollutants are. These are substances (particulate matter, nitrogen dioxide, ozone, sulphur dioxide) in high enough concentrations which flies into the air that are harmful to human beings, animals, vegetation, or material (OECD, n.d.). Where does air pollution come from? Just look at the pictures below (Fig. 2) – it says a thousand words!

One would think that the islands of Malta would have good or even great air quality! The EU has an air quality directive (2008/EC/50) which has set two limit values for nitrogen dioxide (NO<sub>2</sub>) for the protection of human health: the NO<sub>2</sub> hourly mean value may not exceed 200 micrograms per cubic metre (ug/m<sup>3</sup>) more than 18x in a year and the NO<sub>2</sub> annual mean value may not exceed 40 micrograms per cubic metre (ug/m<sup>3</sup>) (Eionet, 2014). This was a little too hard for us to understand, so we dug deeper and found the IQAir site. This site helps us to realize, in more laymen terms, that Malta is ranked 76 out of 118 countries who have the worst air quality in 2021 (IQAir, 2022).



Figure 2 Air Pollution in Malta

Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0-50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51-100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101-150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151-200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201-300	Health alert: everyone may experience more serious health effects.
Hazardous	> 300	Health warnings of emergency conditions. The entire population is more likely to be affected.

Figure 3 Air Quality Index

## Research Methods

We, together with 10 other schools across Gozo, were interested to find out what is the nitrogen dioxide level around our school in Victoria, Gozo (Fig. 5) and participated in the GLOBE Air Quality Campaign 2022-2023. The best way to do this is we would take on the task of doing a traffic survey (comprising of counting each motor vehicle that pass in front of our school) within a certain time frame (10-15 minutes). This experiment would happen prior to the start of the school day (Fig. 6 and 7). Also, with the help of Ms. Ramona, our GLOBE Deputy Coordinator, she acquired a nitrogen dioxide diffusion tube which we hung up for 4 weeks at the beginning of our school street (Fig. 8). We placed the NO<sub>2</sub> diffusion tube on the corner – Vajringa Street in Victoria, Gozo (Fig. 4). This street is a major artery in the capital city of Gozo where cars and heavy/construction vehicles pass – HIGH TRAFFIC. After the monitoring period, the diffusion tube was sent to Gradko Environmental Laboratory in the U.K. for analysis. Our data compiled was put on notice boards and posters (illustrating the need for change) were hung outside of the school for everyone to see. Our information was spread on different forms of media – School Facebook page and GLOBE Database. We also took atmospheric conditions and cloud types to upload on GLOBE’s database.



Figure 4 Aerial view of our school showing site where the diffusion tube was placed.



Figure 5 Map of the Maltese Islands

## Research Methods (cont'd)

**Traffic Survey**

Date: \_\_\_\_\_ Day: \_\_\_\_\_  
 Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_ Total Survey Time: \_\_\_\_\_  
 Location: \_\_\_\_\_  
 Weather: \_\_\_\_\_ Surveyor: \_\_\_\_\_

Traffic	Tally	Total
Bicycle		
Motorcycle		
Car		
Van / Pick-up		
Small lorry		
Articulated lorry		
Bus / coach		
Construction vehicle		
Farm vehicle		
Other		

**Traffic Survey**

Date: 20/10/2022 Day: Thursday  
 Start Time: 8:00 End Time: 8:15 Total Survey Time: 15 minutes  
 Location: In front of school  
 Weather: good sun Surveyor: Ethel Gale

Traffic	Tally	Total
Bicycle		
Motorcycle		2
Car		4
Van / Pick-up		4
Small lorry		4
Articulated lorry		
Bus / coach		4
Construction vehicle		
Farm vehicle		
Other		

**Traffic Survey**

Date: 20/10/2022 Day: Thursday  
 Start Time: 8:00 End Time: 8:15 Total Survey Time: 15 minutes  
 Location: In front of school  
 Weather: good sun Surveyor: Ethel Gale

Traffic	Tally	Total
Bicycle		
Motorcycle		2
Car		4
Van / Pick-up		4
Small lorry		4
Articulated lorry		
Bus / coach		4
Construction vehicle		
Farm vehicle		
Other		



Figure 7 GLOBE students took their daily traffic surveys on these benches outside of the school

Figure 6 Samples of traffic and weather survey data sheets done by the GLOBE students.

**Microscopic Conditions & Cloud Type Datasheet**

Date	Time	Cloud type			Air Temperature (°C)	Pressure (mb)	Humidity (%)	Rainfall			Wind			Visibility	
		High	Mid	Low				Yes	No	Strong	Light	Calm	Good	Fair	Poor
17/10/2022	11:00am				26.0	1017.0	55%								
18/10/2022	10:20am		X	X	26.4	1016.9	52.1%	X							
19/10/2022	10:20am		X		26.0	1020.0	49.5%	X							
20/10/2022	10:10am	X			26.3	1009.6	49.5%	X							
21/10/2022	1:30pm		X		25.9	1012.5	25.6%	X							
24/10/2022	10:00				26.7	1010.4	28	X							
25/10/2022															
26/10/2022	10:00														
27/10/2022					27.5	1012.3	20.1	X							
28/10/2022															
31/10/2022															
2/11/2022															
3/11/2022	11:55			X	28.4	1011.5	51.0	X							
4/11/2022	10:30		X		23.1	1007.2	51.8	X	X						
7/11/2022	10:29		no	clouds	23.4	1011.0	54.2	X							
8/11/2022	10:30		X		24.9	1012.5	54.2	X							
9/11/2022	1:30		X		23.1	1010.4	53.1	X							
10/11/2022	1:00		X		26.1	1012.9	56.2	X							
11/11/2022	2:00		X		26.2	1016.4	58.5	X							
14/11/2022	9:30		X		21.0	1012.3	67.8	X	X						

GC Rabat Primary School  
 Data entered Jan 10, 2023 (Am)



Figure 8 Diffusion tube.



## Conclusion

We, out of 11 areas in Gozo, were analysed and found to be the second worst with a  $\mu\text{g}/\text{m}^3$  of 39.62 (Fig. 9). The highest concentration of  $\text{NO}_2$  was at Sir M.A. Refalo Sixth Form, Fortunato Mizzi Street, Victoria was  $\mu\text{g}/\text{m}^3$  of 43.10. Third was St. Francis Primary School, Main Gate Street, Victoria ( $36.90 \mu\text{g}/\text{m}^3$ ) and the fourth was Sacred Heart Minor Seminary, Enrico Mizzi Street, Victoria ( $\mu\text{g}/\text{m}^3$  33.56). We started to see a pattern were by all four locations are in the village of Victoria which is the capital of Gozo. In our conclusion we found that Victoria, Gozo is the most concentrated part of the island when it pertains to air pollution resulting from heavy car traffic (Fig. 10)

After analysing data and results, our conclusion comes in many forms – the **MAIN** one being the need to educate people. By posting posters at the school entrance (Fig. 11), using our school Facebook page and word-of-mouth we will be informing family, friends, and the public that idling cars are harmful to everyone; when available – take public/school transportation; if possible – use your bicycle or walk to school and FINALLY we need to plant more trees to offset the nitrogen dioxide in the air

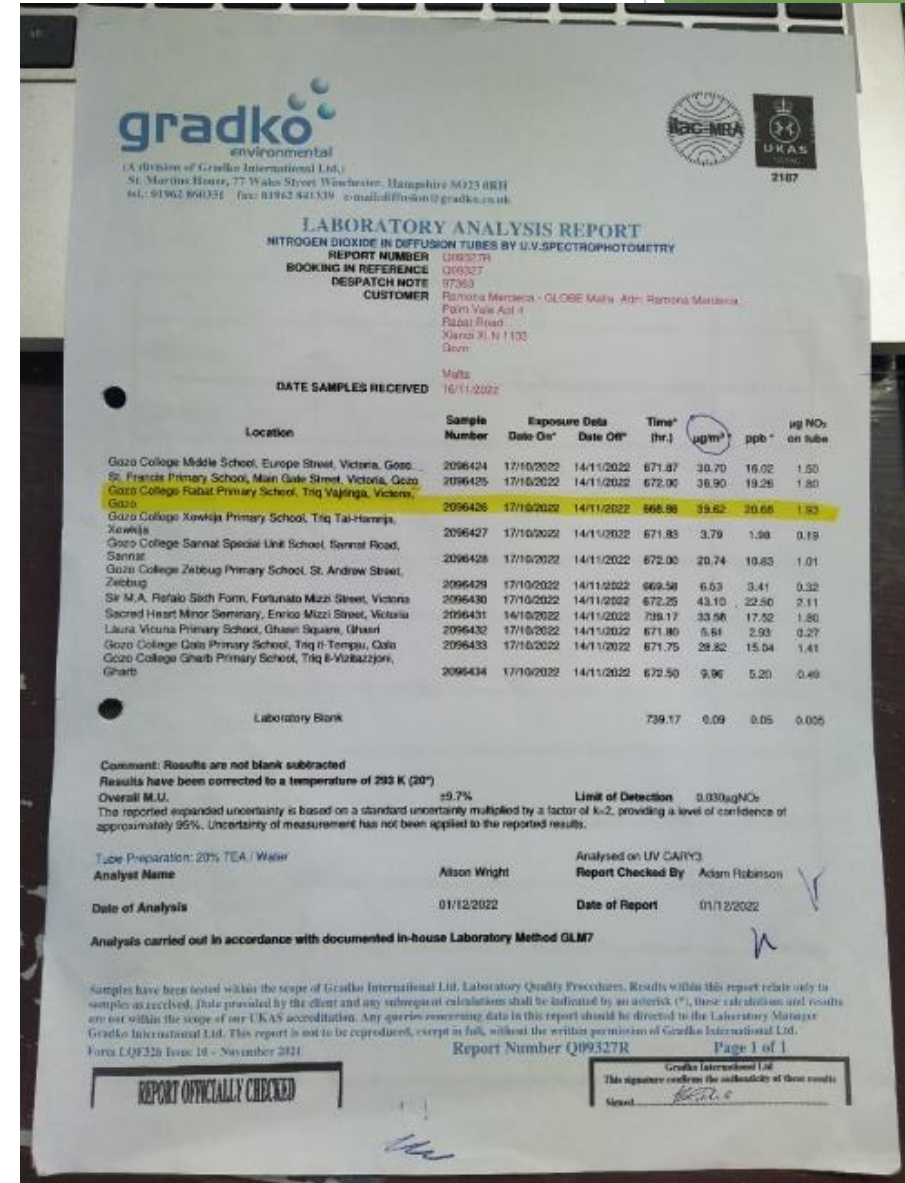


Figure 9 Gradko Environmental Laboratory Report.

Conclusion (cont'd)

**Traffic Survey**  
**Gozo College Sir Arturo Mercieca Primary School**  
**Vajringa Street, Victoria**  
**(3 week period - Oct 17-Nov 14, 2022)**

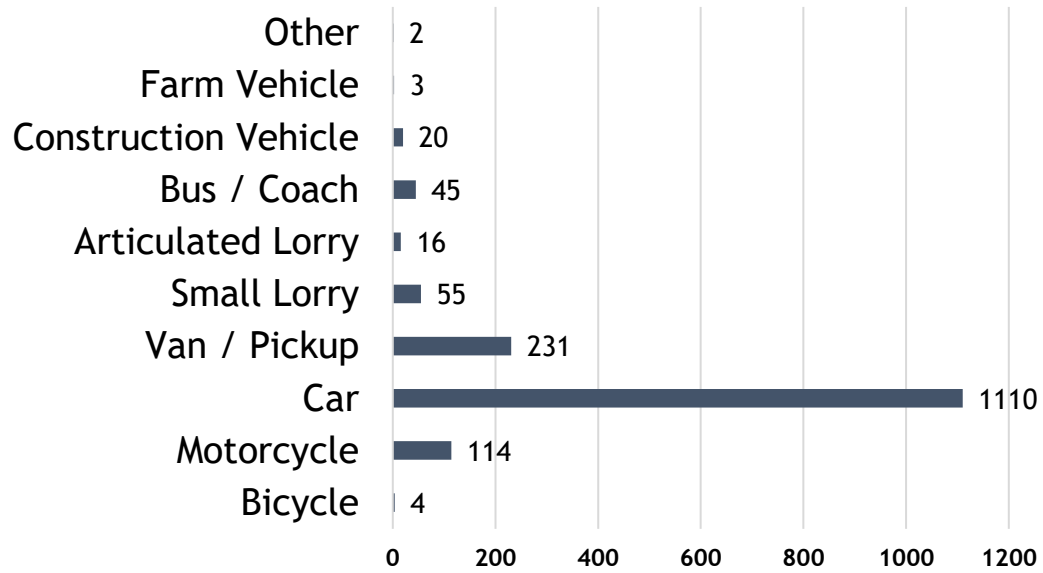


Figure 10 Bar graph showing traffic count results.



Figure 11 Posters on the outside of school

Air Quality Fair in Villa Rundle.





**STOP** idling of cars in front of our schools

**TAKE** public/school transportation when you can

**USE** your bicycle or walk to school

and finally:

**PLEASE, PLEASE PLANT MORE TREES**

to offset the nitrogen dioxide in the air



## References

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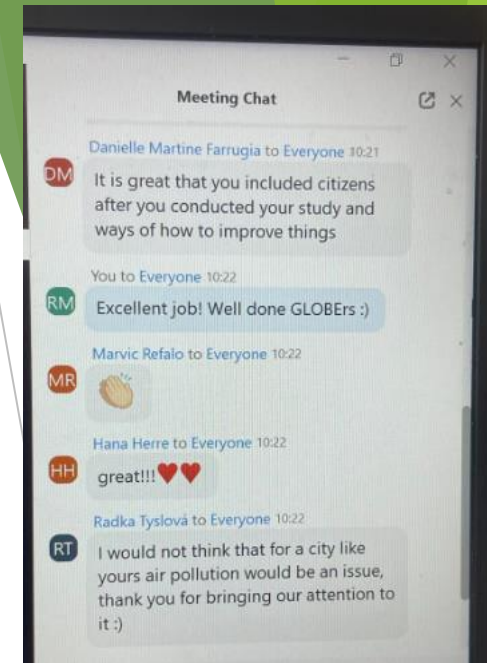
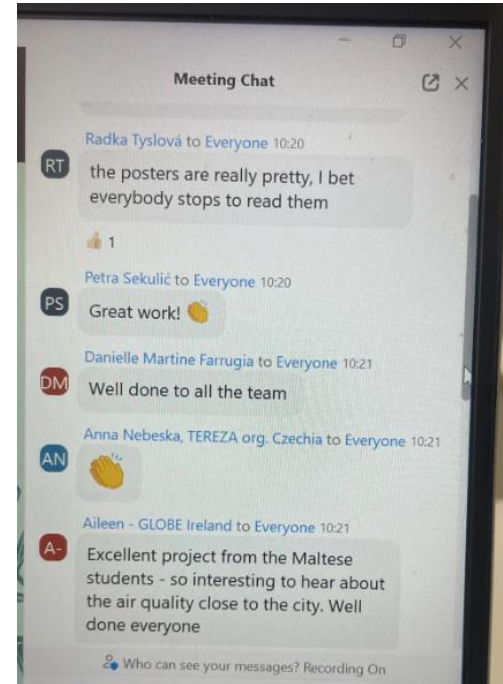
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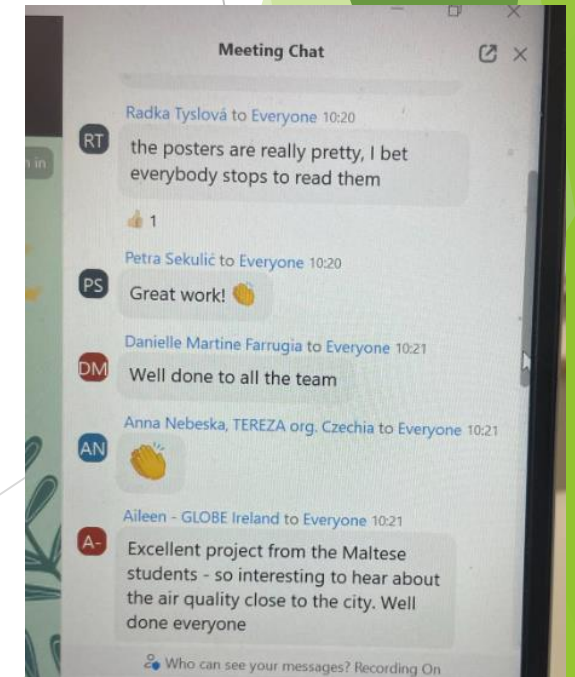
# The 2024 GLOBE Virtual Student Conference of Europe and Eurasia



Eco-School President: Andrea Schembri  
LEAF President: Soleil Grech



Comments from attendees



# Our Students Awarded Community Impact for their work done in 2022-2023

The screenshot shows a Zoom meeting interface. At the top, there are three video thumbnails for participants: Ramona Mercieca, Bara Semerakova, GLO..., Dana Votapkova, GLOBE E..., and Lenka Kleger, GLOBE P... To the right, the name 'Josef Brúna' and 'Elementary sch...' are visible. The main content is a presentation slide titled '2024 Europe and Eurasia GLOBE Virtual Student Conference'. The slide features the GLOBE Program logo and a central text box with a dashed border and a ribbon icon. The text in the box reads: 'Awarded projects – Primary Schools', 'Community Impact', 'Sir Arturo Mercieca Rabat Primary School', 'Malta', and 'Prize: GLOBE materials'. The Zoom interface at the bottom shows 50 participants and various control icons.

You are viewing Lenka Kleger, GLOBE Program Eu...  
View Options

Ramona Mercieca  
Josef Brúna Elementary sch...  
Bara Semerakova, GLO...  
Dana Votapkova, GLOBE E...  
Lenka Kleger, GLOBE P...  
Josef Brúna Elementary school Ru...

The GLOBE Program

2024 Europe and Eurasia GLOBE Virtual Student Conference

Awarded projects – Primary Schools

Community Impact

Sir Arturo Mercieca Rabat Primary School

Malta

Prize: GLOBE materials

50