THE GLOBE PROGRAM

Europe and Eurasia 2022 Country Reports

GLOBE Program

Europe and Eurasia Region Coordination Office

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The GLOBE Program Europe and Eurasia Region Coordination Office

The GLOBE Program network is represented by Region Coordination Office (RCO) in each of the world´s region. The Europe and Eurasia RCO fosters the program in 45 countries with 5300 schools and nearly 45 000 citizen scientists. The office is located in Prague, Czech Republic and hosted by TEREZA, Educational Centre.

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Web: www.globe.gov/web/europe-and-eurasia

Special thanks for the cooperation in the year 2022 belong to

Members of the Board Europe and Eurasia

- Laura Altin - Chair (Country Coordinator, Estonia)
- Sanja Klubicka (Deputy Country Coordinator, Croatia)
- Vladimir Ribičić (GLOBE Alumni, Croatia)
- Marcella van Steenbergen (Deputy Country Coordinator, Netherlands)
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- Ieva Kalka – WG Technology (Teacher, Trainer, Latvia)
- Laura Altin – WG Technology (Country Coordinator, Estonia)

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Content

Europe and Eurasia Region Meetings

2022 GLOBE Regional Meeting for Europe and Eurasia
October 17 - 21, 2022, Omiš, Croatia

Online meetings of Country Coordinators and Deputy Country Coordinators

Meeting No.1, November 10, 2021
Focus on: 2021 Regional Meeting Feedback, Certification process of Trainers/Mentor Trainers, Tree Reporters Challenge.

Meeting No.2, January 13, 2022
Focus on: Water Bodies Challenge

Meeting No.3, February 28, 2022
Focus on: Updates on planned events; Student actions and solutions to benefit the environment

Meeting No.4, March 28, 2022
Focus on: GLOBE and climate change education

Meeting No.5, April 28, 2022
Focus on: 2022 Virtual GLOBE Annual Meeting

Meeting No.6, June 13, 2022
Focus on: Upcoming events – GLOBE Annual Meeting, GLOBE Learning Expedition in Estonia, GLOBE Europe and Eurasia Regional Meeting in Omiš

Meeting No.7, September 12, 2022
Focus on: GLOBE Europe and Eurasia Regional Meeting in Omiš

Armenia

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Organization and Number of Staff:
1 coordinator from the Ministry of Education, Science, Culture and Sports
2 coordinators from the Center for Ecological-Noosphere Studies
National Academy of Science

Funding by:
Ministry of Education, Science, Culture and Sports

Cooperating Organizations/Individuals:

GLOBE Schools (what types, how many):

GLOBE Areas you and schools focus on:
Scientist participation, interactions and collaboration, student investigations, geographic representation

Number of Schools Reporting Data over Past Year:

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
2. **Science**
3. **Community**

4. **Technology**

5. **Communications**

- Regular remote communications with GLOBE Europe and Eurasia RCOs - coordination and consultations.
- GLOBE Program dissemination during national preselection of the **International Science and Engineering Fair (Regeneron ISEF 2022)** for pupils – 26 March, 2022.
- Presentation of GLOBE program in the frame of **Starmus VI festival science camp** (https://www.starmus.com/banner-content/starmus_camp) on 8-11 September, 2022. Starmus Science Camp, in close cooperation with schools and universities, thousands of students and around 100 000 participants involved from Armenia and other countries of the region in the world of sciences.
- National coordinator participation in the **2022 GLOBE Regional Meeting for Europe and Eurasia** on 16-21 October, 2022. Workshops and seminars with parallel sessions made it possible to get acquainted with the details of trainings, tools and software necessary for the full implementation of the program in Armenia.
- Announcement of an **Information day for schools** interested in implementing the GLOBE rogram (the announcement of the Ministry here: https://escs.am/am/news/13692). About 200 schools from all over the Armenia filled out an application and expressed their desire to join GLOBE.

Plans and Ideas for Next Year:

- Organize the abovementioned Information day. During the online meeting with all interested schools, it is planned to present the opportunities to get involved with GLOBE and become an associated GLOBE school, as well as get acquainted with the GLOBE protocols, international developments in the Program, activities occurring in the GLOBE and necessary skills for GLOBE program better implementation.

- Step by step select schools that are interested and ready for the full implementation of activities occurring in the GLOBE, upload them in GLOBE portal and organize trainings for the appropriate group of teachers.

- Start to properly execute GLOBE atmosphere protocols and then continue GLOBE activities in the other Earth Spheres.

Regeneron ISEF 2022


Starmus Science Camp

Belgium

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Funding by:
Ministerium der Deutschsprachigen Gemeinschaft

Cooperating Organizations/Individuals:
Science College Overbach – Philipp Mühlheims (Philipp.Muelheims@cjd.de)

GLOBE Schools (what types, how many):
Königliches Athenäum Eupen (secondary, general education), Pater-Damian Sekundarschule (secondary, general education), Robert Schuman Institut (secondary, technical and vocational education), Bischöfliches Institut Büllingen (secondary, general education)

GLOBE Areas you and schools focus on:
Phenology, atmosphere

Number of Schools Reporting Data over Past Year:
0

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   Cooperation launched with Science College, contacts with university of Cologne

2. **Science**

3. **Community**
   2 new trainers at the Science College, idea of a European German speaking collaboration in GLOBE

4. **Technology**

5. **Communications**

Plans and Ideas for Next Year:

- First hydrology training for Belgian secondary school teachers in the Science College with collaboration of Swiss colleagues on 23rd of November
- 2-3 teacher trainings a year in science college
- At least one training for primary school teachers in GSC (Eupen)
- GLOBE games for students
- Relaunch of the phenological garden
- Flyers and posters for schools

Croatia

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Organization and Number of Staff:
Ministry of Science& Education – number of staff in charge for GLOBE: 1

Funding by:
Government

Cooperating Organizations/Individuals:
Diana Garašić - volunteer
NGO ZNAM – volunteer, non-profit organization

GLOBE Schools (what types, how many):
Elementary, Secondary – grammar and vocational, kindergartens

GLOBE Areas you and schools focus on:
All areas, but mostly Atmosphere and Phenology

Number of Schools Reporting Data over Past Year:
100

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   GLOBE is included in elementary schools' curriculum, especially in the subjects Nature and Geography. Curriculum doesn't demand official GLOBE membership of the school and it doesn't mention GLOBE as the program or GLOBE protocols, but GLOBE protocols are recognized in the

formulation of student's outcomes, in recommended contents and methodology. For example, it says: students measure the changes in the properties and characteristics of the atmosphere, water, soil and living things over the year. That is the reason why there were **more than 100 requests for new GLOBE account in past year**. But, in the same time, many schools drop out, because regular measurements and reporting the data are too demanding, or there is not enough support in the school for GLOBE teacher – if there is only one teacher, or GLOBE teacher just left the school. There are even **179 schools which registered and asked for the account**, but haven't been reporting yet at all. That is one of the biggest problems in our perception. On the other hand, we believe that education for GLOBE (in person or online) significantly contributes to the quality of teaching and we see it as very important too.

Education and Teacher Training Agency (ETTA) organizes **regular training workshops** for teachers (one initial, and another follow up workshop) twice a year. Additionally, there are **7 regional GLOBE centers established by ETTA**, which organize **local meetings for GLOBE members 3 times a year**. We have 11 GLOBE trainers certified this year with the idea that each regional center is fully equipped to organize GLOBE trainings, when needed and in protocols or areas that are suggested by members. This year there is additional GLOBE workshop organized by ETTA, with target audience from preschool kindergarten teachers.

This year we had our regular **GLOBE Competition and Science Fair** – the event organized and funded by ETTA for 40 most active GLOBE schools. Schools are selected on regional level conference, based on their scores achieved according to their activities in past year.

2. **Science**

Big influence on the maintaining of GLOBE participants and the popularity of GLOBE among teachers and students has our **Annual Competition and Science Fair**. We established that event in 1998. And from then until today, Science Fair raises the quality of student's projects. We had many workshops for teachers (follow up) when we addressed the methodology of science research and the methodology of writing the scientific report, since it appears to be a problem for many teachers.

We believe that our GLOBE activities contributed significantly to the **scientific literacy** of involved students and teachers. Each year we engage several scientists to mentor students' projects and be the reviewers as well as the judges at the Fair. Each year there are more than 50 projects prepared for the Fair, but all of them are not judged as good enough to be presented at the Fair. The **reports presented at the Fair are also published on Croatian web page http://GLOBE.hr** as an inspiration for students and teachers with less experience.

This year **6 Croatian schools submitted the reports for IVSS**, and one was awarded in the group of Europe and Eurasia

3. **Community**

Many Croatian schools cooperate within Croatian GLOBE network, especially schools gathered in local GLOBE communities guided by regional centers. They organize **school visits or joined GLOBE projects**. Many schools are **involved in international campaigns or challenges**, especially in European Phenology Campaign, Microplastics experimental campaign, Trees around the GLOBE, European Water Bodies Challenge and so on. There are several schools involved in **Erasmus+ projects based on GLOBE joined research projects**.

One Croatian school participated in **GLE in Estonia**, as well as 2 Croatian GLOBE mentors.
This year we have **2 workshops in cooperation with Slovenia** – Croatian trainers went twice to Slovenia to train new teachers face to face.

Croatia was the **host for the Regional GLOBE Meeting and Training which was successfully organized in Omiš**, with great help of GLOBE school in that city and Regional GLOBE Office. That was the first event organized in person after 2 years of COVID conditions and as it was situated in

attractive part of Croatian coast. It was attended by high number of participants and countries represented.

4. **Technology**

   GLOBE is very much **connected to technology and it contributes to ICT literacy, and especially to Data literacy**. Data literacy is specially encouraged by our scientists reviewing students GLOBE research reports and by reviews in the process of IVSS. We notice that more schools each year use automated weather stations, but open question is if it contributes to the student's competences at all.

   More students and members of wider community use **GLOBE Observer**. It is very helpful for data reporting, for instructions in the field and also more attractive for students. **GrowApp** application is also popular and used. We do not have the information on how much teachers or students use abundant GLOBE web pages and linked pages, which would be very valuable teaching resource indeed. Yet to be investigated.

5. **Communications**

   GLOBE is providing regular and updated information and it is enhanced by information sent by Regional GLOBE Office. They often use reminders which is very useful. But the fact is that we all are overloaded with information. One can't have it in mind all the time, but in GLOBE it is possible to find the info you search for. **In Croatia we have GLOBE web site on http://GLOBE.hr for the specific information.** We use GLOBE Facebook for quick informing and reminding our GLOBE members (but unfortunately all of them do not use FB. So, we combine informing our community by sending the information to regional GLOBE leaders, who proceed the info on local level.

   The project **GLOBE Elementary K4** is posted on internet and FB and it includes Croatian schools and kindergartens, as well as members from several other countries.

   Education and Teacher Training Agency has its own web page where are the information about workshops organized and about Annual competitions and Science Fairs.

Plans and Ideas for Next Year:

We shall continue with our model of trainings, but should also find the way to research among the schools who are not active any more, or haven't been active at all. We are not sure if we should just mark such schools as not active.

We shall continue with organizing of the Annual GLOBE Competition and Science Fair.
The research in plan is about the use of GLOBE resources for teaching and is there the need to translate materials in Croatian language.

Also, **GLOBE Observer is translated in Croatian language**, but some improvements are needed, as well as translation of the new sections added this year.

Translation of GLOBE Elementary page and teaching materials is also planned. The project GLOBE Elementary K4 is being promoted and is planned to expand their activities.

ETTA is planning to organize more teacher training related to GLOBE for kindergarten teachers.

Cyprus

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Organization and Number of Staff:

Funding by:
Government

Cooperating Organizations/Individuals:
Cyprus Open University

GLOBE Schools (what types, how many):
14 active secondary schools: (10 Lyceum and 4 Gymnasium)

GLOBE Areas you and schools focus on:
Atmosphere, Biosphere, Climate change

Number of Schools Reporting Data over Past Year:
14

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   14 schools are implementing GLOBE. Every school has a GLOBE team that includes one or two GLOBE teachers and five to twenty students. Communication with colleagues was done mostly via TEAMS and phone. Four of our GLOBE schools (plus one non-GLOBE school) were **partners of PULCHRA project** from 2020 till 2022. PULCHRA GLOBE schools had the ability to show their work and share good practice in a conference at Nicosia last November.

2. **Science**
   GLOBE schools collaborate with the Cyprus Open University and especially with the Lab of Chemical Engineering and Eng Sustainibility. PhD candidates and researchers visited our PULCHRA GLOBE schools to guide teachers and students to implement science in the city.

3. **Community**
   We strongly suggest that each GLOBE school should have tight association with parent's associations and inform them about GLOBE activities. We also recommend that each school should recommend non-GLOBE teachers and parents to download GLOBE Observer app and become a GLOBE observer.

4. **Technology**
   We try to recruit new GLOBE teachers by e-protocols and e-learning

5. **Communications**

   Every school year we release an invitation through our ministry which reaches every secondary school in Cyprus and we ask old GLOBE schools to continue working and new teachers to get trained. We also have a **TEAMS group for direct communication** between the CC and participating schools.

Plans and Ideas for Next Year:

Get more teachers trained and ask participating schools to collaborate regionally in climate change projects.

Czech Republic

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Organization and Number of Staff:

TEREZA Educational Centre is a professional non-governmental non-profit organization fostering environmental and science education in the Czech Republic. We play a significant role in the GLOBE Program network since 1995. TEREZA has over 20 employees. There are currently five people working for GLOBE country coordination office plus three people working for RCO for Europe and Eurasia.

Funding by:

- Grants: State Environmental Fund of the Czech Republic, Ministry of Education, Youth and Sports, Prague City Hall, U.S. Embassy Prague
- European Funds: PULCHRA Project

- Fundraising: SC Johnson
- Own resources: schools pay 70 EUR per school per year, newcomers pay 140 EUR a year; other paid services include: workshops, online courses, selling publications.

Cooperating Organizations/Individuals:

Apart from the GLOBE Program network, TEREZA is a member of Foundation for Environmental Education (FEE). Within the GLOBE Program we collaborate with various organizations, U.S. Embassy in the Czech Republic, Czech Hydrometeorological Institute, Faculty of Science Charles University, European Space Education Resource Office (ESERO), Institute of Botany of the CAS, and others. We also maintain **close cooperation with 20 members of the Czech GLOBE Scientific Board** and 20 GLOBE mentor-teachers.

GLOBE Schools (what types, how many):

129 registered schools, about 2/3 elementary schools and 1/3 high schools or leisure-time centers

GLOBE Areas you and schools focus on:

Czech schools focus on all GLOBE areas (Atmosphere, Hydrology, Soil, Phenology, Biometry and Land Cover). Our schools were actively involved in the European Phenology Campaign, Water Bodies Challenge and Microplastics Campaign. During Autumn 2022 we launched our own Autumn Climate Challenge focused on school investigations of climate change in the connection with GLOBE measuring methods.

Number of Schools Reporting Data over Past Year:

Around 15 school are reporting data regularly.

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   We took advantage of having GLOBE methodology and organized **Autumn Climate Challenge** in which schools explored nature and looked for connections between observed phenomena and climate change. We have been working on Czech education materials for microplastics project based on **Microplastics Recognition Guide** and monitoring protocols developed by GLOBE Italy.

2. **Science**
   We collaborate with Czech GLOBE Scientific Board, who are helpful in developing and editing methodical materials, giving trainings, webinars, and others. Together with scientists we have been working on **European project PULCHRA** (Charles University in Prague, Faculty of Science), microplastics project (Academy of Sciences of the Czech Republic) and several webinars with experts.

3. **Community**
   We organized our biggest community event **GLOBE Games 2022** in May with participants from Slovakia, The Netherlands and Ukraine, under the auspices of US Embassy in Prague. GLOBE coordinators and two Czech teachers participated in the Regional Meeting in Croatia. Student virtual conference is planned on December 2022.

4. **Technology**
   Using of **City Challenges Platform within the PULCHRA project**. Using special water filtration tools for the microplastics investigations. We improved and established several online products for schools - seven week long online course of IBSE, webinars with experts on various topics, online student conference etc.

5. **Communications**

We are working on better **communication strategy of the program** – developing new website, newsletters and effective marketing of our products. We boosted our Facebook communication and public relations. In Water Bodies Challenge and Autumn Climate Challenge we used broadly online tool Padlet.

Plans and Ideas for Next Year:

- Finalize new communication strategy of our program in the Czech Republic.
- Organize GLOBE Students Conference (GLOBE Games) in Prague in May.
- Develop inquiry-based lessons and activities on climate change.
- Support microplastics investigations at schools by special campaign.
- Support phenology observations through European Phenology Campaign.
- Interconnect GLOBE with Tiny Forest initiative and help schools with implementation.

Estonia

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Organization and Number of Staff:
MTÜ GLOBE Eesti, 3 members of the Board
Tech support
Accountant
Ministry of Education and Research GPO Kärt-Katrin Pere and Liia Varend
Team of volunteers (16 people)

Funding by:
Republic of Estonia Ministry of Education and Research
U.S. Embassy in Tallinn, Estonia
Environmental Investment Centre
Schools, Local municipalities

Cooperating Organizations/Individuals:
Republic of Estonia Ministry of Education and Research
U.S. Embassy in Tallinn, Estonia
University of Tartu
Tallinn University
MTÜ Klubi EGEA-Tartu
AHHAA Science Centre

GLOBE Schools (what types, how many):
90 public schools have joined the GLOBE program
60 schools have reported data
22 schools have reported data during last 12 months

GLOBE Areas you and schools focus on:
Atmosphere: Air Temperatures, Barometric Pressures, Cloud Observations, Precipitations, Relative Humidities, Snowpacks, Surface Temperatures
Earth as a System: Green Up/Green Down
Hydrology: Alkalinities, Conductivities, Dissolved Oxygens, Nitrates, Salinities, Transparencies, Water pH, Water Temperatures
Land Cover: Biometry Trees, Graminoid Biomasses, MUC, Photos, Vegetation Covers
Soil: Fertilities, Layer Descriptions, Soil Moisture via Sensors, Soil pH, Soil Temperatures

Number of Schools Reporting Data over Past Year:

22

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**

   EG1. GLOBE materials are part of curricula in Estonia (science, geography, biology, physics, maths)

   EG2. We have 15 trainers in Estonia. Our trainers speak Estonian, Russian and English. We have one mentor trainer who speaks Estonian and Russian. One new mentor trainer, 2 new trainers.

   EG3. 11 research projects in GLE Estonia (158 participants involved). 7 research projects submitted to GLOBE IVSS 2022

   EG4. Stories in school blogs, local newspapers.

2. **Science**

   SG1. 12 scientists and STEM professionals were involved in GLOBE Estonia Learning Expedition. 6 research projects supervised by scientists.

   SG2. Schools from different regions participate in the GLOBE program. The networks covers Estonia. 6 schools have received honor rolls.

   SG4. 6 research projects in GLOBE IVSS 2022

3. **Community**

   CG1. 4 new GLOBE schools joined the network

   CG2. 37 schools participated in GLOBE Estonia Learning Expedition. Teams were formed of students from different schools. 11 presentations were made based on the data collected. Some research projects will be sent to GLOBE IVSS
   Collaboration project between schools -GLOBE KLASS+

4. **Technology**

   TG1. 16 schools are reporting the data, 6 schools have received honor rolls throughout the year

   TG2. GLOBE website is used by GLOBE schools (data sheets, materials)

   TG3. GLOBE Data Entry App was used during the GLOBE Estonia Learning Expedition, apps are used in schools

5. **Communications**

   CMG1. GLOBE FB and Instagram are introduced to GLOBE Schools.
   GLOBE Estonia launched its YouTube @GLOBEeesti
   Regina Riis is GLOBE vlogger

   CMG2. GRLE2022 and GLOBE star

   CMG3. More than 20 papers about GRLE2022 in Estonian media

Plans and Ideas for Next Year:

GLOBE Baltic Learning Expedition August 7nd to 10th!
GLOBE IVSS
GLOBE Research projects support program
GLOBE Earth Day celebration
GLOBE Klass+ collaboration project among Estonian schools;
Collaboration with MTÜ EGEA-Tartu – Cool Geography Lesson (visiting schools and introducing VR opportunities in GLOBE)

Finland

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Organization and Number of Staff:
2

Funding by:
No funding for GLOBE activities or coordinating GLOBE

Cooperating Organizations/Individuals:
Researchers at the University of Helsinki

GLOBE Schools (what types, how many):
All types primary and secondary schools, 154 schools are registered but only one of them is actively reporting data.

GLOBE Areas you and schools focus on:
Atmosphere, Hydrology, Earth as a system, Land Cover and Soil, Phenology

Number of Schools Reporting Data over Past Year:
2

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   Introducing GLOBE to biology, chemistry and geography teacher students by using GLOBE materials and apps. Some materials of the European Phenology campaign have been translated into Finnish and shared with the schools participating the campaign. Three teacher training schools practiced utilization of materials with students.
2. **Science**
3. **Community**
4. **Technology**
5. **Communications**

Plans and Ideas for Next Year: We continue to translate some GLOBE materials into Finnish. Three schools will pilot the European Phenology Campaign next spring with students. We hope that with their experiences we can get more schools to join the campaign autumn 2023.

France

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Organization and Number of Staff:
3

Funding by:
CNES

Cooperating Organizations/Individuals:
Ministry of National Education and Youth

GLOBE Schools (what types, how many):
Primary and secondary (from 6 to 18 years old) schools, around 30 enrolled.

GLOBE Areas you and schools focus on:
Atmosphere

Number of Schools Reporting Data over Past Year:
Around 15 schools, but not really on GLOBE data entry.

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   To raise awareness on air quality.

2. **Science**
   - To carry on NO2 campaign
   - To carry on atmospheric aerosols' measures with Calitoo
   - To gather GLOBE France teachers for training on air quality once a year
3. **Community**

4. **Technology**

5. **Communications**
   Exchange between Ireland school and French school.

Plans and Ideas for Next Year:

- To carry on activities on air quality and aerosols
- To begin activities on sky quality
- To propose DIY sensors on PM2.5 and PM10 (long term activity)

Georgia

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Organization and Number of Staff:
CENN, 60 employees

Funding by:
Austrian Development Cooperation

Cooperating Organizations/Individuals:
Ministry of Education, Science, Culture and Sport of Georgia

GLOBE Schools (what types, how many):
Both public and private schools have been involved in the program in 2022, 12 schools across Georgia.

GLOBE Areas you and schools focus on:
Georgian schools focused on the biosphere (Cloud Protocol)

Number of Schools Reporting Data over Past Year:
7 schools actively continue to upload data obtained as a result of their observations over the past year

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   During the initial stage, active work began on familiarizing the involved schools with the GLOBE materials. Both **individual and group informational meetings were held** on issues concerning the correct use of guides and instructions and on uploading materials. Furthermore, active work began on cloud protocol (schools were provided with the translated materials in Georgian).

   The Water Bodies Challenge turned out to be a successful activity, in which **12 schools were involved**. Students and teachers of the schools, with the help of the program coordinator, joined trainings and attended meetings planned within the challenge. Each participant carried out the activities provided by the program in their region and shared the materials through social networks, providing people with information and sharing the received knowledge. Schools shared

their work with the participants of the GLOBE Program from all over the world and received positive evaluations and certificate for all 12 schools.

2. **Science**
   The students' cloud observation data are uploaded to the portal according to the guidelines and become part of the scientific information. Local data are also exchanged at the global level

3. **Community**

4. **Technology**

5. **Communications**

Plans and Ideas for Next Year:

TBD, based on the funding opportunities

Germany (University of Cologne)

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Organization and Number of Staff:
University of Cologne, ca 5800

Funding by:
State of North Rhine-Westphalia, Third party funds (EU-H2020 PULCHRA Project (No 824466), EU-EFRE CUBiC Project, project funding but no specific GLOBE funds

Cooperating Organizations/Individuals:
PULCHRA Partners, Local / regional school network of University of Cologne

GLOBE Schools (what types, how many):
New school participants in PULCHRA, CUBiK, Waldklima Project are informed and trained in GLOBE approaches: 6 schools from Junior High to High school in PULCHRA project context + 1 additional being trained + cooperating partners in Pune / India,

GLOBE Areas you and schools focus on:
The method of science, climate and water research, climate change mitigation and participation

Number of Schools Reporting Data over Past Year:

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   NEARPOD training on GLOBE and PULCHRA in the context of a SCERT workshop Pune/ India: see https://app.nearpod.com/?pin=p2jhn

2. **Science**
   GLOBE specific research in the frame of 3 research projects at international (PULCHRA), national (WaldKlima) and local (CUBiC) level
   https://geographie.uni-koeln.de/en/research/working-groups/hydrogeography-and-climatology/research-projects/research-projects

3. **Community**
   Several climate excursions using GLOBE protocols to explore the climate character of urban areas

4. **Technology**
   Development of smartphone and sensor technologies as well as experiments to understand protocol based environmental monitoring and experiment-based climate research
   https://geographie.uni-koeln.de/oeffentlichkeit/buergerwissenschaften-mit-smartphones/app-uebersicht

   Low cost air quality and soil moisture sensor development

5. **Communications**
   Several trainings, newspaper articles, presentations on IBL approaches with GLOBE / PULCHRA. Smartphone applications in community based environmental research / citizen science
   UoC website: https://geographie.uni-koeln.de/en/outreach/GLOBEuzk-science-education-for-pre-service-teachers-and-schools

Plans and Ideas for Next Year:

With the end of the GLOBE@UoC project funded by the University of Cologne the direct support of GLOBE at Univ of Cologne in terms of dedicated education programs has ended. Funding thus is limited to related research projects of PULCHRA, CUBiK and Waldklima. Special classes on GLOBE approaches are not possible any more, instead these approaches are integrated into other teacher education classes.

Students who have participated in previous GLOBE classes at UoC are now joining the workforce and establishing the programs at their schools. The future activities will be related to maintaining and developing these networks and support young teachers in their endeavor to implement GLOBE at their schools.

In the context of abovementioned projects new school networks are in the process of being established. These schools will be equipped with DAVIS weather stations and will be reporting weather data. Utilizing this approach will provide an incentive for these schools to start GLOBE at their school.

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Organization and Number of Staff:
GLOBE-Deutschland e.V.
Staff: 5 people: Anna Heyne-Mudrich, Thomas Beer, Sonja Drzensla, Nico Schultze, Matthias Schmitt

Funding by:
Project funding by Engagement Global, Sparkasse Paderborn, Sparkasse Unna, Erasmus, support associations from schools

Cooperating Organizations/Individuals:
NABU, Engagement Global, Academie of Environment in Westphalia,

GLOBE Schools (what types, how many):
35 GLOBE schools - primary and secondary levels

GLOBE Areas you and schools focus on:
This year schools focused on Hydrology and Atmosphere

Number of Schools Reporting Data over Past Year:
About 20 schools in different seasons

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   GLOBE-Deutschland developed and organized a **project about tree observation and tree history** during the year with activities in all seasons.

GLOBE-Deutschland started a new **discussion about didactics of science and geography** in times of sustainability in cooperation with the university of Münster/Westphalia.

2. **Science**
   GLOBE-Deutschland started the closer **cooperation with the Science College in Jülich-Barmen** with the focus on scientific education.

   We intensified our cooperation with the department of Geography at the university of Münster

3. **Community**
   Online Meeting and Annual Meeting planned for the **10th anniversary of GLOBE-Deutschland** Feb.2021 (problems because of Covid)

   Discussions and plans for a Teacher Training in Ghana

   Plans for a new International Erasmus Project on Hydrology concerning Tributary Rivers

   Starting a Cooperation with the Science Center Jülich-Barmen to intensify the GLOBE Activities in Germany

4. **Technology**
   Start of a discussion to improve the didactical approach to the education for sustainability in Germany

5. **Communications**
   Participation in international online meetings (GLOBE, UNESCO, different German universities)

   Communication within a project of the year about trees between different schools and organisations in Paderborn

   Renewed **cooperation with the NABU**.

Plans and Ideas for Next Year:

The Science College Jülich will intensify the cooperation. Hopefully we will have trainings and meetings in the next year.
We want to restart the efforts to organize teacher trainings in Ghana.
We plan to develop a new project: CLIMP, that means “Climate meets Politics”. We want to build up a network of schools in areas of change from military to civilian use like the former Iron Curtain.

Greece

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Organization and Number of Staff:
National and Kapodistrian University of Athens, Department of Environmental Physics
4 staff members in the GLOBE team

Funding by:
National and Kapodistrian University of Athens

Cooperating Organizations/Individuals:
National Observatory of Athens, Foundation for Technological Research, Technical University of Crete Ministry of Environment, Ministry of Culture, meteo.gr, Corallia incubator, several University Professors and Researchers, etc.

GLOBE Schools (what types, how many):
Primary and Secondary: 34 schools

GLOBE Areas you and schools focus on:
Climate Change, Urban Environment

Number of Schools Reporting Data over Past Year:
Measurements are made by a limited number of schools; reporting problems. Measurements and reporting by GLOBE teams.

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   New technologies in education; integration of urban science to school education

2. **Science**
   Link to the **Pulchra project: Science in the City** (www.pulchra-schools.eu)

3. **Community**
   Schools' visits at the National and Kapodistrian University of Athens; seminars at GLOBE schools; webinars on environmental issues

4. **Technology**
   Use of Earth Observation for environmental monitoring; exploitation of the City Challenges Platform

5. **Communications**
   Schools' support – Newsletter through the PULCHRA project

Plans and Ideas for Next Year:

Concentrate to urban climate change; Introduce SDGs in the schools' activities by means of learning courses provided with self-certification; Cooperation with the network of eco=schools]

Ireland

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Organization and Number of Staff:
GLOBE is coordinated in Ireland by the Environmental Education Unit of An Taisce. An Taisce is an Environmental NGO. The organization has approximately 70 full-time staff. There are 2 full time staff and 1 part time staff member on GLOBE, GLOBE country coordinator, Aileen Bright, Deputy Country Coordinator, Maya Gryesten Fields, and Deputy Country Coordinator, Sabrina Moore

Funding by:
Ireland's Environmental Protection Agency (EPA) is currently funding GLOBE Ireland

Cooperating Organizations/Individuals:
The Environmental Protection Agency is the lead strategic partner for GLOBE in Ireland and is an active member and contributor to the program. The GLOBE program in Ireland **works closely with the EPA citizen science and air quality teams**. GLOBE also collaborates with local authorities in Dublin and around the country on projects

GLOBE Schools (what types, how many):
The GLOBE program in Ireland works with Primary (ages 4-12) and Secondary (ages 12-18) schools, although most participating GLOBE schools are Secondary schools. Five hundred Irish schools have registered with the GLOBE Ireland Air Quality Campaign since 2019, with approximately **200 schools actively participating in the 2021/22 campaigns**. As of, October 2022 there are 84 Fully Trained GLOBE members, and 900 GLOBE Observers in Ireland

GLOBE Areas you and schools focus on:
The Primary focus of GLOBE Ireland is the Air Quality Campaign, which is run in partnership with the EPA air quality and citizen science teams. The **Air Quality Campaign runs twice a year**, once in the spring and again in the autumn. GLOBE Ireland also promoted GLOBE Atmosphere and Biosphere protocols to schools and students participating in the Air Quality Campaign. GLOBE primary schools

in autumn 2022 have begun working on weather and climate related topics and secondary schools have begun working on GLOBE Hydrosphere protocols as part of workshops.

Number of Schools Reporting Data over Past Year:

In Ireland, most of the GLOBE schools participate in a non-GLOBE **nitrogen dioxide protocol**, data was reported at a national level by over 200 schools using this protocol. In the past year, 7 schools have reported data directly to GLOBE.

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**

   During the 2021-2022 year, the GLOBE program in Ireland supported over 200 teachers with measuring ambient nitrogen dioxide levels on their school grounds. Teachers were provided with educational resources related to air quality, to aid lesson planning and encourage inquiry-based learning. Schools were encouraged to introduce students to the scientific method through hands-on learning and meaningful data collection. Participants of the air quality campaign were also encouraged to access GLOBE e-training and take part in related Atmosphere protocols, such as Clouds, Precipitation, and Aerosols.

   GLOBE Ireland held its first **5-day Department of Education accredited, Continuous Professional Development (CPD) training** in August 2022. Teachers were introduced to GLOBE Atmosphere, Biosphere and Hydrosphere protocols over the week in conjunction with training on climate education and nature-based solutions.

2. **Science**

   The Irish EPA provided scientific guidance relating to the Air Quality Campaign. GLOBE schools benefitted hugely from the **active involvement of EPA** staff in many aspects of the program over the year. The Air Quality Campaign, in particular, has benefited immensely from the support and active participation of the EPA Citizen Science and Air Quality teams. GLOBE Ireland has also benefited from collaborations with a research botanist and geography professor from Trinity College Dublin on our teacher training in August, and our Climate Action Week workshops. We also engaged with a University College Dublin geographer on the **urban heat island effect** and an architect on related citizen science projects in Dublin

3. **Community**

   The GLOBE Ireland community grew this year due to our growing online presence and newly established collaborations with universities, Green Schools teams, local authorities, and local community officers. On May 10th, 2022, the GLOBE programme held a **virtual online event to celebrate the successful completion of the 2021/22 campaigns Air Quality campaigns**. We were delighted to be able to celebrate the achievements of the teachers and students that worked so hard during the year. Over 200 people attended the virtual event, including teachers and students that took part in the Air Quality campaign, along with GLOBE Director, Tony Murphy, the Irish Environmental Protection Agency (EPA) Programme Manager, Andy Fanning, EPA representatives from the Citizen Science team and scientists from University College Cork and Trinity College Dublin. We were also joined by GLOBE Europe Regional Office, Dana Votapkova and Lenka Kleger, and GLOBE Malta coordinator Ramona Mercieca.

   Students presented air quality stories from four secondary schools and one primary schools. **The students presented their air quality findings and spoke about the traffic-related pollution pressures that exist at their school.** All students demonstrated an impressive depth of knowledge and scientific reasoning skills. We were delighted that a GLOBE Malta, St Michael's school could present their quality story too. The event also included two keynote speakers, Aine O'Loughlen from Green Schools Travel, who spoke about promoting active travel to improve air quality at and

around schools and Natalie Gravett, a transport planner from ARUP, who spoke about city planning and air quality.

4. **Technology**

   We **promoted the GLOBE Observer App** to many teachers; they found the format and design very easy to follow. Teachers were also introduced to the GLOBE visualization tools through demonstrations online. GLOBE was delighted this year again to be able to use the **EPA visualisation website**, developed by the EPA Analytics team. This allowed campaign participants to view nitrogen dioxide results in map and/or graph format. NO_2 data could be viewed over multiple campaigns and schools could clearly compare their schools' results to other schools nearby and with similar aspects.

5. **Communications**

   The Irish GLOBE program regularly communicates with schools via newsletters, webinars and by email. We **expanded our communications this year on social media** and grew our audience across Twitter and Facebook and began a new Instagram page. Social media was used to recruit new schools, promote GLOBE campaigns, connect with Air Quality campaign participants and encourage collaboration between GLOBE Ireland and the greater GLOBE community. We also began a **monthly newsletter that goes out to over 600 teachers in Ireland.**

Plans and Ideas for Next Year:

- Work with the EPA to support objectives of the EPA Citizen Science strategy through the GLOBE Program
- Provide support, guidance, and in-person and online training to teachers to implement GLOBE in schools
- Engage students via in-person school-based GLOBE workshops and online via webinars
- Promote and coordinate a GLOBE Air Quality campaign (NO_2) in October 2022 and October 2023
- Further develop, promote, and coordinate *Pilot* GLOBE Tree/Phenology Campaign in Spring 2023
- Promote and coordinate a *Pilot* River Ecosystem Campaign in Spring 2023
- Develop partnership with Fingal CC on the 'weather stations for schools' initiative, incorporating GLOBE Atmosphere protocols and linking to Nature Based Solutions and Climate Action
- Establish collaborations with GLOBE countries on specific Irish measurement periods
- Identify opportunities to participate in international and regional GLOBE campaigns and projects
- Continue to work with the GLOBE Implementation Office to develop the NO_2 investigation as an official GLOBE protocol

Israel

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Organization and Number of Staff:
Ministry of Education, 5 members

Funding by:
Ministry of Education, Ministry of Environmental protection

Cooperating Organizations/Individuals:

GLOBE Schools (what types, how many):
360

GLOBE Areas you and schools focus on:
Atmosphere, phenology, biosphere

Number of Schools Reporting Data over Past Year:
290

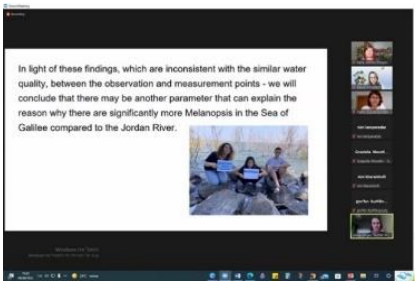
Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   Developing and supporting activities for teachers and trainers, inquiry-focused and based on Earth system science and Science Technology, Engineering and Mathematics (STEM) educational need, especially activities that GLOBE students.

   We held educational activities in three main areas related to climate change, and to the various campaigns in the GLOBE program:
   1) **"Urban Heat Island" campaign** - 54 schools participated in the campaign throughout the year. The learning took place in collaboration between two schools - Jewish and Arab. The students held cultural meetings, learned about the urban heat island phenomenon and mapped the various areas in the schools. Monitored at the same time and wrote research papers.
   2) **Trees around Israel campaign** - 50 schools learned about the importance of trees, and went out to map and monitor the trees around the school. They studied the relationship between the types of trees and the amount of carbon, and their effect on the ambient temperature. At the beginning of the campaign, the teachers met Brian Campbell from NASA for an opening lecture.
   3) **"I am for the sea"** - high school sea monitoring campaign. In collaboration with the Israeli Society for Ecology, and the National Geographic Explorer, Ziggy Livnat. 9 schools from around Israel learned about the importance of the oceans in dealing with the climate crisis, learned to prepare campaigns to raise awareness and studied the marine environment.

During the year we conducted and participated in many conferences:

1) **Students from 40 schools** presented 22 works written in collaboration, at the Ministry of Education's research initiatives conference.
2) GLOBE Europe and Eurasia Water Bodies Challenge conference where students presented 2 research papers.
3) **Europe and Eurasia research conference** where 7 research works from Israel were presented
4) **Academic conference for 80 directors** of scientific education centers in Israel on the subject of civil science, monitoring and clouds.



5) **Urban sustainability quiz** - in collaboration with the GLOBE program
In the city of Kfar Saba, an urban sustainability quiz is held every year with the participation of hundreds of students. The GLOBE program takes part in the quiz. This year students were asked about monitoring trees around the city.

6) **Environmental education conference** at Beit Barel Academic College
We participated in the leading conference in Israel for environmental education, in the capacity of the Minister of Environmental Protection - we presented the GLOBE program - a lecture on student participation in the civic science program, cooperation with civil society organizations "I am for the sea" and a cloud monitoring workshop.

7) **Biennale for Innovation in Education**
The contents of GLOBE were presented at the Education Biennale, in front of thousands of participants from Israel and the whole world.

2. Science

We are collaborating with the Israeli center for citizen science (TCSS- Taking Citizen Science to School, Technion, A science and technology research university.
Researchers from TCSS are involved with the GLOBE teachers training, sharing best practices in science and providing information to teacher and students.

We held a **series of lectures for teachers to deepen scientific knowledge** regarding the various campaign topics:
1) Chief Scientist of the Ministry of Environmental Protection, Prof. Noga Kornfeld Shore - Climate Change in Israel
2) The chief scientist of KKL, Dr. Doron Markel - the role of the trees
3) Researcher of trees and desert phenomenon, Weizmann Institute of Science, Dr. Tamir Klein
4) Director of the Israeli Meteorological Service, Nir Seteo - Urban heat island.

5) NASA, the cloud monitoring program, Peter Falcon and cloud monitoring

We published a study in a journal of the Tel Aviv University's Science Teacher Center, about citizen science and the GLOBE program.
https://www.matar.tau.ac.il/?page_id=23053

3. Community

During the year there were **2 long processes of training new teachers and professional development of GLOBE teachers**. The teachers learned and developed pedagogical tools for scientific inquiry, The teachers learned about atmosphere and biosphere.In total, 60 teachers participated in both processes (30 hours per workshop). The activity took place online, through Zoom, due to Covid-19. In addition to this, we held about 10 deepening and support sessions for the various campaigns.

During the year, **cultural familiarization meetings** were held on the topics of the various campaigns:

- 90 students from the school in Deir Hana, hosted students from Ein Nakoba, and Dimona. The students conducted a study tour, monitored various phenomena together and planted trees
- 90 students from Yuvli Hanegev School, Aksel and Elrazy met for a joint activity day.

Technology

We have trained teachers to use of the GLOBE app, have increased the use of platforms and technological tools to continue the research and monitoring of data.

Communications

We have a new GLOBE Israel page at the social network Facebook.
We have a **"Whats app" group of 100 GLOBE teachers** all over Israel. We share ideas, practices and knowledge. Once a week the GLOBE team give a short, but inspiring new ideas to the teacher's community. In addition, **the GLOBE team (4 regional coordinators), visit the GLOBE school, once a month**, and provide the teachers Pedagogical training.

The journal of the National Teachers' Center for Environmental Sciences and Climate Change, at the Technion, reviewed the contents of The GLOBE in an issue that dealt with citizen science at school.

Plans and Ideas for Next Year:

In the upcoming year, we will deepen the knowledge of the teachers in the scientific inquiry, Climate change

We plan to deepen and expand the collaborative learning between schools from different sectors of Israel, and between students from Israel and students around the world.

We will increase the data collecting and measurements that schools make by increasing the use of the GLOBE app.

Italy

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Organization and Number of Staff:
ASSOCIAZIONE GLOBE ITALIA: 2 Country Coordinators and 6 staff members

Funding by:
European, National, Regional and Private foundations calls for proposals, Municipalities and schools' own budget.

Cooperating Organizations/Individuals:
GLOBE ITALIA Association set up with the aim of supporting the GLOBE ITALY School Network with training courses, activities, events and materials. The implementation of GLOBE in the school network is shared by:

- LABTER-CREA located in Mantova, focused on functions as coordination, information and communication, web management, event promotion and management
- IISS BASSA FRIULANA located in Cervignano del Friuli, focused on testing the use of GLOBE protocols in primary and middle schools, promoting the use of GLOBE protocols in high schools' projects, event promotion and management

GLOBE Italia's relationship with ASVIS continued, through Labter-Crea Mantova. ASviS (Italian Alliance for Sustainable Development) aims to increase the knowledge and the importance of 2030

Agenda for Sustainable Development. Through ASviS the initiatives of GLOBE Italia school network can have greater visibility on a national basis.

GLOBE Schools:
Comprehensive Schools, including Primary and Junior High Schools – 32, Senior High Schools – 69.

GLOBE Areas You and Schools Focus on:
Hydrosphere, Atmosphere, Soil, Land Cover, Earth as a System, Phenology, Bundles. Number of

Schools Reporting Data over Past Year:
6 Junior High Schools + 9 Senior High Schools

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   Teacher Training Course **"#connect school science and society: the GLOBE Program"** a 24-hours course (two editions: online and face-to-face). Implementation of the GLOBE Program with these topics: Landcover and Trees, Phenology, Clouds, Soils, using GLOBE Protocols and Apps of GLOBE OBSERVER. The registration of the teachers to the Course took place on the SOFIA Platform (managed by the Italian Ministry of Education) and this gave it a national dimension, with 80 teachers enrolled in 11 Italian regions.

   Teacher Training Course focused on MICROPLASTICS (2nd edition) 93 teachers from 15 Italian regions, registered on SOFIA platform. The course included two Teacher Training webinars, two Student Training Webinars, the Microplastics Monitoring Campaign (March-May 2022), all managed by Deakin University Australia, in strong collaboration with GLOBE Italia and LabTer-CREA.

   Four proposals from GLOBE Italy and Labter-CREA were **included by Italian Ministry of Education among the official training proposals** for Italian schools for 2021/2022 school year.
   - n. 3 National Student webinars focused on the GLOBE Observer Apps - 126 classes participants
   - n. 2 National Student webinars "Microplastics Hunters"
   - the community event "Rivers in Spring, the Virtual World Water Day in Mantova", 22 March 2022 mainly based on GLOBE activities.
   - the community event "Earth Day in Friuli Venezia Giulia- WitS", 22 April, 2022, based on GLOBE activities

   The publication of the 4 proposals gave relevance to our initiatives, helping to increase the users of the GLOBE Program.

   "GAIA: Geodata Analysis and Acquisition" Science Hackathon, October 2022. The use of GLOBE data for Innovative Teaching Methodology – Participants: Students from Secondary schools - 3 days in full immersion. Challenge: WHAT ARE THE SCENARIOS WE EXPECT TO SEE IN THE NEXT 20 YEARS? Use of various scientific open data-base, public, to visualize trends and propose solutions in relationship with local authorities.

2. **Science**
   INTERNATIONAL MICROPLASTICS MONITORING MARCH-MAY 2022 CAMPAIGN
   39 Teachers from 35 schools took part in the Campaign, of which 6 from Croatia, 1 from Ireland, 1 from Slovakia, 27 from Italy. Schools produced a high number of Data Sheet concerning the situation of their water bodies, as well as, precious Image Galleries, posters, video, summary reports, etc. All these materials were uploaded to the Deakin University cloudstore.

MINCIO Project 32th edition, 21 April 2022. Participants: 3 schools in Mantova area. The data produced by schools with GLOBE Protocols have been supplemented by those provided by a highly specialized Environmental Chemical Analysis Laboratory, concerning two chemical parameters crucial for life in water such as Total Phosphates and Nitrates, and in particular Glyphosate and AMPA, its metabolite, both suspected carcinogens.

"MICROPLASTICS MONITORING OF THE WATER OF RIVER MINCIO, SOME ITS TRIBUTARIES AND THE RIVER PO"
First systematic scientific research on the presence of microplastics in the Mincio river, in two of its tributaries and in the Po River. The monitoring has produced the first x-ray of the state of the water in relation to these dangerous pollutants, which will serve as a basic knowledge for following the evolution of the state of the water over time. 5 schools, 22 classes, 22 teachers and technical assistants and 295 students participated in the project. 28 study sites were monitored and 107 Data Sheets were produced, validated by the Australian researchers, creators of the protocol. The research results were presented in a public conference at Bibiena Theater in Mantova 24 May, 2022 in the presence of representatives of the local administrations. More than 300 people took part in the conference, which had an excellent participation of partners and press coverage (community). Sponsored by the Mantova section of Italia Nostra.

"RIVER ARNO" Project
The GLOBE School IS Ferraris-Brunelleschi of Empoli (FI) carried out the project investigating the quality of River Arno waters concerning the chemical and bacterial parameters, as well as the microplastics in four sampling sites. Students discussed the chemical/bacterial results together with technicians of the local Environmental Protection Agency and with the Australian scientists to discuss the results of the microplastics monitoring. 80 students and 3 teachers took part in the research. The research results were presented in a public conference at Palazzo delle Esposizioni in Empoli, 29 Aprile 2022 in the presence of representatives of the local administrations and of the Tuscan EPA. More than 300 people took part in the conference, which had an excellent press coverage (community).

RIO SCHOOL Project
RIO School Project was conducted by Higher School IS Strozzi in a reduced form compared to previous edition. Students monitored the traditional chemical parameters foreseen by the GLOBE and GREEN projects with the addition of the monitoring of microplastics.
Collaboration in Project "OCEAN MATTERS: Saveguarding our Oceans"
In the project, managed by TERI, the Indian Institute for Energy and Resources, DEAKIN University and GLOBE Italia play the role of trainers concerning the Microplastics Monitoring Protocol. The organizers planned the webinars n.1 and 2 for teachers of 3 cities of the West Coast of India: Mumbay, Goa and Mangalore. The collaboration with TERI is very rewarding.

3. **Community**

"Rivers in Spring, the Virtual International World Water Day in Mantova", 22 March 2022.
The 22nd edition of the event was held in a virtual version, so in addition to local schools it had an international character due to the participation of 15 schools from 6 European countries, a school from Taiwan, Tony Murphy (who sent a video), as well as a scientist and Peter Falcon from JPL of NASA and Bara Semerakova representing GLOBE E-E RCO. The event was structured in 5 thematic sections (underground hydrology, microplastics 1 and 2, climate change, WitS – FVG section). The press coverage of the event was excellent.

WitS #Where is the Science? a project supported by Friuli Venezia Giulia region (grant for scientific dissemination activities), promotes the sharing of knowledge and good practice between different components of civil society and aims to be an agent for a new model of development in order to face the constant challenges imposed by environmental emergencies, with the objective

to transfer knowledge and develop skills regarding STEM, environmental education and sustainability.

Many events were managed during the one-year project, starting with the Earth Day in FVg field exhibits (850 participants) followed by other events like Conferences and Shows.

GLOBE Italy took part in all the monthly GLOBE E-E meetings.

Together with LabTer-CREA and DEAKIN University GLOBE Italy presented the video "GLOBE-L scale microplastics monitoring campaign, challanges & results" at the **Virtual Annual GLOBE Meeting** during the Community Session (26 July, 2022).

4. **Technology**
   There are still critical issues for entering data on the site but there we have good reasons to hope in improvement of the entering of data by schools thanks to the use of Apps, after training for students on GLOBE observer.

5. **Communications**
   GLOBE Italia is using its website, Youtube, Facebook, Telegram, Twitter to disseminate the action of the network and to connect schools and citizens.

   A fortnightly newsletter is sent to schools-teachers and people registered in GLOBE Italy and when necessary, even more times in a week. **Many newspaper articles and local TV have covered this year actions.** The links to press review and social media can be found on www.GLOBEitalia.it.

Plans and Ideas for Next Year:

Microplastics Campaign 2023 - GLOBE schools in Italy will be invited to use the microplastic protocol mentioned before, along with the traditional GLOBE Hydrology measurements.

Microplastics Monitoring Protocol submission to GLOBE Science Group, NASA and NOAA for consideration.

The **"Generation School walking with GLOBE":** a one-year national project by the GLOBE ITALIA Association ranked into the 8 selected on national basis for the "Ecology transition and environmental sustainability" area by Italian Ministry of Education. The project includes teacher training activities on the issues, protocols and Apps of the GLOBE Program and on the Microplastics Monitoring Protocol for the development of monitoring actions on local ecosystems, combined with events and cultural actions to raise awareness of the community on environmental issues, among which the climate change will have a special place. 30 schools, which will be chosen by the Ministry of Education, from the following six regions will be involved: Friuli Venezia Giulia, Lombardy, Tuscany, Campania, Sicily, Sardinia.

SLE-GO Science Learning Expedition Gorizia-Nova Gorica, 20-21-22 April 2023 (Grant for scientific dissemination activities by Friuli Venezia Giulia Region). The Science Learning Expedition offers a group of students, researchers, and citizens, cross-border I-SLO, an expedition model: an immersive exploration experience using Science glasses. The activity is proposed in the natural area surrounding Gorizia-Nova Gorica, and in an urban environment in Italian and Slovenian territory. The project's mission is to inspire people to know and take care of their environment and to facilitate contaminations, useful for learning and suggesting new partnership possibilities. Exploration activities will use Protocols also available digitally as Apps, developed by GLOBE.

Output from PULCHRA Project (Horizon 2020): six Italian schools were directly involved in the project in 2020-2022 and used GLOBE protocols. On the focus "Green Space as a Laboratory for Scientific Green Experiences for the Community" the students are developing a data collection system with field sensors and online transmission.

“Read the horizon, write the future”: Local school network – ISIS Bassa Friulana in cooperation with Associazione GLOBE Italia and the local University propose at the FVG Regional Educational Office a new project to develop STEM enhancing focus on climate change, innovative pedagogical approaches and use of technologies in teaching with GLOBE. October 2022-October 2023

We plan to realize, in presence if pandemic will allow it or virtually if not, **the following activities:**

- 33rd edition of Mincio Project
- 23rd edition of WWD
- 5th edition of RIO School Project
- 3rd edition of Microplastics Monitoring of Mincio, some of its tributaries and the Po River
- 22st edition of At school on the river
- 12th edition of Earth Day

Republic of Latvia

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Organisation and Number of Staff:
Children's Environmental School is a non-governmental organisation (NGO) for the environment and education. For GLOBE, there are 1 country coordinator, 1 Deputy CC, 4 trainers, and 1 event organiser for large events. One of the trainers, Ieva Kalka, is also a GLOBE Technology Working Group member.

Funding by:
Coordination of the GLOBE program is funded by the Ministry of Education and Science based on a delegation agreement. Additional activities are supported by grant projects from different foundations and private donations. Respective municipalities support school participation.

Cooperating Organisations/Individuals:
Embassy of the United States of America, University of Latvia, Nature Conservation Agency, Institute for Environmental Solutions, municipalities.

GLOBE Schools (what types, how many):
In Latvia, there are 36 public schools with teachers who have received GLOBE training.

GLOBE Areas You and Schools Focus on:
From schools that are reporting or have reported in the past:

- Atmosphere: 20
- Earth as a System: 12
- Hydrology: 10
- Land Cover: 6
- Soil: 6

Most schools focus on more than one area; some have tried all areas; some focus on just one – atmosphere – or two – usually atmosphere and hydrology – areas. The atmosphere is the most popular area to start with for new schools as it is or is perceived as the most uncomplicated.

Number of Schools Reporting Data over the Past Year:
1: Mazzalve Elementary School

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorised by GLOBE Strategic Plan 2018-2023 Goals):

Like in 2021, the Covid19 pandemic and related restrictions heavily limited school participation in GLOBE. The situation was changing rapidly, lockdowns and restrictions to in-person teaching were put in place several times, and persisting uncertainty barred schools from planning their work in any serious manner, even two weeks in advance. This has been considered in planning this year's activities, as described in the following paragraphs.
The Russian invasion of Ukraine on February 24th has significantly impacted GLOBE program implementation in Latvia, posing additional challenges for schools and CES.

1. **Education**
   We invited schools to participate in GLOBE campaigns and related webinars, including Tree Reporters Challenge.
   We **translated into Latvian** and published the description of the **GLOBE Urban Protocol Bundle** to encourage teachers and students to investigate urban environments. It was also sent to GLOBE schools, requesting feedback on links to curricula subjects based on their teaching experience.
   We are preparing an overview of GLOBE protocol links with Latvian national education curricula topics to encourage teachers to use GLOBE protocols for teaching curricula content.

2. **Science**
   We invited schools to participate in the GLOBE Tree Challenge webinar on December 1st, PULCHRA Open International Workshop on November 30th and PULCHRA Open Workshop in Latvia on December 9th.

   We invited students to participate in International Virtual Science Symposia 2022 and to attend GLOBE Student Virtual Conference 2022.

3. **Community**
   The country coordinator **participated in GLOBE Annual Meeting** in July, online, and we also invited and encouraged schools to participate. However, we have no information on how many schools responded to this invitation. Nevertheless, schools were informed about important issues discussed in the meeting.

   The country coordinator **participated in GLOBE Europe and Eurasia Regional Meeting in Omiš**, Croatia. With the support of private donations, also one teacher participated in the Meeting. The country coordinator also participated in Europe and Eurasia Region monthly meetings for country coordinators.

   After the Russian invasion of Ukraine on February 24th, we published information about GLOBE protocols translated into Ukrainian on our social media pages and accounts to advise teachers who may receive Ukrainian refugees in their classrooms.

4. **Technology**

5. **Communications**
   We sent **monthly newsletters** to GLOBE teachers, informing them about relevant and actual GLOBE news and events.

   We published information about GLOBE activities on our website and social media pages and accounts.

   We **promoted GLOBE program** activities and experience **at the largest national conference for science teachers in Latvia**, organised by the University of Latvia, and at the Workshop for Environmental Educators in the Daugavpils University Study and Research Centre Ilgas.

Plans and Ideas for Next Year:

There is much uncertainty about 2023 due to the Covid19 pandemic and the Russia-Ukraine war. Nonetheless:

Education
We will try to adapt and implement new ideas learned in the GLOBE Europe and Eurasia Regional Meeting, for example, Teacher Collaboration Day from Estonia.
We will encourage schools to use GLOBE to teach their regular curriculum.
We will continue to invite and **encourage schools to participate in GLOBE campaigns** and try to adapt some in Latvian for schools that cannot participate in international events due to language issues.

Science
We will continue to translate GLOBE materials into Latvian.
We will offer schools one-day events like visits to science centres and other professional organisations related to GLOBE topics, joint clean-ups etc.

Community
On October 2023, we **will host GLOBE Europe and Eurasia Regional Meeting in Riga, Latvia**. The exact date is to be confirmed in consultations with GLOBE Europe and Eurasia Regional Coordination Office.
We will try to restart the annual GLOBE Latvian School Meeting.

Technology
When **Latvian translation is added to the GLOBE Observer App**, we will promote the use of the App for data collection and educational activities.

Communications
We will continue communication with schools through monthly newsletters.
We will continue to publish information about GLOBE activities on our website and social media pages.
We will continue to promote the GLOBE program in public events like science teacher conferences, according to Covid-19 pandemic-related conditions.

Lithuania

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Organization and Number of Staff:
Lithuanian Centre of Non-formal Youth Education. There are 227 employees in total, 6 of them are working in the department of Nature and Ecology education, 1 of them is working with GLOBE.

Funding by:
Ministry of Education and Science

Cooperating Organizations/Individuals:
Embassy of U.S in Vilnius.; Knowledge Economy Forum; Nature Research Centre; Lithuanian Citizen Science Community; Green Policy Institute; Vilnius University Geology Museum.

GLOBE Schools (what types, how many):
34 schools, of them 10 gymnasium, 5 progymnasium and 7 other types of schools were active recently.

GLOBE Areas you and schools focus on:
Earth as a System: (especially Green Up/Green Down), Atmosphere, Hydrology, Land Cover, Soil

Number of Schools Reporting Data over Past Year:
16

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   A lot of refugees from Ukraine come to Lithuania this year including school students. Estonia had some GLOBE material translated to Ukrainian and kindly shared it with us. This was a very beautiful collaboration and we are very thankful for it!

2. **Science**
   As in every year we had **scientific students conference**. It was remote because of quarantine restrictions, but a lot of students represented their researches. We also invited members form Lithuanian Hydrometeorological Service, Nature Research Centre and Lithuanian Citizen Science Community to participate in it.

3. **Community**
   Ukrainian refugees joined our community in Lithuania. Two teachers with their students and a representative from U.S. Embassy participated in **GLOBE learning expedition in Estonia** where met participants from other countries. During 4 of July in Embassy, country coordinator made a new connection with Green Policy Institute and Vilnius University. A travelling GLOBE teacher from the Netherlands visited our organization.
4. **Technology**

Since half of this year was in quarantine, some activities were remote. Our conference was remote with vlog-like excursion in museums and laboratories and we successfully continued virtual photo competition for Earth day.

5. **Communications**

   As always, we are communicating mostly through email. Teachers are getting newsletters, also news are announced through social media on the page of our organisation.

Plans and Ideas for Next Year:

The next year we are planning to have joined camp together with Estonians for all Baltic countries. Also, as every year - virtual photo competition, and students conference.

Malta

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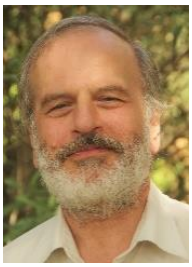

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Organization and Number of Staff:
None of the two persons running GLOBE Malta are in full-time employment with GLOBE. The CC is a full-time professor at university and GLOBE related work is done above his workload. The Deputy CC is a class teacher who has been officially granted 3 weekdays to specifically promote GLOBE in schools and support teachers.

Funding by:
GLOBE Malta does not receive any specific funds. GLOBE is supported by the Directorate for Learning and Assessment Programmes (Ministry for Education and Employment) and the Centre for Environmental Education & Research (University of Malta). The US Embassy, HSBC Bank (Malta) and Europe Direct Gozo also support GLOBE Malta by purchasing scientific equipment and sponsoring events.

Cooperating Organizations/Individuals:
A researcher from the Institute of Earth Systems (University of Malta) is directly supporting 10 schools in a project about weather observations. The NGO Nature Trust – FEE Malta promotes GLOBE investigations during activities related to the Eco-Schools and LEAF programs

GLOBE Schools (what types, how many):
Total number of schools: 55. The schools are from the State, Church and Independent Sectors and are distributed thus: Primary schools (5 -11yrs): 30; Middle Schools (11-13yrs): 3; Secondary Schools (13-16yrs): 15; Post-Secondary Schools (16 – 18yrs): 3; University: 1; and Field Study Centres: 3.

GLOBE Areas you and schools focus on:
Atmosphere (Air Temperatures, Barometric Pressures, Cloud Observations, Precipitations, Relative Humidity, Surface Temperatures);
Earth as a System (Green Up/Green Down);
Hydrology (Mosquito Habitat Mapper, Water Temperature, Water pH);
Land Cover (Biometry Trees, Vegetation Covers, MUC, Photos);
Soil (Soil Temperatures, SMAP Soil Moisture)

Number of Schools Reporting Data over Past Year:
25

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   - Introduction of undergraduate students following the BSc Science for Education & Communication to GLOBE
   - In-school training sessions for students and teachers of new GLOBE schools
   - Various lessons to show how GLOBE can be integrated into the normal classroom schedules.
   - A series of fieldwork sessions and accompanying tutorials about how to use the trees tool on the GLOBE Observer App to gather data about trees with students from 8 schools.
   - Developed, in **collaboration with the Girl Guides movement**, a badge curriculum with GLOBE program for Brownies and Guides. Using the GLOBE protocols, the brownies and guides sections will have a GLOBE badge based on different modules. These modules fit mostly into the non-formal program of the Girl Guides curriculum.
   - An online professional development session organised by a GLOBE School to share good practices.
   - A GLOBE teacher and a GLOBE student gave a presentation at the webinar 'All About the European Phenology 2022 Spring Tree Campaign with Student Research Presentations from Across the GLOBE Europe and Eurasia Region'. The webinar was organised as a part of Trees Around the GLOBE Student Research Campaign.
   - GLOBE Students and Teachers shared their investigations with the GLOBE community during then 2021 Virtual Meeting of the Europe and Eurasia GLOBE Region.
   - Organisation of **monthly meetings with Peter Falcon (Jet Propulsion Laboratory, NASA)** to explore the best ways to promote international collaboration.
   - Participation in the **Project Maleth - Save the planet** during which students sent messages about the need to take care of our planet on board a bio-cube that reached the international space station. For more details visit: https://www.facebook.com/Spaceomix/videos/255105919837601

2. **Science**

GLOBE Phenology Autumn Campaign 2021: The campaign was active between September and December 2001. Students from 4 schools continued observing and gathering data from the same tree they had observed during the Spring Campaign. They successfully completed the Autumn Campaign and received a certificate.

GLOBE Tree Reporters Challenge: As part of the European Autumn Phenology Campaign, from October 22 to November 19, 2021 students from 8 GLOBE countries took the role of GLOBE Program Tree Reporters and 'interviewed' trees in their neighborhood. A total of 13 entries from GLOBE Malta were submitted to the Europe and Eurasia GLOBE Regional Office. The best videos and posters were presented to the international community during the webinar Our Autumn with Trees. More information about the Challenge is available here: https://www.GLOBE.gov/web/malta/home/news/-/newsdetail/14028/do-you-know-that-trees-can-tell-stories-tree-reporters-challenge.

European Spring Phenology Campaign 2022: The campaign was active between February and June 2022. Students had to choose and observe a tree from buds to leaves and upload their measurements into the GLOBE database. Following the success of the previous year there was an increase in schools participating in this campaign. Eleven schools from Malta and Gozo observed trees as they woke up after their winter sleep. Besides observing and measuring leaf growth of the Mulberry Tree growing in their school garden, GLOBE students from a school extended the activity by squeezing mulberries and making refreshing popsicles.

Volunteer Weather Observer Programme: this is a continuation of the UM Citizen-Science Project in local schools. Dr Charles Galdies from the Institute of Earth Systems, University of Malta is the

mentor and coordinator of this pilot project. A total of ten educators from primary and secondary State, Independent and Church schools were selected and are monitoring and recording rainfall data.

Urban Heat Island Effect Campaign: Running in October, December and March, the campaign was focused on looking at the impact of urbanisation on the Earth's surface temperature and how the surface temperature changes the dynamics of the Earth's atmosphere. Students from eleven schools collected surface temperature readings using an Infrared Thermometer sponsored by HSBC Malta. During March, Post-Secondary Students started gathering data on the urban heat island effect. They also teamed up and involved a group of Polish students, who visited their school on an Erasmus+ project, in data collection. As a follow-up, the Polish students decided to engage in GLOBE in their home country.

Air Temperature Data Challenge: On 25th March 2022, GLOBE Malta students joined other students around the world and collected Air Temperature (AT) data. The challenge consisted of a one-day AT collection followed by a series of activities focused on visualizing and connecting worldwide air temperature data.

International collaboration with Ireland: GLOBE Malta, in collaboration with GLOBE Ireland, supported the Air Quality campaign for the first time. The GLOBE Air Quality Campaign is a citizen science project to assess traffic-related air pollution at schools. The campaign provided a collaborative platform for schools to share their research and insights. This educational project was designed to: (i) raise awareness about air pollution through a practical investigation; (ii) collect accurate data that was used in students' research projects; (iii) share knowledge with the participating school community; and (iv) showcase the potential of citizen science to gather unique datasets and insights into our environment.

In October 2021, students from 2 Maltese GLOBE Schools, in collaboration with 2 school from Ireland measured nitrogen dioxide (NO2) - a principal pollutant from car exhaust emissions - at three locations around their schools. Schools were provided with the necessary equipment and guidance to carry out nitrogen dioxide measurements.

International collaboration with Israel – 3rd edition: 'For the Sea' is a GLOBE project focusing on marine litter which brought together 4 GLOBE schools from Malta and Israel. The collaboration between Gozo (Malta) and Israel brought together students, teachers and representatives from U.S. Embassy and the GLOBE Program. It provided a unique learning experience where students and teachers, besides contributing to scientific research, were exposed to different cultures, languages, and traditions.

A Maltese primary school and another one from Israel worked on a scientific collaboration about marine life. The Maltese school carried out a beach fieldwork during which they observed and measured weather parameters and sea water conditions. The session ended with a clean-up and the students had the opportunity to analyse litter using a digital microscope.

GLOBE students from a Maltese secondary school collaborated with a school in Israel carried out an outdoor class activity at the beach during which they used the GLOBE Atmosphere and Hydrosphere protocols. The Eco-Schools Committee and Form 3 biology students had an outdoor STEAM session at the bay. They also carried out a litter survey, did a clean-up and created beach artwork. The Deputy CC assisted the students and gave a detailed insight on the geography of the bay and how the data collected is used by NASA scientists.

GLOBE students also had a **training session with the Deputy CC on how to use the Clouds tools on the GLOBE Observer App**. The students downloaded the App on their devices and joined the GLOBE team created by their teacher through the GLOBE website. They also had a follow up activity of their fieldwork at the bay during which they analysed microplastics using a handheld digital microscope provided by Digital Education, Malta.

International GLOBE collaboration through eTwinning: GLOBE students from a GLOBE School participated in an eTwinning project focusing on the importance of trees. Using the tree tool in the GLOBE Observer app they collected tree height measurements and invited their collaborating partners from Turkey, Greece, and Italy to do the same. The Deputy CC provided the necessary training to the eTwinning teachers. During this outdoor STEM activity students gathered a total of 70 biometry tree measurements collected from across Malta, Greece and Turkey. (See: https://youtu.be/m5ZbgrkQDSU). The Deputy CC created a GLOBE team on the GLOBE website and all observations were automatically marked on a map. This collaboration and activity were commended by The GLOBE Program and a tweet was uploaded on Twitter which then retweeted by the US Embassy.

GLOBE Tree Challenge in collaboration with Esplora Interactive Science Centre and the US Embassy: The challenge was open to students and teachers of all levels, informal educators and the general public. It aimed at encouraging participants to collect data and learn about trees.

GLOBE Cooling Down Students' Investigation: 19 Maltese schools took part in the GLOBE Cooling Down Students' Investigation which explored the Urban Heat Island Effect (UHIE) in Malta. The schools suggested immediate action to counter the lack of trees and high urbanisation that give rise to this phenomenon.

In November 2021, GLOBE Malta and the Education for Sustainable Development (ESD) Program at Xrobb l-Għaġin launched an ambitious scientific investigation which gave the students the opportunity to enjoy meaningful time outdoors and be involved in data collection. In this STEM project, students had to use an infrared thermometer to collect nine temperature readings from homogeneous surfaces for 5 days monthly throughout the scholastic year.

Besides generating new scientific data about the Urban Heat Islands Effect, this citizen science investigation provided students with the opportunity to think critically about their surroundings and develop a sense of belonging to an international science community that contributes valuable environmental scientific data. The activity also introduced schools to the GLOBE Program. Indeed, some of the teachers involved registered their schools with the GLOBE Program, successfully completed the online training and are now new, promising GLOBE teachers.

GLOBE International Virtual Science Symposium 2022: This year, GLOBE Malta had six research reports submitted for the IVSS, two of which were done through national and international collaboration:

(i) Are there any differences between surface temperature readings across the Maltese Islands?
(ii) An investigative study on air quality at St Michael School
(iii) A Journey to the Underworld ();
(iv) Measuring the Air Quality (the amount of Nitrogen Dioxide) in three different areas around our school
(v) Save our Seas by reducing your use of Plastics
(vi) An international comparative study of nitrogen dioxide levels recorded at schools in Malta and Ireland

GLOBE Water Bodies Challenge by Europe and Eurasia Implementation Office: 9 Maltese schools participated in the 2nd edition of the GLOBE Water Bodies Challenge. Through this challenge 2 schools, were introduced to the GLOBE Program and are now new GLOBE Malta schools. The students had fieldtrips to different water bodies in the Maltese Islands and shared their findings with the GLOBE Europe and Eurasia community on the Water Bodies Challenge Padlet GLOBE Water Bodies Challenge (padlet.com). All schools have been awarded a certificate and a virtual badge. The best entries, 3 from Malta, were presented on 8th June during the Water Bodies Show.

3. **Community**

   GLOBE student Benjamin Copperstone from St Michael School was selected as one of the new **GLOBE Student Vloggers** for 2022-2023. Seethe video here.: https://www.youtube.com/watch?v=EPpsHTDoYhw&list=PLfpnkASII_Nb5QSSHnVOJIugNnp2weyNF&index=60

   Hannah Vella was selected as one of the **GLOBE Student Vlogger Alumni Mentors** for 2022/23. She will create vlogs and also train and mentor the new cohort of vloggers.

4. **Technology**

   The Deputy CC GLOBE Malta provides personalized support for teachers during their e-Training, while adding sites, inputting and visualizing data on GLOBE website.

5. **Communications**

   Communication with GLOBE schools and teachers was maintained through e-mail and one-to-one school-based meetings by the Deputy CC

   Showcasing and promoting the work of the participating schools through regular updates of the GLOBE Malta Facebook page (with 1.2K followers to date) and the Malta Page on the GLOBE website.

   The GLOBE Program and the students' investigations were disseminated through newspaper articles and features on popular TV & Radio programmes on the national channel.

Plans and Ideas for Next Year:

Continue negotiations with the Ministry of Education to upgrade the current status of the Deputy CC to a full-time post

Continue exploring possibilities for more joint investigations involving schools from other GLOBE countries.

Organize a Science Fair in Gozo during which students present their research and findings following the Air Quality Campaign 2022-2023

Netherlands

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Organization and Number of Staff:
GLOBE Nederland, 4

Funding by:
Grants, school membership, government programs

Cooperating Organizations/Individuals:
RIVM, Wageningen University & Research, KNMI, Utrecht University, province of Utrecht, province of Noord-Holland

GLOBE Schools (what types, how many):
Secondary schools, ±90

GLOBE Areas you and schools focus on:
Air quality, (biological) water quality, GrowApp, research skills

Number of Schools Reporting Data over Past Year:
11 on GLOBE.gov, but we work mainly with our own system for: air quality, water invertebrates and GrowApp

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**

   We developed learning materials for our **new project "Sniffer Bike"** where students measure air quality with a sensor on their bike. In the province of Utrecht we finished one pilot with 4 schools, and have expanded the pilot to 12 schools in the school year 2022-2023. In the province of Noord-Holland we started a pilot with 6 schools and in the municipality of Rijswijk with 2 schools.

   Organization of a **national Science Fair** for students at the Wageningen University. Seven teams of upper forms students presented their GLOBE research for a jury of scientists. The winning team won a trip to Czech Republic for the GLOBE games.

   We are working on **education materials for the following new projects:**
   - microplastics project in the Netherlands, together with Hellen Parkhurst secondary school and the Plastic Soup Foundation. We received funding from the U.S. Embassy to develop lesson materials for the microplastics protocol developed by GLOBE Italy.
   - NO_2 measuring with Palmes tubes

2. **Science**

   We work together with scientists for the following projects:
   - GrowApp: Arnold van Vliet, Wageningen University
   - NO2: National Meteorological Institute (KNMI)
   - Particulate Matter: National Institute for Public Health and the Environment (RIVM)
   - Plastic Soup: University of Amsterdam
   - Water invertebrates: Wageningen University, who published a scientific article

3. **Community**

   Organisation of a **national Science Symposium for students at the Wageningen University**.
   Participation in the Regional Meeting in Croatia.
   Several online meetings with GLOBE school coordinators to help implement GLOBE at schools.

4. **Technology**

   Implementation of a **new platform www.knowyourair.net for the Snifferbike**, a mobile PM sensor.

5. **Communications**

   Launch of the **new website www.GLOBEnederland.nl**
   Participation in multiple teacher conferences, specifically for Chemistry, Biology and Geography teachers.

Plans and Ideas for Next Year:

Roll-out of the microplastics project in spring 2023
Roll-out of a NOx project using Palmes diffusion tubes together with the RIVM and KNMI
Roll out the Sniffer Bike to schools across the country

Republic of North Macedonia

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Organization and Number of Staff:
Ministry of Environment and Physical Planning, Staff - CC and DCC

Funding by:
Ministry of Environment and Physical Planning

Cooperating Organizations/Individuals:
Ministry of Education and Science, Faculty of Civil Engineering, Faculty of Forestry (University "St. Cyril and Methodius, Skopje), Peace Corps

GLOBE Schools (what types, how many):
Until now, we have included 33 schools, 13 secondary schools and 19 primary schools, 1 kindergarten, 97 GLOBE observers.

GLOBE Areas you and schools focus on:
Atmosphere, Phenology, Hydrosphere, Pedosphere and GLOBE at night.

Number of Schools Reporting Data over Past Year:
16 schools

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   In some schools, teachers use the GLOBE data and previous measurement results in other projects that are implemented together with **international schools under the cooperation with the ERASMUS+ program**, and this way the data gains more value and recognition.

   From the previous year where one day training was organized, this year we had a more in-depth explanatory of the protocols and the teachers that had their doubts all cleared up. It can be seen also from the positive numbers where we got an increase in the schools that are reporting from 11 to 16.

   The benefits that we are seeing is that schools started to participate in the annual campaigns with their own projects. They took active participation in the Water body challenge and the Phenology

campaign. Also, the teachers and students started using the GLOBE experience to participate in international conferences and competitions.

2. **Science**

New equipment, instruments and chemicals were obtained from the state budget by the Ministry of Environment and Physical planning necessary for effective implementation of activities and trainings for the professors and students.
The procurement also involved a **three-day training for teachers** involved or wanting to be involved within the program.

3. **Community**

We organized **a three-day theoretical and practical training** for all the protocols including GLOBE at night where we had around 60 participants from 20 schools.



GLOBE practical training for teachers

4. **Technology**

Students in their research often use mobile phones with various applications and tools to develop skills such as communication, archiving, photography, change tracking, computation and more. The Turn on the Night Kit from Laser Classroom is also used to implement one of the protocols.

5. **Communications**

The GLOBE Program in North Macedonia now has a social media page on Facebook where news, updates and accomplishments are posted for the wider public eye.
https://www.facebook.com/profile.php?id=100083451606568
We are also active through a **Viber group with all the GLOBE schools in North Macedonia**. They receive regular updates on activities and campaigns through the group and through regular e-mail communication.

Plans and Ideas for Next Year:

For the following 2023 we hope to continue the financial support and obtain new equipment preferably for new protocols (such as for surface temperature) to the schools and organize an advanced teacher training and/or organize GLOBE student games. We intend to become more proactive in expanding and delivering information and activities that can be useful to the schools. As a Ministry our intention is to start organizing webinars for the teachers that have some trouble entering data or if they need some other technical help navigating the web page and the applications.
We hope at least one school to participate in testing the microplastic monitoring protocol proposed by the team of Italy.

Furthermore, one school is in the process of conducting a project for measuring aerosols (a first) and the night sky visibility.

Portugal

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University of Coimbra

Funding by:
GLOBE Portugal is currently funded by the Earth Observation Laboratory of the University of Coimbra

Cooperating Organizations/Individuals:
GLOBE Schools (what types, how many):
GLOBE Areas you and schools focus on:
Number of Schools Reporting Data over Past Year:

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**

   The focus of the GLOBE Program in Portugal has been to **develop and initiate the implementation of a plan to reintroduce the program in the country**. To this end, activities were designed to evaluate successful approaches that may captivate educators, students, and the public. This is part of the development of the stepwise approach outlined in the strategic plan, submitted in the past year as well.

   During 2021/2022 several activities were implemented during a number of key initiatives. Such activities included **lectures and hands-on activities during the Summer University at U. Coimbra** as well as the launch of a project at the Avelar Brotero High School, Coimbra. This project will allow students to collect data while interacting with scientists and explore different approaches to understanding, monitoring, and communicating climate data. An artistic component will be explored as well, with the support of the teachers.

   With the collaboration of the CESUCA (The U. Coimbra office in Alcobaça) and local authorities, the program created a **new exhibit, named 'Stories of a Changing World'**, which was fully funded by the eoLab (Earth Observation Laboratory of the University of Coimbra). The exhibit features testimonies of scientists from Portugal, the United States of America, and the United Kingdom, who reflect on climate change, ecosystem degradation, and their own personal experiences. The testimonies are supported by background information on climate change and what technology, especially remote sensing, can do to mitigate it or support adaptation. This exhibit will remain open until December 2022, and will be shared with schools after that period. Activities with scientists accompany the exhibit, which has engaged hundreds of school children and members of the general public.

Figure 1. GLOBE lecture in Coimbra.

2. **Science**

   The program in Portugal conducted a review of existing materials available in Portuguese and prioritized the domains where scientists are needed to support the production of new content. It was also **established an advisory board, which includes scientists and science managers**, to provide guidance on priorities and ensure the quality of the offerings.

   The development of customized solutions, aligned with existing ones, but addressing specific gaps, was considered. Such development efforts were primarily directed at land cover and atmospheric science objectives. Considering that this is the first year of activity of the program, under the new management and strategic plan, activities in the science domain were essentially exploratory.

   A course to be taught at the University of Coimbra, focusing on the GLOBE experience to STEM education was also approved and is currently pending scheduling.

3. **Community**

   The program is currently focused on school-oriented activities. Even though we recognize the importance of communities, the first year of the new coordination under the Strategic Plan now in force, did not include an important community outreach component. Nonetheless, in 2022/2023, this will change, through the implementation of an integrated plan designed to engage schools and the community through thematic packages.

4. **Technology**

   The program did not focus on technology-related activities in the past year. However, the advanced visualization and data discovery solutions being considered, and described earlier, have strong technological components.

5. **Communications**

   The program centered communications around **B2B meetings for the development of a network of partners** who could support the introduction of activities at schools and other organizations. Additionally, the Exhibit 'Stories of a Changing World' is a major communications piece (including its virtual twin). It is visited by hundreds and will become an itinerant exhibit in January 2023, potentially reaching thousands across the country. The online component, a story map that replicates the content of the entire exhibit is available to a global audience (contents in English).


Figure 2 and 3: The exhibit Stories of a Changing World, currently in Alcobaça.

Plans and Ideas for Next Year:

In the next year, the program in Portugal will consolidate its footprint across the country. The team will focus on expanding the core members in the coordination (i.e. appointment of a deputy coordinator) and ensure diverse leadership. Furthermore, the program will steer activities towards the recruitment of new schools and educators in accordance with what is outlined in the Strategic Plan. Thematic areas, currently being reviewed by the coordination, will be selected, in order to align the GLOBE experience in Portugal with the educational and scientific priorities of the country and the need to reinforce trans-Atlantic relations. Specifically, the emphasis will be on the development of relevant materials in close collaboration with scientists, complete and scale activities already underway in several schools, training trainers, and reinforce ties with other GLOBE countries. Activities leading to increased diversity, equity, and inclusiveness will take center stage. The Strategic Plan will continue to be the essential document for the design and implementation of new activities.

Slovak Republic

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16 internal employees from which 1 part-time employee is dedicated to GLOBE and other 3 people are involved in GLOBE above their regular work agenda

Funding by:
Embassy of the United States of America
Small grants from local private foundations
Interreg Slovakia-Austria
Norway Grants Fund for Regional Cooperation

Cooperating Organizations/Individuals:
Slovak Hydrometeorological Institute,
Matej Bell University Banská Bystrica,
Comenius University Bratislava
Embassy of the United States of America

GLOBE Schools (what types, how many):
51 Primary schools and 9 Secondary schools

GLOBE Areas you and schools focus on:
Atmosphere, Biosphere, Hydrosphere

Number of Schools Reporting Data over Past Year:
18

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**
   Educational materials, presentations, and ideas for activities for all schools involved in GLOBE were provided by our website www.GLOBEslovakia.sk. **GLOBE Elementary book and activities for Aerosols were translated into Slovak language** and are available to teachers in pdf version. Two-day online introductory GLOBE training for teachers was organized in September 2022, involving 23 new schools in the GLOBE program. Regular monthly webinars were organised to discuss scientific topics and school measurements, as well as to keep the communication with teachers lively.

2. **Science**
   Our GLOBE schools participated in the Phenology Campaigns and successfully joined the Tree Reporters Challenge. Microplastics´ protocols were tested at one primary and one secondary school, and webinar to microplastics was provided to introduce the topic to teachers and students.

   Two-day capacity building seminars for teachers were organized in quartiers of US Embassy libraries, dedicated to **IBSE and outdoor learning**. These seminars were held in three cities of Slovakia, so as to allow teachers from different regions to participate.

   Aerosols´ topic was introduced to teachers at these seminars through lectures and practical experiments by scientists from Slovak Hydrometeorological Institute.

3. **Community**
   Face-to-face seminars with teachers allow us to meet our members finally after the two years of Covid online meetings. This helped us to enhance the cordial relationship within our GLOBE community in Slovakia which we consider as an essential part of implementation of the program at schools.

   3 schools attended the GLOBE Games in Czech Republic in May 2022. 4th grade pupils together with secondary school students successfully presented their observations and joined the practical workshops. Students and teachers, as well as our CC´s team greatly enjoyed the whole event.

   We celebrated the second year of GLOBE Program in Slovakia at **online conference in June 2022** https://www.GLOBE.gov/web/europe-and-eurasia/home/news Students presented their activities, discussed their observations with scientists from our Scientific Board and had a chance to see the variability of GLOBE measurements and activities at other GLOBE schools in our country.

4. **Technology**
   The GLOBE Observer App and GrowApp have become popular among teachers and students. Consultations with schools were held to overcome the English language barrier and technical issues when entering the data into the GLOBE database. **GLOBE tools for hydrology and meteorology were introduced to teachers** and provided for all new member schools. **Calitoo photometers** were purchased and are available to schools for rent at American Centre Libraries of US Embassy.

5. **Communications**

We regularly attend CC meetings of Europe and Eurasia Region to learn about the ongoing events and to communicate our activities. Our team joined the Europe and Eurasia GLOBE meeting in October 2022 to present GLOBE activities in our country and to enhance relationships with the international community. It was our first in-person international meeting, and we enjoyed seeing all the faces from online webinars finally alive and smiling 😊

Plans and Ideas for Next Year:

- Look for new funds to cover the running of the GLOBE program in Slovakia.
- Focus on Carbon Cycle theme, in connection with peatlands
- Organize capacity building seminars for teachers in Spring 2023 in quartiers of US Embassy libraries, dedicated to IBSE and outdoor learning.
- Motivate and provide additional support to schools to raise number of data entry
- Encourage teachers to participate on international meetings, e.g. through Erasmus cooperation
- Participate on GLOBE Learning Expedition in Estonia

Slovenia

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Organization and Number of Staff:

Country coordinator and deputy country coordinator, supported by their organizations (Centre for School and Outdoor Education and the Ecoschool Program) and **a team of four GLOBE teachers** that have taken on additional organizational tasks (translation and quality of materials, purchasing and logistics of equipment, communication and promotion).

Funding by:

Ministry of Education, Science and Sport of Slovenia provides core funding, additional funding is provided by **various projects**. In 2022 there was one such project, financed by the US Embassy in Ljubljana, we are also applying for Erasmus+ projects that include GLOBE activities and exploring options of funding some GLOBE activities within the framework of national projects connected to Environment and Climate Change education.

Cooperating Organizations/Individuals:

The **Ministry of Education, Science and Sport of Slovenia** has charged the **Centre for School and Outdoor Education (CŠOD)** with coordinating the GLOBE program in Slovenia. CŠOD in turn formed a partnership with the **Ecoschool Program in Slovenia** to ensure a quicker implementation of the GLOBE Program in Slovenian schools. The Ministry has also formed an advisory group to oversee the GLOBE Program implementation in Slovenia. An active cooperation with the **US Embassy in Ljubljana** in established.

GLOBE Schools (what types, how many):

Slovenia is finishing its second year of GLOBE, and we have already registered **41 GLOBE schools** (from 14 in 2021), of which **25 are primary schools** (from 8 in 2021), meaning students aged 6 to 14, **15 are secondary schools** (from 5 in 2021), meaning students aged 15 to 19, and one is the Centre for School and Outdoor Education with its 25 outdoor learning centers throughout Slovenia.

GLOBE Areas you and schools focus on:

All GLOBE Areas, with a starting focus on **Hydrology and Atmosphere**, as well as the more basic protocols in **other Areas**, such as soil temperature, biometry, land cover, green-up and green-down. Additionally, we are focusing on GLOBE international campaigns and have also taken part in several international GLOBE events this year.

Number of Schools Reporting Data over Past Year:

21 schools have reported data in 2022, along with several citizen scientists.

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**

   37 GLOBE teachers (new and existing) attended the **May 2022 live training** in Slovenia with trainers from GLOBE Croatia (live), the GLOBE Europe and Eurasia regional office (online) and NASA (online). There will be a **similar training held on 18th and 19th November**, with 45 teachers (new and existing) applying to attend. Several teachers also finished the **e-training program** on the GLOBE website.

   The first GLOBE Trainer in Slovenia, Danica Korpar, succesfully finished the certification process in June 2022. By mid-November 2022, Slovenia has a total of **83 trained GLOBE teachers** and **one certified GLOBE trainer**.

   The first **16 protocols with accompanying materials** were translated into Slovenian in 2021 and have undergone language and expert review in 2022 (Atmosphere – 5, Hydrosphere – 7, Pedosphere – 1, Biosphere – 3) and are available for Slovenian GLOBE teachers to use with their students.

2. **Science**

   GLOBE Slovenia has not yet established a connection with scientists in Slovenia, but **NASA scientists** have participated in several of our events, and we are in contact with **scientists from Australia** that are working on the proposed Microplastics protocol.

   We are expecting **a visit from NASA scientist, Brian Campbell**, from 23rd to 27th November. Brian will present several times on different topics connected to GLOBE to Slovenian students (a lecture at the Center of Space Technologies Herman Potočnik Noordung) and Slovenian teachers (lecture and workshops at the international conference Forest and Climate Change in Bohinj, Slovenia).

3. **Community**

   The **GLOBE community in Slovenia is getting stronger**, with some GLOBE teachers continuing their work with students and some starting it for the first time in the school year 2022/2023. We have several citizen scientists interested in the program and using the GLOBE Observer mobile app.

   In addition to the Country Coordinator and Deputy Country Coordinator, a **growing number of teachers is becoming active in the global, regional and cross-border GLOBE activities**, connecting GLOBE Slovenia to the wider GLOBE community:

   - Slovenian teachers have been active in several **international GLOBE campaigns**, including the Spring and Autumn European Phenology Campaigns, the Water Bodies Challenge and the NASA Cloud Challenge.
   - A group of teachers and students, including the Deputy Country Coordinator, have participated in the **GLOBE Learning Expedition in Estonia**.
   - Representatives of Slovenia, including the Country Coordinator, have participated in the online **GLOBE Annual Meeting**.
   - A group of teachers and the Country Coordinator have participated in the **regional meeting for Europe and Eurasia** in Omiš, Croatia.
   - School to school **cooperation between Croatian and Slovenian GLOBE teachers** that has started in November 2021 has continued in 2022 and resulted in a successful project application to the Erasmus+ program.

   Additionally, the GLOBE Country Coordinator for Slovenia, Zoran Petrov, has been elected as a **member of the GLOBE Regional Board for Europe and Eurasia**.

4. **Technology**

GLOBE Slovenia continues using **online tools** (Zoom, MS Teams, Padlet etc.) for most of our coordination work, as this approach allows us to quickly connect different parties and lower our environmental footprint, so we will keep using it in the future.

We continued with procurement of **equipment for GLOBE Program implementation** and in November 2022 purchased numerous additional devices, which we will distribute to GLOBE schools in December.

5. **Communications**

Most activities of GLOBE Slovenia connected to communications were aimed at further presenting the GLOBE Program in Slovenia. Notable activities include:

- presenting the GLOBE program at the **yearly Ecoschool meeting**,
- presenting GLOBE at the **yearly training for all CŠOD teachers**,
- **meeting with the US Embassy in Ljubljana representatives** to present GLOBE activities in Slovenia,
- **developing a webpage** for CŠOD projects where we will be able to feature GLOBE and distribute GLOBE materials in Slovenian language,
- featuring the GLOBE Program at the upcoming **international conference "Forest and Climate Change"**, organized by CŠOD in November 2022 (will include a presentation of GLOBE European Phenology Campaign, a lecture on GLOBE and NASA observations of tree height from the ground and space, a workshop with the GLOBE Observer App, and an appearance by a NASA expert at the panel discussion on Forests and climate change),
- upcoming **lecture by NASA expert Brian Campbell** at the Center of Space Technologies Herman Potočnik Noordung (o Earth Science, Satellites, a Changing Climate and the Importance of Ground-based and space-based observations with NASA and the GLOBE Program),
- presenting the GLOBE Program at **several other meetings and conferences** in Slovenia,
- presenting the GLOBE Program through **webpages and social networks** of the country coordinator (CŠOD) and their partners (Ecoschool program, GLOBE schools).

Plans and Ideas for Next Year:

In 2023, our plans are:

- to successfully **implement and improve GLOBE activities** in existing and new Slovenian GLOBE schools, as this will be the second school year in which the GLOBE program is carried out with students in Slovenia,
- to **motivate more teachers** to become GLOBE teachers and further **increase the number of GLOBE schools** in Slovenia,
- to carry out **several training events**, both live and online, for Slovenian GLOBE teachers,
- to enable Slovenian GLOBE teachers to attend **trainings and other GLOBE events in other countries**,
- to establish **further cross-border cooperation** between schools in Slovenia and schools in neighboring countries (Croatia, Italy),
- to **support schools that wish to connect** with other schools in the wider GLOBE community,
- to start building **connections with scientists in Slovenia** in connection to GLOBE,
- to **continue translating** GLOBE protocols and other GLOBE materials into Slovenian,
- to **acquire more equipment** for GLOBE schools in Slovenia,
- to **actively contribute** to the further development of the GLOBE international Community,
- and to **further promote** the GLOBE program in Slovenia.

Switzerland

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Organization and Number of Staff:
GLOBE Switzerland is organized as an association (NGO) with a national implementation office situated in Berne, the capital of Switzerland. At the office in Berne three staff members work part time (at 60% to 80%). In addition, GLOBE Switzerland has six (from 2023 onwards even seven) regional offices implementing the GLOBE program in 3 languages (German, French, and Italian). The regional implementation is done by mandates to Teacher Education Universities (part time jobs of 10% to 20%) and allows to have direct access with the GLOBE activities to students' courses.

Funding by:
GLOBE Switzerland has major funding by the Swiss Federal Office of Environment. Additional funding for events (like GLOBE Contest, national GLOBE students conference) comes from private foundations, US Embassy, and sponsors. R&D projects are funded by other Swiss Federal Offices and private foundations.

Cooperating Organizations/Individuals:
GLOBE Switzerland has close cooperation with all regional Teachers Education Universities, some with and some without mandates. In addition, we cooperate with Swiss Federal Research Institutions, with universities and Federal Institutes of Technology for common R&D projects, for science outreach, and for citizen science projects. Collaboration with the Swiss Academy of Science, with national environmental education programs,

GLOBE Schools (what types, how many):
210 schools of all levels: primary, secondary, and high school. Most of the schools are public, some are private ones. The number of schools is still slightly decreasing because in some schools there are no more contact persons, and the school management does not feel the need to be a GLOBE school. On the other hand, a few new schools are added every year.

GLOBE Areas you and schools focus on:

Atmosphere, Hydrosphere, Biosphere, Pedosphere, and Earth as a System. Complementary to international protocols, national offers on agriculture (biodiversity and climate change), phenology and water quality are very often implemented.

Number of Schools Reporting Data over Past Year:

14

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**

   In numerous GLOBE introductory trainings and workshops for in-service and pre-service teachers, future multipliers in all regions of Switzerland could be reached by the national implementation office and by the six regional offices. The training units were carried out by trainers and our regional experts who are employed at the Universities of teacher Education. In addition to workshops **more than 200 individual consultations of teachers were carried out** as in the last year before or while they were implementing GLOBE offers.

2. **Science**

   We are steadily working on our national GLOBE offers in collaboration with partners of teachers' education and with scientific partners. In addition, we have **close collaboration with the Swiss Federal Office of Environment** to develop science education offers adapted to their needs. In 2022, our collaboration was focused on the following partners from science:

   - ETH Zurich: Training course for young scientists to accompany school classes in their research projects on farms on biodiversity and climate change.
   - ETH Zurich, Swiss Academy of Science and Research Institute of Organic Agriculture: two Workshops for teachers on science outreach for the two topics biodiversity and climate change.
   - Swiss Federal Institute for Forest, Snow and Landscape Research WSL: Common projects on phenology in forests and forest pests.
   - Botanical Garden of the University of Berne: Training course for teachers and public relations for topics around phenology.
   - Swiss Federal Office of Meteorology and Climatology: Common project on phenology.
   - Swiss Federal Office of Environment and Bern University of Applied Science: Common citizen science project on forest phenology (particular trees).
   - Oeschger Centre for Climate Change Research (OCCR): Collaboration to organize the first national students scientific conference in 2022 (GLOBE Contest).

3. **Community**

   Between September 2021 and May 2022, around 1400 students from three school levels (5th/6th grade, 7th-9th grades, high school) from all parts of the country did research on exciting topics. With great commitment and under the guidance of their teachers, they prepared their results as posters and submitted them to GLOBE Switzerland. On June 24, 2022, the final **research conference took place at the University of Bern**. Selected groups of students presented and discussed their research and a judging panel awarded prizes. The conference attendees were honoured by the guest lectures of Thomas Zurbuchen (Associate Administrator of NASA's Science Mission Directorate), Nina Buchmann (professor at Swiss Federal Institute of Technology Zurich) and Samuel Nussbaumer (glaciologist at the University of Zurich). They provided exciting insights into their fields of research - entirely in the spirit of Science Outreach.



4. **Technology**
   We steadily work on our offers, restructure our GLOBE website (in three languages), and make it more user-friendly.

   In the area of phenology, we are working on the **introduction of temperature and humidity probes (air and soil) to measure the microclimate in observed plants**. These data will provide information on how much the microclimate influences phenology. In addition, we are testing a soil microphone to record the sounds of soil animals. In the future, this scientific method should enable us to make statements about biodiversity in the soil.

5. **Communications**
   Three to four times a year the national implementation office sends a **newsletter to Swiss teachers network**. Each time, the newsletter contains the most important information coming from international program and points out activities, campaigns and training opportunities. If necessary, target groups are contacted by direct mailings. We regularly promote selected offers on social media.

Plans and Ideas for Next Year:

Over the next two years, we are focusing on action orientation in a research project. The point is that we want to move from research and understanding to action with all our offerings. For us, it is important that we do not engage in any actionism, but rather work out well-functioning instructions for meaningful actions that teachers can implement in practice.

Ukraine

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Organization and Number of Staff:
The National Ecology and Nature Center of the Ministry of Education and Science of Ukraine is a leading educational institution in the field of ecology, nature and science in Ukraine, a component of the system of extracurricular education for gifted and motivated school students.

NENC is the national coordinator of the GLOBE program in Ukraine since 1999. GLOBE is a part of a program of national integration into European and world educational space.

There are two people working in the GLOBE coordination office in Ukraine, however the center has the capacity to include other people during the organization of events or competitions.

Funding by:
Main funding: Ministry of Education and Science of Ukraine.

Cooperating Organizations/Individuals:
Ministry of Education and Science of Ukraine, Minor Academy of Sciences of Ukraine, Ukrainian Hydrometeorological Center, State Space Agency of Ukraine, Palladin Institute of Biochemistry and others.

GLOBE Schools (what types, how many):
There are 602 schools and educational institutions registered on the website, actively participating schools – about 50. The GLOBE network in Ukraine includes not only secondary schools, but also regional environmental education centers that are part of the system of afterschool education in Ukraine.

GLOBE Areas you and schools focus on:
The most popular areas among Ukrainian GLOBE students is Phenology (GreenUp/GreenDown), as well as Atmosphere (Air Temperature, Cloud observations, Barometric Pressures, Precipitations, Relative Humidities, Surface Temperatures). Some teachers have made measurements of Hydrology (Dissolved Oxygens, Nitrates, Transparencies, Water pH, Water Temperatures) and Land Cover (Water Temperatures, Water pH).

Number of Schools Reporting Data over Past Year:

16

Program Implementation, International Cooperation in GLOBE Network, and Activities over Past Year (categorized by GLOBE Strategic Plan 2018-2023 Goals):

1. **Education**

   We were providing support for GLOBE teachers and schools during this year as well as we were translating protocols and instructions.

2. **Science**

   During the period 23 teachers were registered in the GLOBE Program. Science data were collected and entered on the site: 8 schools have received Science Honor Roll in Phenology, Atmosphere, Climate, Land Cover and Pan-GLOBE.

   Teachers and students from Ukraine were so active in many events of this year. They participated very actively in Tree Reporters Challenge (10/22/2021 - 12/01/2021). Their work was presented in a webinar "Our autumn with trees" on December 1, 2021 (https://www.GLOBE.gov/web/european-phenology-campaign/overview/webinars).

   Also we **submitted video to Virtual International 2dn World Day in Mantova** (ITA) 22 March 2022 (https://www.GLOBEitalia.it/gma2022/528-sezione-0-inizio-lavori-section-0-start-session.html).

   Our students managed to participate in the GLOBE Games 26-29 May 2022 in the Czech Republik (https://www.facebook.com/GLOBEgames/).

   As always, our teachers were very active in European Phenology Campaign. This year we were organized large project **"Phenology Gallery",** the main aim of which was to create photo collection of different phenology phases of trees. But unfortunately, it was not completed. We hope that next year we can do it successfully.

3. **Community**

   23 new teachers were involved in the GLOBE Program.

4. **Technology**

   16 schools entered scientific data during this period.

5. **Communications**

   Consultations and explanations for community members are constantly conducted, we keep people up-to-date on news and events.

Plans and Ideas for Next Year:

Participating in the European Phenology Campaign and other GLOBE activities.
Translating GLOBE materials for teachers.
To involve new teachers to the GLOBE Program.

THE GLOBE PROGRAM

Europe and Eurasia

2022 Country Reports

GLOBE Program Europe and Eurasia Region Coordination Office

Sponsored by: NASA Supported by: NSF NOAA Implemented by: UCAR