



Science Voices
Annual Report
2022



To Our Valued Partners and Supporters,

This past year has been a time of growth and change for Science Voices. We said good-bye to a few volunteers and welcomed new ones, including summer students through the Blue Marble Space Institute of Science's Young Scientist Summer. We were also awarded two grants, which has allowed us to implement larger projects in the US Virgin Islands and Indonesia. We continued implementing our online programs that we developed during the pandemic while, for the first time since 2020, conducting significant in-person work, this year focused in Brazil. Additionally, we debuted our podcast, Global.Science, which in its current format interviews science teachers to better understand the diversity of pathways into science education and the shared and unique challenges that we face in our work.

But that's not all. Some additional highlights of the past year include:

- Arrival in Brazil and exploration of the Brazilian teaching ecosystem at the Universidade Estadual de Campinas (UNICAMP) and an agro-forestry community in Guapiruvu in São Paulo state (early 2022)
- In-person deployment of the Greenworks role-playing game with future Brazilian science teachers, including environmental education and teacher training (late 2022)
- Development of a new curriculum for the Project Design component of Greenworks, tested with geology and environmental sciences students at UNICAMP (late 2022)
- Deployment of an online version of Project Design to Ukrainian and Indonesia students (late 2022)
- Shortlisting of the Greenworks program for the QS Reimagine Education Award in the category of Sustainability Education (late 2022)
- Grant from the International Astronomical Union's Office of Astronomy for Development to deploy astrotourism projects in the US Virgin Islands (early 2022)
- Grant from Global Ties US's Citizen Diplomacy Action Fund to expand our Greenworks program in Indonesia via a canal beautification project (mid 2022)
- Election of a new board member, Sarah Buchwitz, from Mastercard Brazil (mid 2022)
- Recruitment of Odion Okougbo to spearhead our grant strategy (late 2022)
- Development of an Agavi research group to help guide the development of the platform (late 2022)
- Launch of Global.Science, our podcast on science education around the world (mid 2022)

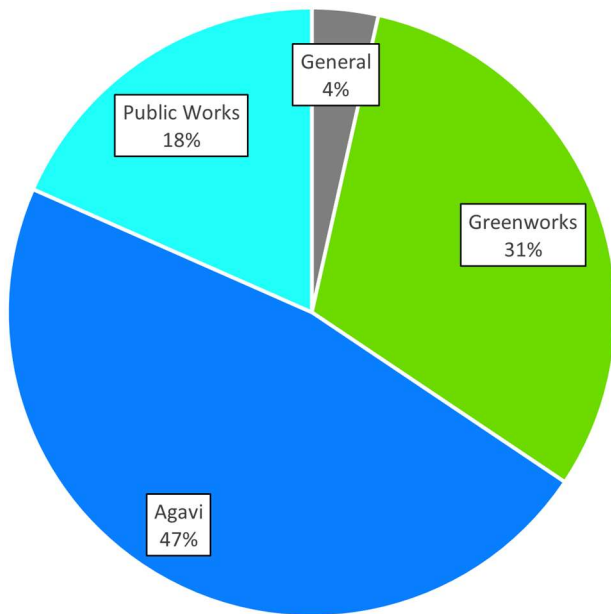
2020 and 2021 were years of pivoting and exploring the opportunities that were available in a drastically changed world. 2022 was a year of streamlining to focus our efforts on the projects that are performing best. In 2023, we will be working on scaling the successful initiatives so that we can increase their impact and make them self-sustaining. It will be a challenging task, especially for a small organization. Your contributions will help us achieve that goal. Whether it's your attention to our work, volunteer time, or donations to help pay for equipment and materials, please keep us in mind as you think about your giving this year.



Lev Horodyskyj
Founder, Science Voices

Funding Allocation by Project (2022)

39% from donations, 46% from grants, 15% from awards



General = funds for operations and prototyping

Greenworks = funds for role-playing game and project design curriculum (Brazil, Indonesia, Ukraine)

Agavi = funds for Agavi platform development (Brazil, Indonesia, Ukraine, USA, USVI)

Public Works = funds for implementation (USVI)

Volunteers and Researchers

Greenworks (2 volunteers)



Agavi (4 volunteers, 2 researchers)



Administration, Global.Science, Public Works (3 volunteers)



Instructor Partners



Brazil



Indonesia



S. Korea



Ukraine



USA

Students Impacted (Greenworks)



Brazil
+150 (Courses)



Indonesia
+10 (Projects)



Ukraine
+5 (Projects)

Awards (Greenworks)



QS Reimagine Education Awards

Shortlisted

Sustainability Education

2022

Greenworks

Greenworks is a global environmental stewardship classroom that utilizes role-playing games and community projects to create grassroots change for urgent environmental problems.

2022 Successes

Curriculum Finalization (Brazil)

This year, working with Dr. Tara Lennon (Arizona State University – ASU) and Dr. Roberto Greco (Universidade Estadual de Campinas – UNICAMP), we developed the full curricula for the two primary components of the Greenworks program: the environmental diplomacy role-playing game (RPG) and a new "project design" curriculum for conceptualizing community projects including their logistics, costs, timelines, risks, and final evaluation. Both curricula were tested in Dr. Greco's classes at UNICAMP and were positively received. The RPG was enthusiastically received, but feedback from the students (teachers-in-training) indicated that they would have trouble setting it up on their own and they requested a simpler analog or analog-digital hybrid version that they can more easily deploy in their future classrooms. This is a concept that we'll be further developing in 2023. The project design curriculum achieved its learning objectives and we are currently testing an online version with students in Ukraine and Indonesia.

We also welcomed representatives from GlobalGiving, the platform we use to do most of our fundraising, for a virtual site visit. GlobalGiving was able to observe how we constructed, reviewed, and translated the curricular materials and how they were implemented in the classroom. We were thrilled to be able to share our work with our funding platform and received great advice on how to increase our impact.



Negotiations during the Greenworks role-playing game (UNICAMP 2022)



Students presenting their project designs for an environmental stewardship project (UNICAMP, 2022)

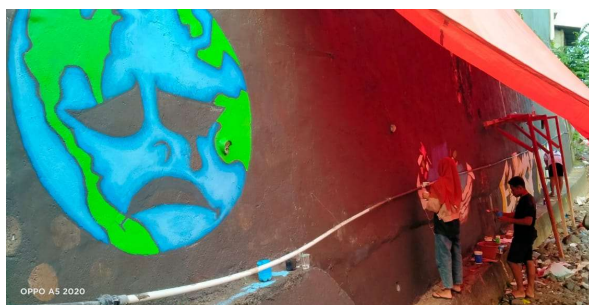


Students and instructors in the Greenworks role-playing game experience (UNICAMP, 2022)



Canal Beautification Project (Indonesia)

With the Citizen Diplomacy Action Fund grant from Global Ties US, we were able to fund the development of a new Greenworks arts and sciences prototype project that beautified a canal in Ternate working together with our colleagues at Khairun University (UNKHAIR) in Ternate, Indonesia. The drainage canal, one of many that help funnel excess rainwater out to the ocean, is one that sees a lot of garbage accumulation and a lot of bridge traffic, making it an ideal location to call attention to environmentally destructive behaviors. Students began by using drones to survey the canal to identify high sources of waste. Afterwards, they conducted a canal clean-up operation, where they gathered and properly disposed of the garbage that had accumulated. They then strung netting across the canal and under the bridge to catch garbage in the canal before it reaches the ocean. Over several weeks, they designed and added beautiful murals to the canal walls, illuminated by solar-powered lighting, that highlighted the damage that uncontrolled waste disposal causes to the surrounding coral reefs. Finally, when the project was completed, they conducted public outreach activities to communicate the project and its goals to education the local population on proper waste management.



Students working on the canal mural in Ternate, Indonesia (UNKHAIR, 2022)



Students cleaning the canal (UNKHAIR, 2022)



Some of the finished murals, with solar-powered lighting (UNKHAIR, 2022)

Partnerships (South Korea)

Joining us in late 2022 and continuing through 2023 is Jim Morgan from Ivy Collegiate School in South Korea, who will be helping us adapt and test the curricula for grade school and high school students. This is part of our broader push to build a global environmental stewardship classroom that integrates our various partners into one global initiative.

As a result of these successes, we have promoted Greenworks as Science Voices' primary project.

2022 Challenges

We were not able to meet our goal of scaling up the curricular offerings of Greenworks, which include our partners in Indonesia and Ukraine. Most of our students in Ukraine were caught up in the unprovoked and horrific Russian invasion of their home country, resulting in severe difficulties in remotely deploying our programs. Language and cultural barriers resulted in limited success in Indonesia as well, as active learning approaches are quite unusual there. Although we have helped students deploy multiple community projects, we have had less success in guiding students through the curricula that help them design projects that can continue beyond their initial deployment. A significant challenge in both locations is providing the teacher training necessary to support students in these active learning classrooms. We will be working in 2023 to develop better teacher support. This will include continued remote work with our colleagues in Ukraine and in-person work with our colleagues in Indonesia.

People Involved

Program Development



Lev Horodyskyj
Co-Lead (Science)



Tara Lennon
Co-Lead (Policy)



Daniel Orta
Game Engine
Development



David Orta
Game Engine
Programming



Lily Ishak
In-Country
Facilitator
Indonesia (North
Maluku)



Halikuddin
Umasangaji
In-Country
Facilitator
Indonesia (North
Maluku)



Roberto Greco
In-Country
Facilitator
Brazil (São Paulo)



Ihor Bubniak
In-Country
Facilitator
Ukraine (Lviv)

Faculty Partner Locations



Khairun University
(Indonesia)



University of Campinas
(Brazil)



Lviv Polytechnic
(Ukraine)

Looking Forward

As a result of discussions with our partners, we have decided to split the RPG and the community projects into separate offerings under the Greenworks label (previously, the RPG was required for the community project training and small grants). We'll be working to scale both of these components in 2023 as we continue to develop the program. Our roadmap for 2023 includes:

Role-Playing Game

- Develop a simplified analog version of the game for use in classrooms and public outreach settings
- Play-test the new version at fundraising events in the US, South Korea, and Brazil in early 2023
- Debut in Brazilian classrooms in late 2023 and make the base kit and initial expansion packs available for broader use (kits will include playing materials such as maps/cards/dice and lesson plans)

Community Projects

- Develop the digital infrastructure for the Greenworks Global Environmental Stewardship Classroom (allowing us to better track the development of projects using the Project Design curriculum and then assisting with matchmaking for technology and funds to implement the project)
- Improve teacher training in Indonesia and Ukraine (including on-location work and professional development materials)
- Raise at least \$20,000 in general Greenworks project funds to sustain student projects for the next year
- Help students in Brazil, Indonesia, South Korea, Ukraine, and the US coordinate and launch environmental stewardship projects

Agavi

Agavi is an adaptive learning platform designed for smartphones that enables teachers to build innovative new experiences for their students.

2022 Successes

Agavi-Adjacent Hackerspaces (Brazil)

A long-term goal for the Agavi system is to have an associated hackerspace where students and teachers can add functions and equipment to the system to enhance its capabilities. We launched a Coding Club at the University Estadual de Campinas (UNICAMP) in Brazil this year, where we're currently training students in Python coding and working with low-cost sensors and processors (Raspberry Pis, Arduinos, and Circuit Playgrounds). Our goal over the next few years is to develop systems and approaches that will work in remote forest communities, including in the Atlantic forest in São Paulo state and the Amazon rain forest in Amazonas state. We then plan on utilizing the successful approaches to deploy the system and its associated sensor ecosystem to more challenging environments, such as in remote parts of Indonesia and war-torn Ukraine.



Students exploring sensors, Circuit Playgrounds, and Raspberry Pi computers as part of Coding Club (UNICAMP, 2022)

Research Group (Global)

In the latter part of the year, we began to construct a research group working on several challenging problems in digital science education through smartphone-based platforms. One of our affiliated students, Daniela Cristea (PhD student in Romania), is working on building an algorithm that will help convert activities into the Agavi format. Another affiliated student, Leonardo Macedo (BS student in Brazil), is working on designing an evaluation system that will help teachers write learning objectives in Agavi that can be utilized to evaluate student competencies based on their interactions with Agavi. Additionally, over the summer we hosted two students, Suzana Varjão (Brazil) and Fiorella Ojeda (Peru), through the Blue Marble Space Institute of Science's Young Scientist Program (BMSIS YSP).

Platform Construction

Programming has proceeded over the course of the year, with the supporting digital infrastructure in place and the beginnings of the teacher interface and student interface currently in development. Additionally, we recruited a user interface and experience designer who has helped revamp how users will interface with the system.

2022 Challenges

Personnel departures and scarce funding (until the end of the year) have prevented us from progressing on the platform as quickly as we would have liked. As a result, we have taken the time to slow down the project and to think more deeply beyond the engineering of the platform itself as we work to raise additional funds to accelerate its development. Success of the program will require a teacher network and support system that will help with adoption and support once the system launches. This has led us to re-evaluate our strategy to include a parallel teacher community development approach in addition to developing the digital infrastructure of Agavi itself.

People Involved



Lev Horodyskyj
Lead



Alexandru
Gazdac
Co-Lead



Iulia Toma
User Interface/
Experience



Jonathan
Oribello
React
Programming, Data
Analytics



Wayne
Parkhurst
Programming Lead

Looking Forward

We anticipate being able to begin testing Agavi with teachers in the latter half of this year. Our roadmap for the upcoming year includes:

- Raise at least \$50,000 to accelerate the development of Agavi's beta version
- Complete a beta version of the system
- Develop the internal team necessary for long-term growth and support of the system once it is operational
- Develop a teacher community drawing on all the locations where we work (and beyond) to test the beta version in real-life teaching settings
- Continue developing the Agavi hackerspace ecosystem (building upon the Coding Club model)
- Continue developing Agavi-associated research projects with interested affiliates and BMSIS YSP

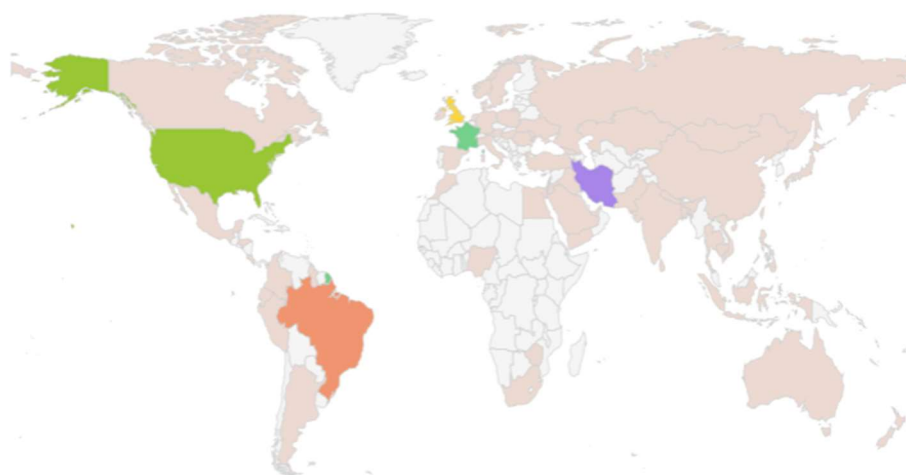
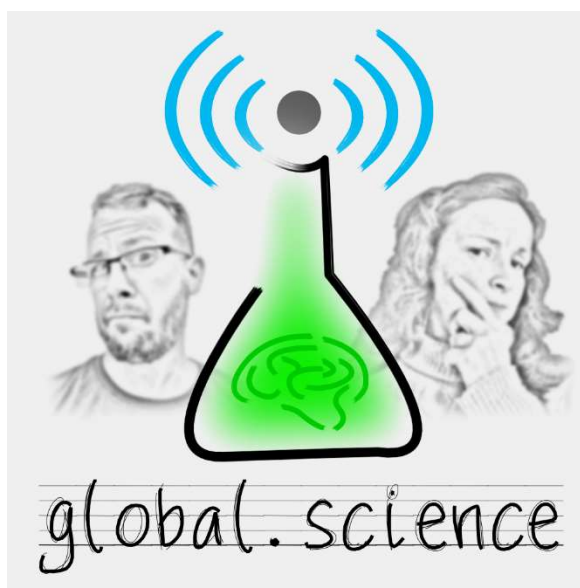


Public Works

Our work with the Etelman Observatory on St. Thomas in the US Virgin Islands, USA, continued this year with our research student, Nikita Beck, working with us to develop astrotourism projects supported by a grant from the Office of Astronomy for Development. We will be wrapping up this work in early 2023 and then put USVI projects on hold until renovations at Etelman Observatory are complete later in 2023.

Global.Science

In May 2022, we debuted a podcast on science education. This podcast, hosted by Drs. Lev Horodyskyj and Fabia Battistuzzi, features interviews with scientists and science students across the US and some parts of the world to better elucidate pathways into careers in science and the stunning diversity with which scientists bring their science to the public. Highlights from the first season included science outreach in extreme environments (Dr. Ulyana Horodyskyj), interacting with the media (Dr. Kristan Schneider), being a disabled student in the sciences (Alissa Bandalene), starting a science-based nonprofit (Dr. Sanjoy Som), museum work (Dr. Melissa Pardi), science outreach in tropical resorts (Dr. Dario Carbone), and developing community projects (Dr. Roberto Greco).



Top Countries: USA (45.7%), Iran (9.6%), UK (3.4%), France (2.6%), Brazil (2.5%)

Statistics (Season 1)

Total Episodes
15

Total Downloads
804

Listener Countries
67

Most Popular Sources
Samsung Podcasts, Browsers

Season 2 will begin recording in early 2023 and feature new formats and locations.

Partners and Major Supporters

Partners

Blue Marble Space Institute of Science
Etelman Observatory
Orange Wave Innovative Science, LLC
Geneva Lake Astrophysics and STEAM

Dr. Roberto Greco (University of Campinas, Brazil)
Dr. Ihor Bubniak (Lviv Polytechnic, Ukraine)
Dr. Halikuddin Umasangaji and Dr. Lily Ishak (Khairun University, Indonesia)

Major Supporters

International Astronomical Union's Office of Astronomy for Development
Citizen Diplomacy Action Fund

Chou Chen Che
Ivan and Luba Horodyskyj
Lev Horodyskyj
Joel Morton
Steve Robertson
Aaron Thompson

Join Our Journey

A heartfelt thank you to all the donors and volunteers who have contributed their time, expertise, and money to our cause. If you would like to join us on this journey, you can contact us at <https://sciencevoices.org/get-involved/>. Additionally, you can follow us at our websites and social media channels.

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