**ANNUAL REPORT**

**GLOBE Chile**

**2020 - 2021**

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# INTRODUCTION

**The GLOBE PROGRAM in Chile** has been significantly affected by externalities such as the political crisis triggered in October 2019 and the covid-19 pandemic health emergency, which is still in an endemic phase in our country, undergoing its third wave of infections, which It has had less impact on people's lives, a fact that can be attributed to the attempt to maintain basic control measures and the start of a massive vaccination process. However, as in the previous period, the reformulation of the processes and attempts to reactivate the schools that have participated has continued, also seeking the incorporation of new schools and organizations with educational purposes.

The process described above is based on a paradigmatic vision of sustainability and an action based on the Development of Environmentalization processes in the organizations in which it operates. To do this, there is a strict subscription to the GLOBE strategic plan, based on our academic affiliations, which we recognize as one of our strengths.

The following considerations remain:

* Prioritize participation in teacher training centers (Universities), especially initial training (considering its multiplying power in the construction of learning and the possibilities of linking students with the human environment), over training and services for individual teachers. of Schools, without excluding this last modality.
* Prioritize initial actions in schools that have expressed interest in the program and the capacity to finance its inputs until a critical mass of resources is formed to implement the program in interested schools without financing capacity.
* Establish a pedagogical dynamic that privileges accompaniment (coaching), over intensive training workshops (not excluding the latter). And seek the inclusion of the GLOBE protocols in the study curricula by inserting them in the framework of curricular environmentalization processes and proposals in the form of collaborative work and S.T.E.A.M.-type projects. Additionally, define a monitoring system through action research methodology.
* Establish an autonomous presence of the GLOBE Program with independent. For this purpose, cooperation agreements are being established with educational institutions and a projected NGO. For the purposes of expeditiously and efficiently managing the logistics, function of the GLOBE application in the country.

# EDUCATION

1. **Activities in execution.**
   1. **Action in Higher Education.**

Actions in Higher Education focus on three universities: University of the Americas (UDLA), Metropolitan University of Educational Sciences (UMCE) and the University of Chile (UCH). Recently the AIPEP Professional Institute has been integrated. With whom we have an active agreement, we have participated in the accreditation processes of careers as a collaborating entity and their students continue to participate in local GLOBE actions.

* + 1. **University of the Americas (UDLA)**
* The university maintains its support for the program with the participation of students in the activities and the provision of facilities. Work is being done to form a stable group of students and teachers for GLOBE topics, whose focus is on the logic of linking with the environment (academic line), research, development and curricular environmentalization.
* In the School of Basic Pedagogy, the inclusion of GLOBE protocol elements in practical-experimental activities has been practiced for years; considered an active part of the environmentalization actions, together with the elaboration of STEAM-type projects considered in the training process that include the use of protocols.
  + 1. **Metropolitan University of Educational Sciences (UMCE)**
* There is a working group with which we have given some training, there is a station that collects meteorology data and a virtual classroom available for GLOBE teachers who wish to register (it is conceived as a repository of materials and an instruction platform). Additionally, with them we try to advance on the issues of protocols to build instruments. We persist in the work in the Entomology areas, where work actions are structured in hydrology protocols, specifically with benthic macroinvertebrates, (M, I, B,) and soil activities for 2022, when the internal restriction (intervention) of University ends.
  + 1. **University of Chile.**
* There are actions to support activities in the atmosphere and development protocols in the area of ​​aerosols, with sponsorship and support from the Department of Meteorology and academics available to give talks on their specialties.
  + 1. **AIEP Professional Institute.**
* The process of training pre-service instructors and active participation in the campaign for the period (ventilation) with sanitary restrictions and the survey of the state of the art in the campaign for water scarcity has continued. Talks and trainings have continued to be implemented, as a contribution to the curricular environmentalization and the strengthening of the institutional B-corp certification.

1. **School Action.**

* We have increased our network with other schools, maintaining the criteria of sustainability and commitment to constant work, in which the following stand out:
* The **Lincoln College Academy** maintains digital stations at its two campuses and an exclusive laboratory for GLOBE for research on aerosols and the implementation of the water protocols that will be released when the sanitary restrictions cease.
* The **Eleuterio Ramírez School** hasstations and a GLOBE work group that work rigorously and participate in campaigns of GLOBE OBSERVER. They took measurements of the astronomical event in Araucanía, under the leadership of professor (GLOBE trainer) Manuel Bianchieri, which are part of our GLOBE STAR 2021 proposal, and have held their internal workshops, as permitted by the health restrictions.
* **Federico Lhose de los Vilos High School**: They have joined the meteorological stations of the Navy and the “Los Pelambres” mining company, and are still implementing their meteorological station. They have perfected their water-harvesting project, carried out various dissemination activities among schools in the area and we hope to present associated school research, with scientific support from Pamela Pizarro, to the 2022 IVSS.
* **Manuel Rodriguez de Arica School**: this establishment is in charge of the M.T. Viviana Zamorano who continues the mission of integrating schools and working on the mosquito protocol, (it is the only locality in Chile with the presence of these vectors in its area).
* **International Preparatory School**: this school is developing a water desalination project to present at the IVSS. Here we have a professor who is an expert in technology; with him, we designed "low cost" instrument manuals, this year with an app for the National Water Scarcity Project and CO2 meter, for school facilities as a contribution to the health campaign.
* **Melián de Talca School**: coordinated by our scientist Pamela Pizarro, it is carrying out research in Nieblas. It also continues in status quo due to the pandemic.
* **Dominican Mothers School of Pitrufquén**: in this school the Atmosphere area is worked on, they have a meteorological station that periodically reports data and our GLOBE teacher is coordinating the campaign (in his region) on rainfall and snow in his geographical area to contribute to the study national on water scarcity.
* Additionally, we are analyzing the application of a high school educational corporation that will be integrated into GLOBE CHILE as soon as the sanitary restrictions end.

1. **Campaign Action.**

* As GLOBE CHILE, we had four teams on the ground to collect data and observations in the Araucanía eclipse (December 2020). Despite having adverse weather, we managed to have a successful registration with professor Banchieri’s team; which mobilized since dawn that day and was located in a town towards the coast (west) of Villarica. We will report the findings from the 2019 and 2020 eclipses in our proposed Star 2021 publication.

* We have developed a campaign for the diffusion of measurements and ventilation practices, based on an interdisciplinary study in which our scientist Roberto Rondanelli participated called “Safe schools in times of Covid-19”, recommendations to prevent contagion in the classroom, (https://www.cedeus.cl/escuelas-segurascovid19-recomendaciones-prevenir-aulas/). Multiple studies point to aerosols as the main route of transmission (particles of fluids emitted by the mouth and nose that remain floating in the air for hours, contagion being possible even respecting a distance of two meters between people and its possible control associated with CO2 measurement (below 800 ppm) in the facilities. Our associates have traveled with CO2 measurement devices to different schools promoting these measures and our technological advisor (M. Pailalli) has developed a measurement equipment (low cost) Arduino-based for groups of students who wish to have a reliable ventilation control tool at a cost much lower than that of the export device.
* We have started a micro project that we want to develop in an action research modality; consisting of recruiting special educators (specialists in working with students with special educational needs) to train, them as GLOBE Teachers and see the feasibility of applying the knowledge of GLOBE protocols with the school population they serve.
* We continue to project a base study of M.I.B. in some rivers of South America with a GLOBE focus, for Development in 2021-22, for which we have a commitment with the GLOBE team from Arequipa (Peru), the team from Ecuador has been invited and we hope to convene other LAC participants.
* This year we have started a general project at the GLOBE CHILE level, on water scarcity, where we intend to integrate the work of bibliographic collection (state of the art) that involves AIEP and university students, with development of meteorological water harvesting experiences in at least three areas of the country. The initiative will incorporate GLOBE measurements and other rain and/or snow data collection in areas with little access and eventual microclimates with the support of an app designed by Prof. Paillali.

# SCIENCE

1. **Academic Production:**

* We continue with progress in the work on curricular setting with the inclusion of GLOBE protocols, and writing for a publication on STEAM projects for teachers in initial training and with two scientists we are preparing a work to survey Environmental education and the GLOBE protocols associated with formal content of primary and secondary education in Chile.
* Participation in the First Latin-American Citizen Science Congress of the University of La Rioja (Argentina, June 2021), at the invitation of Prof. Ana Prieto, Director of Postgraduate Studies at ULaR, with a presentation by GLOBE CHILE “Opening spaces with GLOBE for a citizen science” and another by UDLA”; "Elements of citizen science in the initial training of teachers" and we made a reproduction of the event in social networks of the University of our GLOBE associates, which reached a number of more than 1100 people

1. **Network of Scientists**

* We continue to improve the management to channel the contributions of our scientific collaborators efficiently. We are also calling on specialists in Education, which is curiously perceived as one of the aspects of little participation in GLOBE.

# TECHNOLOGY

1. **SAW. Development of low cost instruments.**

* Under the leadership of Professor Paillali, methods of building accessories and instruments based on Arduino hardware and the use of 3D printers continue to be developed. We participated in a STEM artifact contest at the beginning of 2021. A low cost Arduino-based artifact was developed for CO2 measurements; design of a special App for pluviometry and a prototype development of a water desalination plant.
* Under the supervision of the postgraduate students of Professor Rondanelli. School scientific research initiatives on mists and aerosols continue to be supported with instruments. And manufacture of photometers.

# COMMUNITY

In this area, we have continued to have limitations due to the health issue and the actions have been:

* Realization of five virtual presentations for schools about the GLOBE Program.
* Dissemination talks by the teams participating in the 2019 / 2020 eclipse campaign and basic astronomical aspects, in their surrounding communities and social institutions.
* Virtual expository talks about GLOBE experiences.

# COMMUNICATION

* Within the framework of the collaboration agreement signed with the company LUDENS, dissemination and sponsorship content is being integrated for a micro project for differential teachers and the development of 3D printing accessories.
* Our fan page is active on Facebook.
* The stand at the Quinta Normal art and technology museum in Santiago is in status quo. It is currently closed due to the health crisis.

# STAFF

Active Capacitors:

M.T. Raúl Pérez

M.T. Viviana Zamorano

Trainers: Hernan Costabal

Manuel Banchieri

Active Agreements:

* Ludens - Global Creative - Instituto AIEP.
* UDLA
* UMCE

# APENDIX



