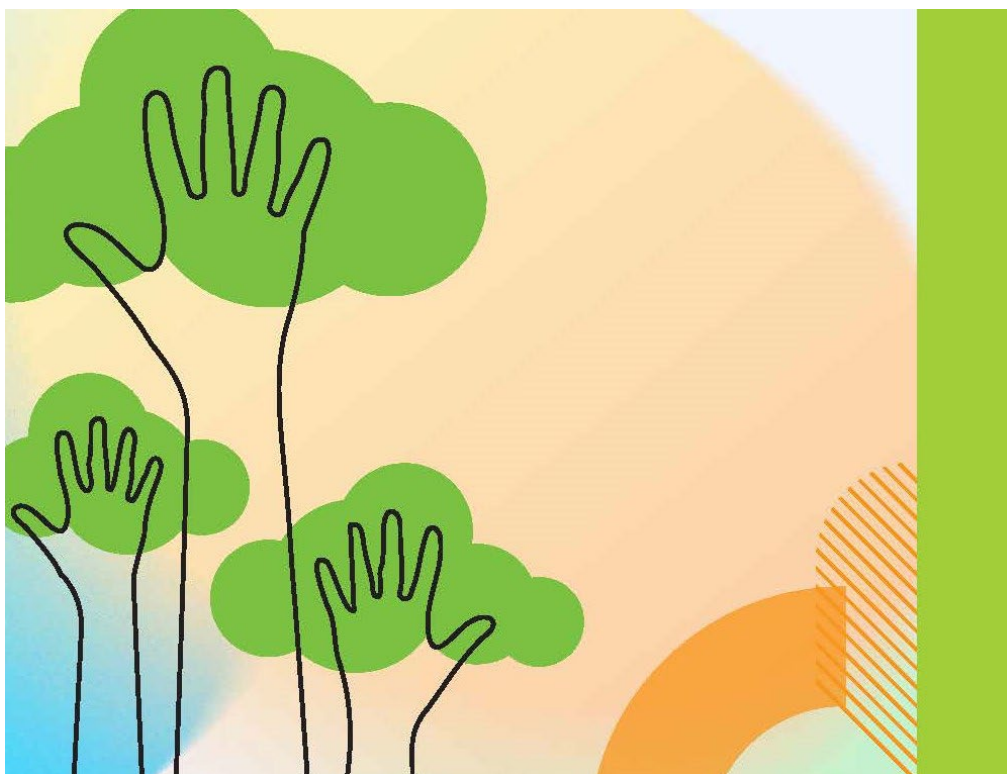

EDUCATION FOR SUSTAINABILITY



SUMMARY PROJECT

2021/2022

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1. EDUCATION FOR SUSTAINABILITY: ALCOA FOUNDATION AND UNIVERSITY OF A CORUÑA

The **Alcoa Foundation** works with a values-based culture to minimize its environmental impact while returning positive results to society. In this line, the Foundation collaborates with non-profit associations and public and private entities in the areas in which it is located. The Alcoa Foundation area of work in sustainability focuses on biodiversity conservation and climate change mitigation and adaptation, supporting equitable access to education, skills development and research in this field.

In this way, it converges with the lines of action of the **University of A Coruña (UDC)**, which has its own service for the improvement of Campus sustainability: the Office for Environment (*OMA*), dependent on the Vice Chancellor of Infrastructure and Sustainability. Its priority objective is to raise awareness and participation of the university community and society in sustainability.

It is in this context that the fourth call of the **project 'Education for Sustainability UDC + Alcoa Foundation'** was promoted, carried out by the UDC during the academic year 2021-2022 and with the co-financing of Alcoa Foundation. The project was effective in two locations of the Galician region: the Campuses of University of A Coruña, and the primary and secondary schools of A Mariña de Lugo, with the aim of promoting the training and participation of the educative community in matters of environmental and social sustainability.

One chosen area to carry out this project was A Mariña Lucense, composed of 15 municipalities, which comprise a population of 70,000 people, including approximately 5,000 students and more than 300 teachers. A Mariña reaches 51 educational centers, covering from early childhood education to high school, and also including specialized centers, such as music, language or sports schools.

The other influence area is the UDC and A Coruña-Ferrol metropolitan area, with more than 600,000 inhabitants. The university community reached about 18,200 students in 2021 and more than 2,700 employees (faculty and staff). The sustainability programs at the UDC spread the transfer of environmental knowledge towards the communities of the UDC, which affects the whole northern area of Galiza, that is to say, the north of the provinces of A Coruña and Lugo, therefore including the A Mariña Lugo region (Image 1).

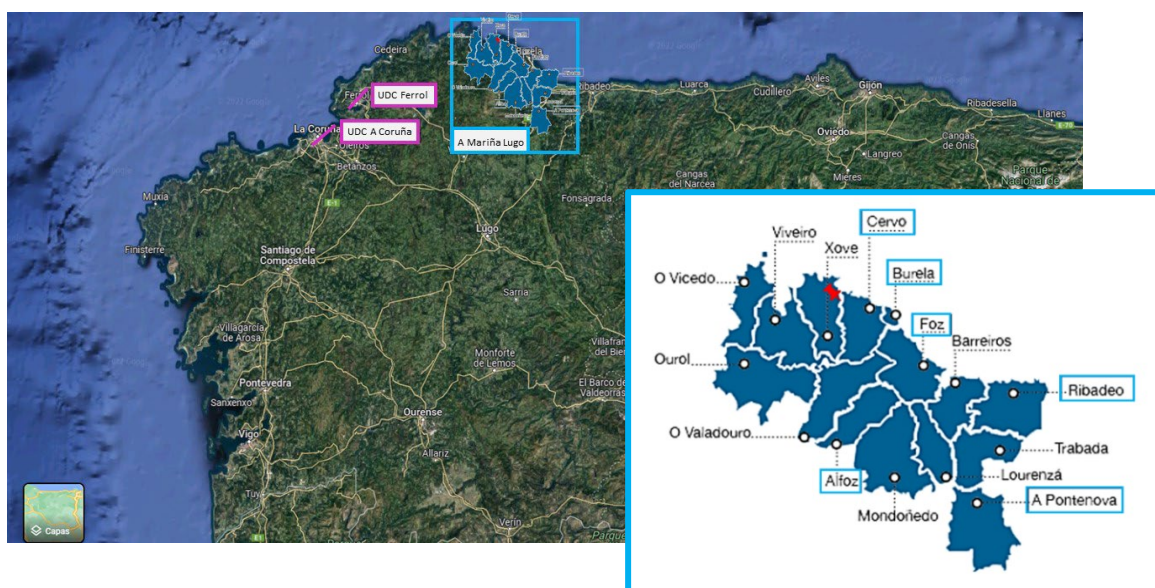


Image 1. Geographical location of the development sites of the 'Education for Sustainability project': University of A Coruña (Coruña and Ferrol campuses), and Comarca da Mariña Lucense (primary and secondary education centers directly involved in the project are labelled with a blue box; in red: location of the Alcoa San Cibrao factory).

2. PRESENTATION AND CALENDAR

'Education for Sustainability' is a project that seeks to advance in the university community and citizenry's training in the basic concepts of environmental and social sustainability, and also to develop its capacity to act on priority issues of our time.

This is a multidisciplinary environmental education project that covers a wide range of ages, extending the present call to children's, primary and secondary education, in addition to the university audience targeted by previous editions. The target audience are students, but also including the teachers and workers in educational centres, such as administrative assistants, research staff, garden workers or dining rooms attendants, among others.

On the one hand, the project continued with its format of activities at the University of A Coruña, by its general name '*Campus, Home, City; Labs for change*', and through the main call 'Environmental March 2022' and the online course 'Ecological footprint and climate emergency: contributions from the UDC'. Additionally, specific actions spread throughout the course 2021/2022 also took place.

On the other hand, and as a novelty, 'Education for Sustainability' has extended its scope and approached to earlier ages, by developing activities with primary and secondary education students located in the region of A Mariña, in the north of Lugo's province. The project titled 'A Mariña Environmental Project', has the aim of providing sustainability training to the younger generations in this geographical area of shared influence for both the UDC and the Alcoa factory.

A specific section on the website of the Office for Environment of the project was created: https://www.udc.es/en/sociedade/medio_ambiente/curso/, where the links were provided for online registration in the activities. A complete final report (in Galician) is also available on the same website.

The overall timetable for the academic year 2021/2022 is shown in the table below.

2022-Oct							2022-Jan							2022-Feb						
M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su
				1	2	3						1	2		1	2	3	4	5	6
4	5	6	7	8	9	10	3	4	5	6	7	8	9	7	8	9	10	11	12	13
11	12	13	14	15	16	17	10	11	12	13	14	15	16	14	15	16	17	18	19	20
18	19	20	21	22	23	24	17	18	19	20	21	22	23	21	22	23	24	25	26	27
25	26	27	28	29	30	31	24	25	26	27	28	29	30	28						
2022-March							2022-April							2022-May						
M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su
	1	2	3	4	5	6	25	26	27	28	29	30				1	2	3	4	5
7	8	9	10	11	12	13								6	7	8	9	10	11	12
14	15	16	17	18	19	20								13	14	15	16	17	18	19
21	22	23	24	25	26	27								20	21	22	23	24	25	26
28	29	30	31											27	28	29	30			
2022-June							2022-July							2022-Aug						
M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su

	'A Mariña Environmental' coordination: Oct-contact, engagement; May-centre project application deadline; Jun-centre project development
	Activities of 'A Mariña Environmental' in Lugo province
	'Environmental March 2022' dissemination and engagement
	'Environmental March 2022' cycle in UDC
	Pilot experience of composting and selective organic collection at campus Ferrol canteen
	Installation composting area and selective waste collection equipment at campus Ferrol UDC canteen
	Online course 'Ecological footprint and climate emergency'

3. ACTIVITY SAMPLES

3.1. 'A MARIÑA ENVIRONMENTAL PROJECT'

The educational offer consisted of a total of **ten activities differentiated in three thematic training modules**, which were presented in the form of explanatory sheets (Image 2) with the technical details and needs for the development of each one. They can be consulted at the following link (in Galician): https://www.udc.es/export/sites/udc/sociedade/medio_ambiente/_galeria_down/curso/Fichas-actividades-Marina-Ambiental.pdf_2063069239.pdf

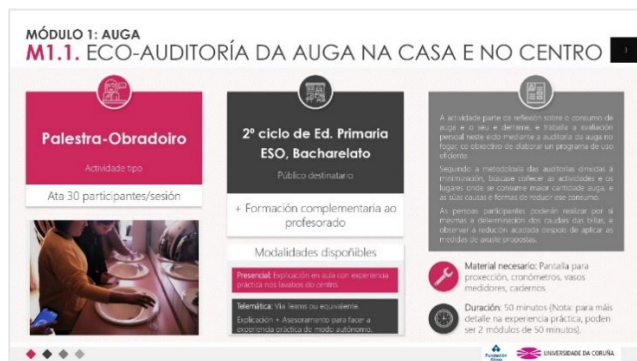


Image 2. Example of an explanatory sheet for one of the activities.

The three training modules and the activities contained in each one were:

1. WATER: This module had the objective of highlighting this vital resource, raising awareness of the need of water-saving and efficiency measures in the current scenario of scarcity and inviting reflection on the consumption of water in everyday activities. The module included the following activities:

- M1.1. Eco-audit of water at home and at school (lecture-workshop)
- M1.2. Collaborative mapping of water consuming equipment (Emapic UDC calculator)
- M1.3. Natural wastewater treatment, constructed wetlands (lecture-workshop)

2. WASTE: It was the module with the highest number of requests, demonstrating the need and interest of the new generations in responsible consumption, waste prevention and circular economy. The activities contained in the module offered advice and awareness practices through the realization of eco-audits, the calculation of the ecological footprint of waste generation and management, the practice of recycling organic matter and the experience of cleaning litter from natural spaces. This module offered the following activities:

- M2.1. Calculation of the ecological footprint of waste generation (Emapic UDC calculator)
- M2.2. Eco-audit of waste: quantities, composition, and separate collection (lecture-workshop)
- M2.3. Practical experience of composting in the educational center (lecture-workshop)
- M2.4. Cleaning of the natural environment: beaches, rivers, plogging (field activities)

3. ENERGY: This module, which included 3 activities related to the energy issue, was not requested in the form of an activity for students in any educational center, although it was worked during the visits of the centers to the UDC, and was also requested in the form of a sustainability project to be implemented in one center, showing the interest of the teachers and working staff as the second target audience of the project. The activities offered in the module were:

- M3.1. Calculation of the ecological footprint of mobility (Emapic UDC calculator)
- M3.2. Calculation of the ecological footprint of energy consumption (Emapic UDC calculator)
- M3.3. Eco-audit of energy at home and in the center (lecture-workshop)

In addition, the project was completed with **the implementation of sustainability initiatives and equipment** in the schools, and with **visits by students** from A Mariña to the UDC Campuses.

As an example, the following page shows the summary of one of the developed activities (the full report in Galician contains the details of each of the activities):

M2.4. Cleaning of beaches and the natural environment

✓ Field activity

This is a practical activity with the aim to sensitize students to the problem of leaving waste out of collectors, as well as the excessive generation of waste and the multiple ways it can finally end up in nature.

The four cleanings carried out were located on beaches, rivers and in urban parks. They began with a brief explanation of the problem, followed by the rules and considerations for carrying out an ecological and collective collection, and finally an analysis of the rubbish found: typology, origin, and how it affects natural ecosystems.

A space was also dedicated to reflection on how everyone can potentially be responsible for this situation and what changes can be made to become agents of change in the face of this worrying situation.

Dates and locations:

- ✓ June 8: CEIP Gregorio Sanz (Ribadeo).
- ✓ June 9: IES Enrique Muruais (A Pontenova).
- ✓ June 10: CEIP Cervo (Cervo).
- ✓ June 20: Plurilingual CPR Martínez Otero (Foz).

Scope:

N ^{er} groups	N ^{er} students	Level/Age
10	150	Child education (3-5 years), Primary 5 th (10 years), 1 th -4 th Secondary (12-16 years)

In addition, 12 teachers responsible for the groups participated.

Results: After collecting waste for 1,5 hours, in all cases waste of various types was found. It stands out the large amount of microplastics found on the two visited beaches. The global results were:

Centre	Location	Rubbish tipology
CEIP Gregorio Sanz	Santa Cruz park	Total 17 kg: light packaging, glass, plastic bottles, cans, cigarette butts abandoned objects (shopping trolley, carpets), etc.
IES Enrique Muruais	Eo river	Total 8 kg: caps, food wrappers, cans, bottles, masks, etc.
CEIP Cervo	Rueta beach	Total 6 kg: microplastics, cigarette butts, fishing net debris, wet wipes, sewage treatment plant parts, cotton swabs, mermaid tears, etc.
CPR Martínez Otero	Rapadoira beach	Total 8 kg: cigarette butts, cotton swabs, wet wipes, remains of fishing nets, masks, mermaid tears, raft, etc.



3.2. 'ENVIRONMENTAL MARCH UDC 2022'

This was the fourth edition of UDC actions for sustainability receiving the support of Alcoa Foundation. In total, almost **fifty activities took place throughout the month of March** at the UDC. Specifically, 17 lectures and panel-table discussions, 16 workshops, 3 technical visits, 2 volunteer actions, 3 facilitated meetings, 4 film-discussion sessions, 3 consecutive days for stands exhibition with sustainable experiences, and 8 exhibitions/displays available for free visits.

The priority issues that were discussed in the present call were:

Sustainable and healthy food | Wind energy | Bioconstruction | Climate crisis and ecological emergency | Energy efficiency | Exercise and health | Environmental volunteering | Noise pollution | Eco-design | Biodiversity | Eco-conscious menstruation | Associations and citizen power | Responsible mobility | Law, economy, and social perspective of the green transition | Composting and waste prevention | Responsible and ecological consumption | Ecological and water footprint | Eco-audits | ...and more.



Image 3: General view of the 'Environmental March 2022' leaflet, distributed at educational and administrative centres of the UDC.

As an example, the following page shows the summary of one of the developed activities (the full report in Galician contains the details of each of the activities, available at https://www.udc.es/gl/sociedade/medio_ambiente/curso/):

Speakers: **Jorge Quindimil** (International Law Department), **Javier Sanz Larruga** (Administrative Law Department), **Xosé M. Carril** (Public Law Department), **Natalia Álvarez Lata** (Private Law Department), **Xulio Ferreiro** (Department of Criminal Law), who, as Dean of the Faculty, also acted as presenter and moderator.

Date and place: Monday, March 14, 2022, Faculty of Law (Elviña).



The variety of represented Departments nurtured the content to understand the green transition within the EU framework and the possibilities of the UDC.

First, J. Quindimil linked International Law and the environment with a historical review starting in the 2nd World War, going through key dates such as the Bruntland Report (1987), the Rio Conference (1992), the Kyoto Protocol (1997) or the Paris Agreement (2015).

Then J. Sanz presented from the scope of Administrative Law, issues such as urban planning, the (circular) economy, the protection of biodiversity, and specifically his research about the effect of marine wind energy on fishing activity in Galiza.

Thirdly, X. Carril developed an interesting analysis from an environmental, organizational and gender perspective, with a practical example: an occupational accident in itinere, an issue that is already contemplated in countries such as Portugal or Italy, with solutions for the triple axis analyzed, among them collective and sustainable transport.

N. Álvarez continued with the intervention Civil Law, emphasizing the transversality of environmental law: damage to the environment is a civil liability, which is expressly accepted in the Law of environmental responsibility (2007) of mandatory compliance.

In fifth and last place, the exhibition on Criminal Law by X. Ferreiro took place, where the types of environmental crimes, non-compliance with green fees and their criminal implication were highlighted.

The atmosphere of the discussion round was very participatory, concluding that law is a key and transversal issue for making effective the green transition.

"The lines of law are a substantial challenge for humanity and its sustainable development" - Xulio Ferreiro.

The capacity of the Faculty's auditorium, with **40 seats**, was completed.



3.3. ONLINE ECOLOGICAL FOOTPRINT CALCULATOR

The Office for the Environment has developed an application adapted to the geographical area of Galiza for the calculation of various components of the ecological footprint, through the carbon footprint: energy, waste and mobility, as well as another citizen science application for the collaborative mapping of water-consuming equipment (taps, cisterns). These tools are presented to the university community within 'Education for Sustainability' workshops, and, on this occasion, they were also introduced to the teaching centres of A Mariña Lucense for the free participation of interested students.

The application used is EMAPIC, a free software service developed by cartoLAB (the cartography laboratory of the UDC School of Civil Engineering), with the peculiarity that all participation contributions are georeferenced. This allows to make the calculation of the ecological footprint, while also registering their geographical distribution and possible habits depending on the location.

The access for contributions is open at this link: <https://emapic.es/custom/oma>. The results of participation in the present academic year 2021/2022 are shown in Table 2 and Image 5. To estimate the amount of CO₂ avoided, an average reduction of 5% in declared per capita emissions after participation in the project's activities was considered.

Table 2. Participation on EMAPIC-OMA carbon footprint tool (2021/2022).

	MOBILITY	WASTE	ENERGY	WATER	Total GHG avoided
Course 2021/2022 (n ^{er} contributions)	99	456	60	182	Total
kgCO ₂ /person-year	708,24	111,45	642,15	249	8222 kg CO ₂

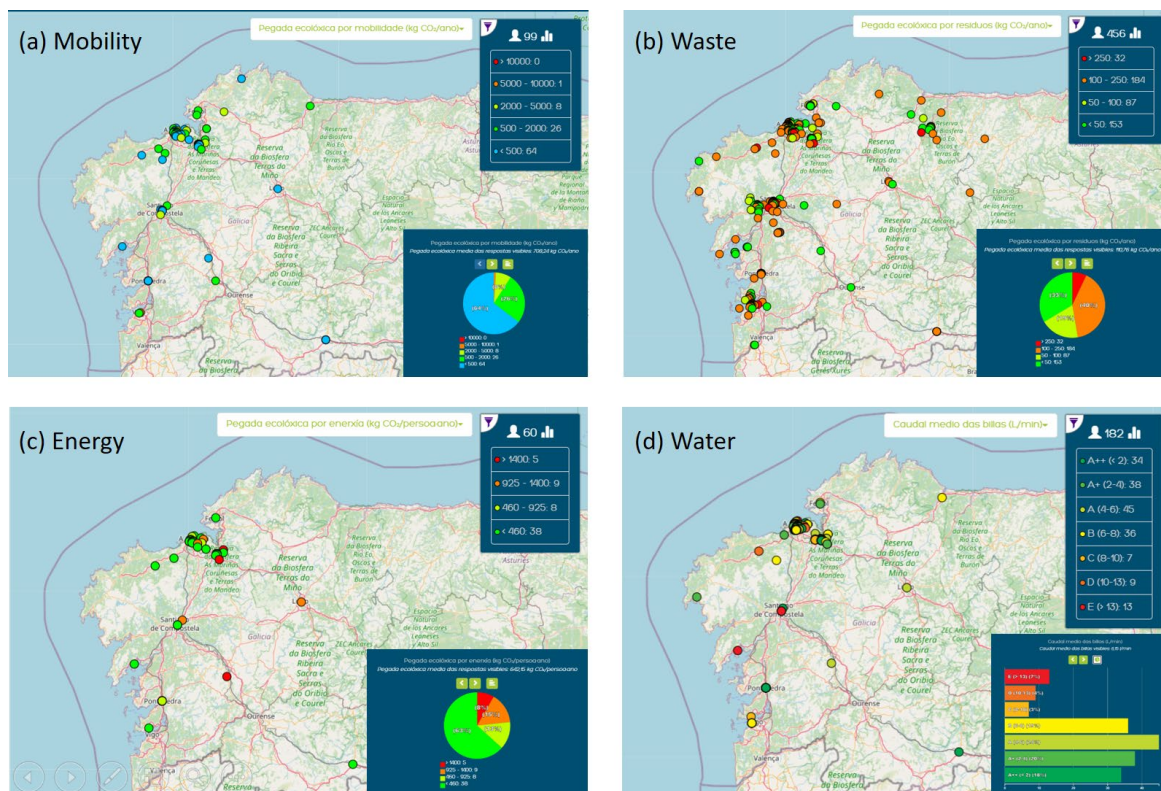


Image 5. Geolocation and graphics obtained for the contributions at carbon footprint and water use equipment during the course 2021/2022.

3.4. OTHER ACTIVITIES

ONLINE COURSE 'ECOLOGICAL FOOTPRINT AND CLIMATE EMERGENCY'



Image 4. Poster of the online course (left); some of the participants during the guided tour (right).

It combined a part about understanding concepts, making use of web tools, citizen science applications, audio-visual material, and supporting texts; with another practical part of analysis and calculation of the personal ecological footprint. The course was completed with a guided tour around the Campus to find out live the main sustainability actions of the UDC: wastewater treatment by wetland, composting areas, energy efficiency, water saving, vegetable gardens, urban sustainable drainage systems, bioconstruction, among others. The course took place between 16 and 30 June, with 27 people enrolled, and 12 of them finally passing the positive evaluation.

COMPOSTING EXPERIENCE AT FERROL CAMPUS



The composting at the Ferrol campus began on June 3, 2022, as a pilot experience and activity for the celebration of World Environment Day. In this initial phase, it included the following stages:

- ✓ Agreement with the dining service staff for the separate collection of waste in the dining room in three fractions: organic (food remains), paper (tablecloths, clean napkins), plastic and metal (packaging, wrapping).
- ✓ Installation of the collection bins for each fraction and information campaign to the users.
- ✓ Installation of 2 composting bins near the cafeteria, to which the canteen staff transfer organics every day.
- ✓ Provision of bulking material to mix with food waste.
- ✓ University volunteer for monitoring the process (addition of bulking agent, mixing, watering and temperature measurement).

The pilot experience was maintained until July 7. The total amount generated was estimated at 445 kg of bio-waste, while the inappropriate ones removed reached only 0.1% of the total. Thus, waste separation was very good. The composting material reached thermophilic temperatures (56.1 ± 4.4 °C) and gradually declined after day 22 due to the lower contribution of waste with the end of the academic year. Monitoring continued until day 54, when the thermal gradient became lower than 15 °C, beginning maturation.

Considered very positively, both by the participation of the university community in the separation of the three fractions, and by the good progress of the composting, its consolidation was proposed. This initiative will allow the recovery of more than 3 t of biowaste and 1 t of packaging and paper for recycling.

4. RESULTS

4.1. PARTICIPATION

The results obtained in the project regarding the hours of involvement of the participants were a **total of 3,262 hours and 2,876 people**, what implicates **1,13 hours per person** of training in sustainability.

In this edition of 'Education for Sustainability', new modules were added, being 'A Mariña Environmental Project' the principal one and followed by the three consecutive days of stands exhibition with sustainable experiences, promoted by the galician title '*Feira da Sustentabilidade*'.

More than 50% of the participation took place during the 'Environmental March at UDC 2022', that achieved near 1,600 implicated people in one month of diverse activities.

Table 3. Participation in 'Education for Sustainability' 2021/2022 Project: numbers per module of formation (left); percentage of participation (right).

	Persons (number)	Hours (number)	
Environmental March UDC	1,596	2,067	- Environmental March UDC - Environmental Mariña Lugo - Online course - Carbon footprint calculator
Environmental Mariña Lugo	471	809	
Online course	12	120	
Carbon footprint calculator	797	266	
TOTAL	2,876	3,262	

4.2. METRICS

Table 4. Expected and obtained metrics in Education for Sustainability Project 2021/2022.

CONCEPT	Expected	Obtained
Number of communities to be impacted by this initiative	4	4
Environment		
Number training hours A Mariña	900	809
Number training hours UDC	2000	2453
Number of individuals (students) to be trained to support environmental initiatives A Mariña	300	442
Number of individuals (students) to be trained to support environmental initiatives UDC	200	245 ^a
Number of teachers to be trained to support environmental initiatives	20	49
Number of environmental initiatives to be created ^b	2	3
Bodies of water to be restored	2	4
Expected reduction of CO ₂ in tons	20	51
Expected reduction in energy use in kWh	40000	68203
Reduction in/avoidance of waste generation in tons	10	11
Tons of aluminum to be recycled	2.0	1.3
Tons of non-aluminum to be recycled	20	29.5
Education		
Number of teachers expected to be trained to deliver academic improvement programs	20	49
Number of schools expected to be impacted by academic improvement programs ^c	16	21

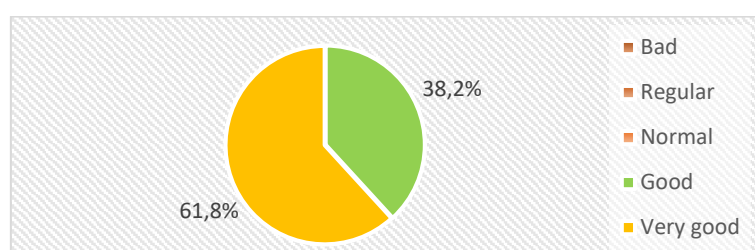
^a Number of students at UDC are considerate normalized by 10 hours of formation

^b Environmental initiatives created: 1) Environmental March, 2) Environmental A Mariña, 3) Other disperse activities: online course, composting at Ferrol campus, Emagic calculators for EF.

^c Study centers directly affected by the academic improvement programs are: **15 at UDC** (Faculty of Sociology, Faculty of Communication Sciences, Faculty of Philology, Senior University, Faculty of Sciences, Faculty of Labor Sciences, Higher Technical School of Civil Engineering, Faculty of Economics, Faculty of Education Sciences, Faculty of Physiotherapy, Faculty of Law, Technical Superior School of Architecture, Study-Support Building in Ferrol, University School of Industrial Design, Ferrol University Cultural Center), **6 at A Mariña** (CEIP Castro de Ouro - Alfoz, CEIP Cervo - Cervo, CEIP Gregorio Sanz - Ribadeo, CPR Plurilingüe Martínez Otero - Foz, IES Enrique Muruais - A Pontenova, IES Perdouro -Burela).

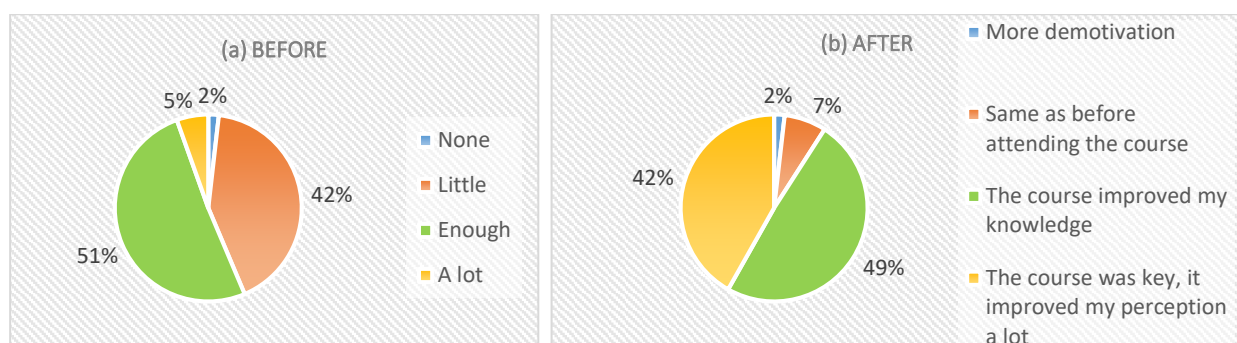
4.3. EVALUATION

The assessment of the 55,5% of participation, included at 'Environmental March 2022' was done using a web form in which 55 assessments by anonymous participants were obtained (Graphic 1) with an overall assessment of 100% Good or Very good.



Graphic 1. Overall rating of Environmental March 2022

In addition, the evaluation questionnaire contained questions for the analysis of the impact of the course on people, before and after having participated in the training modules. The results, which are shown in Graphic 2, reflect that despite the fact that 44% respondents said they had zero or low prior knowledge, then 90% of them achieved a perception of improvement in their knowledge, and 42% considered it key to their training.



Graphic 2. Perception of the people who responded to the assessment survey regarding their learning in sustainability after attending the training modules. (A) "Your knowledge/interest in sustainability issues BEFORE attending this course was..."; (B) "Your knowledge/interest in sustainability issues AFTER attending this course is...".

On the other hand, on June 20, 2022, the preliminary results for the 'A Mariña Environmental Project' were presented to press and to the students and staff in an event that took place at IES Perdouro (Burela). The event was attended by Manuel Fernández Alonso, director of the San Cibrao Aluminum plant, Manuel Soto Castiñeira, director of the UDC Office for the Environment, and María José Pardiñas, director of IES Perdouro (Image 5). The local media echoed the news, which was published in the following newspapers (Image 6):

- El Progreso: <https://www.elprogreso.es/articulo/a-marina/400-alumnos-formaron-sostenibilidad-udc-alcoa/202206211800101585129.html>
- La Voz de Galicia: http://www.newsletterdigital.com/admin/media/recortes/1655779688_vzMarPrograma21.pdf

