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**The Project "Knowing the Global Environment to Act
Locally: From Learning in Natural Areas to Urban
Intervention (GLOCAL-act)"**

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**The Project "Knowing the Global Environment to Act Locally:
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Abstract

The project "Knowing the global environment to act locally: from learning in natural areas to urban intervention (GLOCAL-act)" began in January 2017. The project integrates five teachers from the Polytechnic Institute of Lisbon (Instituto Politécnico de Lisboa - IPL), 4 from the Lisbon School of Education (Escola Superior de Educação - ESELx) and one from the Higher School of Health Technologies and it involves pre-service teachers and children from primary schools, where these pre-service teachers have teaching practice. It obtained funding from the Environmental Fund, under the responsibility of the Portuguese Ministry of the Environment. The project aims to meet the United Nations 2030 Agenda for Sustainable Development and the National Strategy for Environmental Education 2020 in the following strands: to decarbonize society by promoting the development of a resilient and low carbon society; to value the Territory by promoting a territorial civic culture that considers land planning and the conservation and valorization of landscape, natural and cultural heritage. Thus, the project aims to achieve the following objectives: i) the valorization of natural areas, promoting their visitation and a greater knowledge of the biodiversity and geodiversity that characterizes them; ii) the promotion of sustainable mobility between the Campus of the IPL and the Monsanto Forest Park (Parque Florestal de Monsanto), a green area close to the Campus and iii) local action with the aim of improving the environmental quality of the Campus of the IPL. Consequently, several trips to areas of natural interest in the Lisbon region have been carried out. The mobility between the IPL Campus and the Monsanto Forest Park is being intensified, enhancing the educational value of this area within the scope of several activities of different curricular units. An intervention in the Campus of the IPL was carried out with the planting of at least 100 trees and 100 shrubs of different species of the Mediterranean flora. The sites for this plantation were selected by ESELx students, after the evaluation of the characteristics of each species and the identification of the Campus areas that need an increase in plant density. At the end, a general assessment of the project will be discussed.

Keywords: Sustainable Development, Agenda 2030, Natural areas, Higher Education, Primary Education.

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Introduction

The project "Knowing the global environment to act locally: from learning in natural areas to urban intervention (GLOCAL-act)" began in January 2017 and will end on December, 2018. Its main aim is to promote contact with natural areas, aiming to promote nature conservation and understanding the services performed by nature in environmental quality. The target public is pre service teachers from the Lisbon School of Education (Escola Superior de Educação de Lisboa – ESELx) and Primary schools in the Lisbon region, where those students have teaching practice. In addition, it aims to reach other audiences through the construction of a site of the project where several resources will soon be available.

The project was based on two guiding documents: one is a national document, the National Strategy for Environmental Education 2020 (Estratégia Nacional de Educação Ambiental 2020 – ENEA 2020) and the other an international one from the United nations, the 2030 Agenda for Sustainable Development. Thus, the project intends to contribute to the national and international commitments assumed by Portugal in the field of Sustainability.

With regard to the first document, the project meets the following axes:

- to decarbonize society: promoting the development of a resilient, low carbon society, ensuring a sustainable path to reducing national greenhouse gases emissions and adapting to climate change;
- to value the Territory: promoting a territorial civic culture that considers land planning and the conservation and valorization of the natural and cultural heritage, allowing us to live within the ecological limits of the Planet.

In addition to these two axes of the ENEA 2020, the present project also integrates some dimensions of the axe "Making the economy circular", since in the trips to the natural systems and in the activities associated to the intervention in the Campus of the IPL it bets on strategies of consumption with a less carbon footprint, which are more sustainable.

With regard to the 2030 Agenda for Sustainable Development, the project aims to meet the following goals:

Goal 4 - *Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*, since it is an Environmental Education project oriented towards sustainable development and it is hoped to contribute to the acquisition of knowledge and skills for the promotion of lifestyles in harmony with the aims of that kind of development;

Goal 11: *Make cities and human settlements inclusive, safe, resilient and sustainable*, since it seeks to reduce the negative impact of cities by promoting sustainable mobility between the Campus of the IPL and the Monsanto Forest Park (Parque Florestal de Monsanto), and also improving the environmental quality of the Campus increasing its biodiversity and its air

quality and decreasing the noise caused by two highways close to the Campus;

- Goal 12: *Ensure sustainable consumption and production patterns*, since it bets on online educational resources, which can be downloaded, and electrical and electronic equipments already owned by students and pupils of primary education, like tablets and smartphones, that can be used for educational purposes. Likewise, the modalities of visitation to the natural spaces are oriented to the necessity of management and reduction of waste, discussing its impact in natural systems.
- Goal 13: *Take urgent action to combat climate change and its impacts*, since it includes several actions to mitigate climate change through the promotion of sustainable mobility and planting of native species, in line with what is also intended to be achieved under /the/ goal 15;
- Goal 14: *Conserve and sustainably use the oceans, seas and marine resources for sustainable development*, since it promotes the visitation of natural parks, which include several aquatic ecosystems, exploring the role of the oceans in minimizing climate change and the impact of waste, particularly plastics, on these ecosystems;
- Goal 15: *Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss*, since it intends to focus on the importance of the biodiversity and geodiversity of several ecosystems and the actions to be developed in the urban environment aim to fight the proliferation of exotic plants, valuing native species.

Development of the Project

At this point the three main dimensions of the project will be highlighted and remembered: i) the valorization of natural areas, promoting their visitation and a greater knowledge of the biodiversity and geodiversity that characterizes them; ii) the promotion of sustainable mobility between the Campus of the IPL and the Monsanto Forest Park, a green area close to the Campus and iii) local action with the aim of improving the environmental quality of the Campus of the IPL

Visitation of Natural Areas

The Lisbon region is characterized by the existence of several natural parks and natural reserves. In the present project the visitation took place to the Nature Park of Sintra-Cascais (Parque Natural Sintra-Cascais) and to the Nature Park of Arrábida (Parque Natural da Arrábida). The first park is 30 km from Lisbon, in the west coast, and it is a natural area that was intervened by the human being since the XIX century, where the cultural and natural heritages are harmoniously related. For this reason part of the Park was classified by the UNESCO as Cultural Landscape of Sintra.

The second park is also 30 km from Lisbon, in the south, and it is one of the most representative sites of Mediterranean flora, consisting of areas of bushes and forests. Although both parks are close to Lisbon, the majority of the students of the Lisbon School of Education (Escola Superior de Educação – ESELx) never visited them or did it only sporadically. The same happens with the pupils from primary schools in the Lisbon region also involved in the project.

Contact with nature is an important dimension of the training of any student, independently of his/her age or cycle of schooling. As Kola - Olusanya (2005) points out, in natural places students can learn in a more integrated and contextualized way, and learn to respect Nature, also understanding the threats caused by human action, but also the positive actions taken for its preservation.

Figure 1. *Localization of the Nature Park of Sintra-Cascais (Parque Natural Sintra-Cascais) and of the Nature Park of Arrábida (Parque Natural da Arrábida)*



Source: Google Maps

For both target publics, the intention was similar: to make known the important biodiversity and geodiversity of both parks, and also to discuss the impact of human activities on them. Therefore, more than 100 pre-service teachers from the ESELx and also more than 100 pupils visited one of the parks. Since each visit involved up to 25 visitors, several day trips were carried out. However, pre-service teachers had the challenge of building educational resources for primary school pupils. Several proposals were even tested by the pupils who also traveled to the referred Parks, which made it possible to improve them and to reformulate them in several aspects.

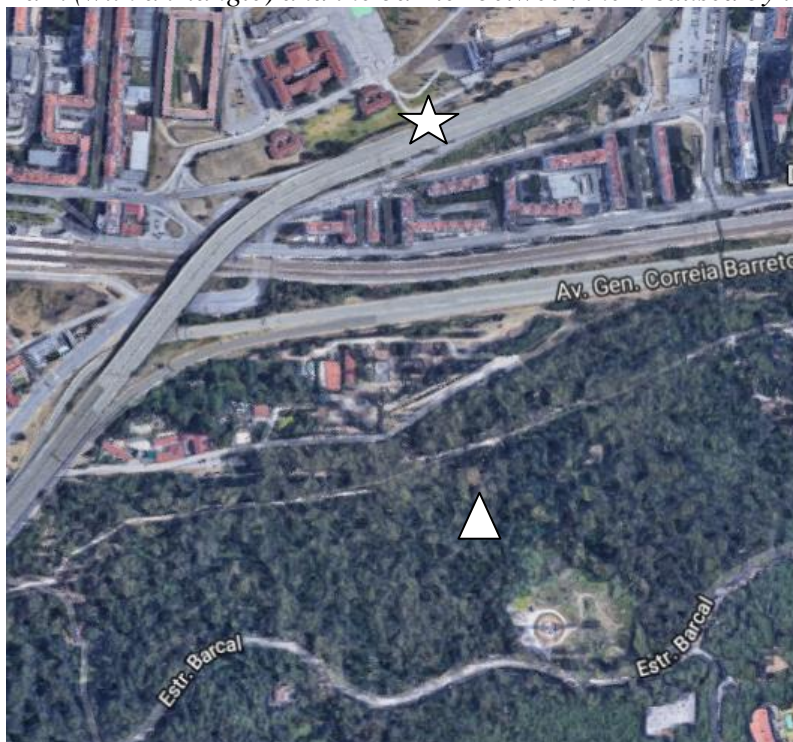
Articulation between the Campus of the IPL and the Monsanto Forest Park

The Monsanto Forest Park is an immense green area in the city of Lisbon (near 900 ha, 1/8 of the total area of the city), which was forested in the thirties of the twentieth century (Tremoceiro & Montinho, 1996), and like almost urban parks, it offers several leisure and sports areas.

At the time of its creation, the appearance of the area was very different. In that time, the land was occupied by wheat fields and pasture areas. Initially, Monsanto was planted with only a few species, but it gains a natural dynamic due to the transport of seeds by birds and micromammals coming from nearby natural areas. Therefore, several plants from the Nature Park of Sintra-Cascais and the Nature Park of Arrábida can also be found here.

One of the borders of Monsanto Forest Park is adjacent to the Campus of IPL. However, the existence of two highways between both areas and a train line are barriers that make more difficult the mobility between these spaces, although there are several connections by road and even a pedestrian crossing, not far from the Campus.

Figure 2. *Localization of the Campus of IPL (with a star) and the Monsanto Forest Park (with a triangle) and the barrier between them caused by the highways*



Source: Google Maps

This part of the project began with the administration of an online questionnaire that aimed to know the knowledge of ESELx students about the Monsanto Forest Park. The questions are in Table 1 with the indication of their type (closed or open).

Table 1. *Questions from the Questionnaire administered to the Students of Lisbon School of Education about the Monsanto Forest Park*

Monsanto Forest Park	Type of question
1. What is the protection status of the Monsanto Forest Park? (Select the correct option)	Closed (Multiple choice)
2. What was the reason for the creation of the Monsanto Forest Park in the 1930s?	Closed (Multiple choice)
3. What relevant natural aspects can be found in the Park?	Open
4. What equipments, infrastructures or thematic spaces can be found in the Park?	Closed (Multiple choice)
5. How many times did you go to the Monsanto Forest Park?	Closed (Multiple choice)
6. With whom were the trips you did to Monsanto Forest Park?	Closed (Multiple choice)

Source: The authors

The questionnaire was answered by 80 students from the various courses of the ESELx. The respondents stated that they live in the Lisbon region (more than 90%). For this reason, the results were quite surprising. The majority of the students (66.3%) classified the Monsanto Forest Park as a Natural Park, and only 2.5% identified it an Urban Park, its real classification. The other alternatives received the following percentages: National Park 16.3%; Protected landscape, 7.5%; Natural Reserve, 2.5%; Natural monument, 1.3%; and I do not know, 3.8%. This result demonstrates the lack of knowledge of the legal framework of the Monsanto Forest Park, but it also reveals the lack of knowledge associated with other preservation statutes previously cited. For example, in Portugal there is only one National Park and 16.3% of the students classified the Monsanto Forest Park as such.

The students' lack of knowledge about the Monsanto Forest Park was manifested also in other aspects, since 80% of the students said that they did not know the reason for its creation in the 1930s. Among the 13 students who said they knew the reasons for its creation, the majority referred the following: i) to improve the environmental quality (61.5%), ii) to have a place for leisure activities (38.5%), iii) to protect certain species (15.4%). Also, 85% of the respondents reported not knowing the natural aspects of the park and 61.3% mentioned not knowing the equipments, infrastructures or thematic spaces that exist there.

In terms of visitation, 30% of respondents said they had never visited the Park and 35% said they did it once to three times. Finally, the respondents who stated that they had visited the park said that the visits were with their families and friends (87.5%). The visitation during primary or high school was referred only by 14.3% of the students and during higher education only by 5.4%. Even so, 14.3% reported to had visited Monsanto in the scope of their work or during voluntary actions.

After the treatment of the presented results, 40 students from two master classes visited an area of the Monsanto Forest Park, more specifically, a small area called “the Biodiversity Space” (50ha from the 900ha). It is a fenced area, with scheduled visits only. Because of this, the space, despite having asphalted paths and several infrastructures such as a seed bank and a clinic for wildlife, is very well preserved and reveals a minor impact of the human presence when compared with the open

surrounded areas. This small area within Monsanto is only 10 minutes drive from ESELx. Even so, it was totally unknown to the students. Through a guided tour, the students could understand some of the main natural features of the area: the geological history, the identification of several plants and their adaptations, the most abundant bird species and could also collect climate data. Since the Monsanto Forest Park was human planted about 80 years ago, it is common to have a dominant tree species by area (e.g. an area with Stone pinus - *Pinus pinea* or an area with cork oaks - *Quercus suber* - and holm oaks - *Quercus ilex*). Based on the information acquired, the challenge to the students was also the idealization of educational resources for primary school pupils. These resources are already designed but have not yet been tested.

Figure 3. On the Left, the Map of the Biodiversity Space, a Small Area inside the Monsanto Forest Park. On the Right, a View of the Space from the Observation Tower



Sources: Respectively, Monsanto Forest Park and Photo by António Almeida

In order to ensure mobility between the two spaces (the Campus of the IPL and the Monsanto Forest Park), and given their proximity, 30 bikes were bought to allow learning activities in the near future.

Local Action with the planting of an Area of the Campus of the IPL with Native Plants

The intervention in the Campus of the IPL with native plants was motivated by several reasons. The Campus was very little wooded and during the summer the high temperatures are felt intensely giving a terrible feeling of discomfort. Therefore, the students try to occupy the few shadows that are available. The proximity of two highways causes a high noise level, as there is no sound barrier to isolate the Campus.

Figure 4. *The Localization of the Planting Action in the Campus of the IPL. The Majority of the Plants were distributed by the Areas with a Star*



Source: Google Maps

Thus, about 100 trees and 100 shrubs from different species were planted (see the species on Table 2). The plantation involved a group of students and obeyed to a previous planning for the distribution of the species for the intended space. A range of activities has been carried out using sensors to analyze noise levels, carbon dioxide levels and temperature measurements. Thus, plantation sites were chosen as the result of these measurements and also from the need to improve the aesthetics of the area, leading to its greater fruition for leisure and learning purposes.

Figure 5. *Photos of the Planting Action in the Campus of the IPL*





Source: Photos by António Almeida

The selection of native species was motivated by several reasons: i) they could be studied in several curricular units; ii) they are better adapted to the climate and require less intensive irrigation; iii) they are species that can be found in the natural parks near Lisbon, mainly in the Nature Park of Arrábida, and some of them can also be found in the Nature Park of Sintra-Cascais and in the Monsanto Forest Park.

Table 2 shows the names of species planted in the Campus. According to Cabral and Telles (1999), a few of them are non-native, but traditional in the Portuguese landscape (e.g. Carob tree - *Ceratonia siliqua* or Judas tree - *Cercis siliquastrum*).

Table 2. Names of the Species planted in the Campus of IPL. The English names are according to Schonfelder and Schonfelder (1990).

Scientific name	English name	Portuguese name
<i>Arbutus unedo</i>	Strawberry tree	Medronheiro
<i>Ceratonia siliqua</i>	Carob tree	Alfarrobeira
<i>Cercis siliquastrum</i>	Judas tree	Olaia
<i>Juniperus phoenicea</i>	Phoenician juniper	Zimbros
<i>Lavandula luisieri</i>	Lavandula	Rosmaninho
<i>Lavandula multifida</i>	Lavandula	Alfazema
<i>Myrtus communis</i>	Myrtle	Murta
<i>Olea europaea</i>	Olive	Zambujeiro
<i>Phillyrea angustifolia</i>	-	Lentisco
<i>Pinus pinea</i>	Stone pinus	Pinheiro manso
<i>Pistacia lentiscus</i>	Mastic tree	Aroeira
<i>Quercus coccifera</i>	Kermes oak	Carrasco
<i>Quercus faginea</i>	Portuguese oak	Carvalho cerquinho
<i>Quercus ilex</i>	Holm oak	Azinheira
<i>Quercus pyrenaica</i>	Pyrenean oak	Carvalho negral
<i>Quercus suber</i>	Cork oak	Sobreiro
<i>Rosmarinus officinalis</i>	Rosemary	Alecrim
<i>Viburnum tinus</i>	Laurustinus	Folhado

Source: The authors

Discussion of Several Aspects of the Project

The different dimensions of the project allowed concluding some relevant aspects. The majority of the pre-service teachers and of the children of different primary schools visited the referred nature parks for the first time. In fact, Kellert (2005) points out that in today's society there is a decline in the unplanned direct contact with nature. The participants in the present project confirm this tendency, at least concerning the nature parks near Lisbon, since the visitation provided corresponded to their first experience with these natural areas. Consequently, the biodiversity and geodiversity of these areas was unknown, of which the result is a lack of knowledge of the territory.

Also the Monsanto Forest Park, only a few minutes away from the Campus of the IPL, was equally unknown to many students. In fact, this space was created by human intervention but gained a natural dynamic that brings it closer to the natural spaces. Therefore, it is also partly understandable that the majority of the students lack the legal status of this area. But, the unfamiliarity of the students with this area is part of the same tendency highlighted by Kellert of the decreasing of the contact with nature in our society.

For Rolston III (1994), it is necessary to intensify a perspective of articulation with the territory, something that he defines with the need to be resident, a concept that extends the community perspective more than the concept of citizenship. As he says:

It is not enough to be a good “citizen”, it is not enough even to be “international”, because neither of those terms have enough “earthiness” in them. “Citizen” is only half the truth; the other half is that we are “residents” dwelling on landscapes. (p. 234)

This perspective leads to a better identification with the landscape and develops a sense of belonging with the territory where each one belongs.

The present project sought precisely this connection with the spaces visited. Also the plantation action in the Campus of the IPL with native flora can be seen as a way to a continuous contact with plants that are fill part of our identity. But, of course, Rolston's concept requires more continued experiences with the territory, and not only the participation in a few activities. Even so, the project GLOCAL-act tries to increase the connection with nature, although knowing that it is only a seed in this long process.

Finally, we should highlight the enthusiasm of the students in the construction of the educational resources for the different areas. The proposals were very diverse and focused on distinct aspects such as vegetation, plant adaptations, the search for traces of animals or the articulation between biological and geological aspects. Also relevant was the action of planting native species in the Campus of the IPL, and the discussion with the students about this preference.

Conclusions

The project GLOCAL-act started with the main aim of promoting the contact with nature, a way to improve the knowledge of pre-service teachers and primary school pupils about biodiversity and geodiversity of two natural parks around Lisbon and an Urban Park in the city of Lisbon.

It aims to continue in the near future, since several educational resources for these areas were designed and need to continue to be tested with pupils from Primary Schools. After this process they will be available at the website of the project and can be used by in-service teachers in the promotion of the visitation of the natural areas explored. The intervention at the Campus of the IPL will be a continuous, monitored and iterative process, in which students and teachers from different UC's will continue to be involved, with the main aim of improving the surrounding space.

It is hoped that the dynamics of the project may have a multiplier effect, since ESELx's mission is largely associated with teacher training courses. Thus, pre-service teachers involved in the dynamics already described can replicate (and recreate) several of the activities with their future pupils.

Finally, the project also seeks to have a multiplying effect of other actions in other educational institutions, evidencing the need for all of us to act to build a more sustainable society.

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