E-Book Creeper Project

Associação POIOMAR

HighonLife

TrainingAcademy
L'ACCADEMIA DELLA FORMAZIONE

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Creeper E-Book

Table of Content

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Introduction

This eBook is the final result of the CREEPER project, a Small-Scale Erasmus+ project implemented in between February 2022 and August 2023. The project consortium was composed of three organisations from Portugal, Italy and France.

CREEPER plants to prevent soil erosion, hereinafter referred to as CREEPER, aims to create a context of discussion, awareness, and intervention in combating the soil erosion through the use of natural engineering techniques and creeper plants.

Central Objectives of the project:

- Implementation of interventions to combat erosion based on the results of the study plan mentioned above.
- Promotion of cooperation between civil organisations and educational institutions
- Production of an e-book with the results of the project on a pedagogical and technical level.

In the pedagogical framework, the e-book presents the methodology used in the project, with a description of the schools involved, the activities carried out by the students, the subject areas involved, the skills acquired, and the results obtained in terms of the students' academic and personal development.

In the technical framework, the e-book presents the results of the different activities of the project, including the identification of sites for intervention, the identification of creeper plant species, the natural engineering techniques used and the definition of the characterisation system for the creeper plants identified.

The e-book also provides details on the characterised creeper plants and the local criteria used in selecting the plants to be used in the various interventions. The e-book is a central tool for the dissemination of the project results and provides technical and pedagogical information useful for the understanding and application of the techniques used.

This high-quality publication contains all the technical data collected during the project and is based on the best reference sources in the field of natural engineering and botany.

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CREEPER PROJECT PRESENTATION

Project description

The CREEPER project - Creeper plants in the prevention of soil erosion, is concerned with combating a hardship that is increasingly present nowadays, and is a universal problem, affecting every geographic context in a progressive manner.

This project was implemented with the aim of achieving the following objectives:

- To explore and raise awareness of the problem of soil erosion and the rejection of natural engineering techniques to combat this problem.

In this regard, 3 meetings were held throughout the project.

The first meeting was held on the island of Madeira, Portugal, where the Poiomar Association explained the problems of the area and with the help of land experts, brought to light what is happening on the island and how to mitigate the risk.

The second meeting was held in Martinique, French Antilles, where the High On Life Association highlighted the issues inherent in erosion, albeit with different temperatures and landforms, illustrated what is happening in their country.

The third and final meeting was held in Rome, Italy, where the Training Academy with the help of an expert botanist showed the partners everything that depicted the problem in the maritime area and possible natural engineering strategies.

- Connecting different European realities and sharing solutions to common problems

In this regard, the problem of soil erosion turned out to be more common than usual, managing to combine simple and sophisticated contexts. The cooperative work among the participating organisations meant that there was an exchange of opinions, ideologies and methodologies. Each plant covered a different environment, but more solutions to the common problem of erosion were shared.

- Promoting cooperation between civil organisations and educational institutions

The cooperation between the schools involved, and the participating organisations resulted in a complete synergy. The synergy was expressed with an increase in students, teachers and staff working. People's knowledge was enhanced and an exchange of best practices and curiosity between schools was realised.

- Implement actions to share learning and good practices in the context of European cooperation.

The implementation of actions involved setting up multiple events to promote awareness of the topic and spread the project message. Each multiple event to be carried out at different times and places to promote the total dissemination of the project and the phenomenon that the project deals with.

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Needs Analysis

Learning by doing is a type of practical learning in which the learner actively participates in a real-world activity in order to gain knowledge and skills. This type of learning is often considered more effective than traditional forms of learning, such as lectures and textbooks, because it allows the learner to apply what they are learning in a practical setting most commonly in a ludic way.

There are many benefits to learning by doing. It is a method that helps learners to develop a deeper understanding of the material they are learning as they are actively involved in an activity. In this way, they are more likely to pay attention and retain what they are learning as they are also motivated at the same time. Practical skills are also developed with this approach of learning. In addition, learning by doing creates a sense of independence and self-efficacy which promotes a level of confidence; as when learners are successful in completing tasks, they feel more strongly about their abilities and are increasingly motivated to contribute even more.

There are numerous ways to incorporate learning by doing into teaching and in this e-book we have presented a very good example of this.

Throughout Europe there are areas that, due to the morphology of the terrain, are highly exposed to natural erosion. Science and engineering have studied this phenomenon and often found ways to mitigate it in nature itself.

The CREEPER project provided work proposals framed within the Biology/Geology subject curricula of secondary education, promoting learning through projects and students' contact with science from a practical perspective. The involvement of other disciplines promoted the empowerment of students as active and participative individuals in their communities, making them aware of the importance of natural resources and the diversity of their applications for the environment and quality of life.

The students were involved during the project by carrying out activities that dealt with gradual steps:

• Identification of the place subject to erosion according to needs, requirements, and research criteria

• Identification and classification of plants according to their use, need and characteristics

• Visual scouting of the identified location and refinement of knowledge

Therefore, the project idea arose from the problem of permanent rock fall and ground instability, the permanent risk of falling stones and the recurring loss of heritage due to landslides, which occur on Madeira Island, and the possibility of using natural engineering. Discussion on this issue with our working network (which includes the E+ programme support platforms) led to the identification of organisations that shared the same concerns with expertise and interests in the area.

This made it possible to develop the CREEPER project and to tackle this application strongly motivated by the interest and relevance we recognise in what has been done.

This initiated cooperation between organisations, believing that the possibility of using community-based natural engineering techniques as a solution to the problem, avoiding the need for high-cost interventions, was fundamental.

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Analyses of each territory proved to be crucial in customising the success of natural techniques and combating erosion, as they were the subject of progress and development in various scientific and human fields. At the same time, the participating organisations moved, on the basis of the science already produced, to promote small-scale interventions at the local level and to share the results of the experience, with the idea of ensuring that the message continues after the project ends.

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Partnership

The partnership between the three organisations was motivated by their common interest in combating soil erosion. Two of the partner organisations come from European outermost regions, with similar geomorphological characteristics; the other organisation includes specialists in the field of local development and agriculture, core areas of the CREEPER project. The partnership also brings together the continental, subtropical and tropical climate aspect, in addressing the problem of erosion, as well as in the possibilities of intervention based on natural engineering, allowing to achieve a broader set of results and, consequently, with greater applicability at European level.

Throughout the project, the participating organisations involved associated partner organisations, through which part of the CREEPER methodology will be implemented.

It is intended that this cooperation results in an interaction that paves the way for new projects, namely Erasmus+ projects, between partner organisations and in which participating organisations can play an active role.

Lastly, the transnationality of the project will make it possible to generate impacts on a larger scale, through the implementation of the Dissemination Plan in the three countries, which gives greater dimension to the project and greater capacity to contribute at European level to the potential of natural engineering in combating erosion and soil stabilisation.

Project Consortium

Associação Poiomar
https://www.poiomar.org

Training Academy
https://www.tracademy.it/

High on Life Martinique
http://highonlife-network.com/high-on-life-martinica/

Associated partners

Escola Básica e Secundária da Ponta do Sol
https://escolabspontadosol.wixsite.co

Centro Studi Genzan
https://www.tracademy.it/centro-studi-genzano.html

Dilon Doubout
http://dillondoubout.fr/

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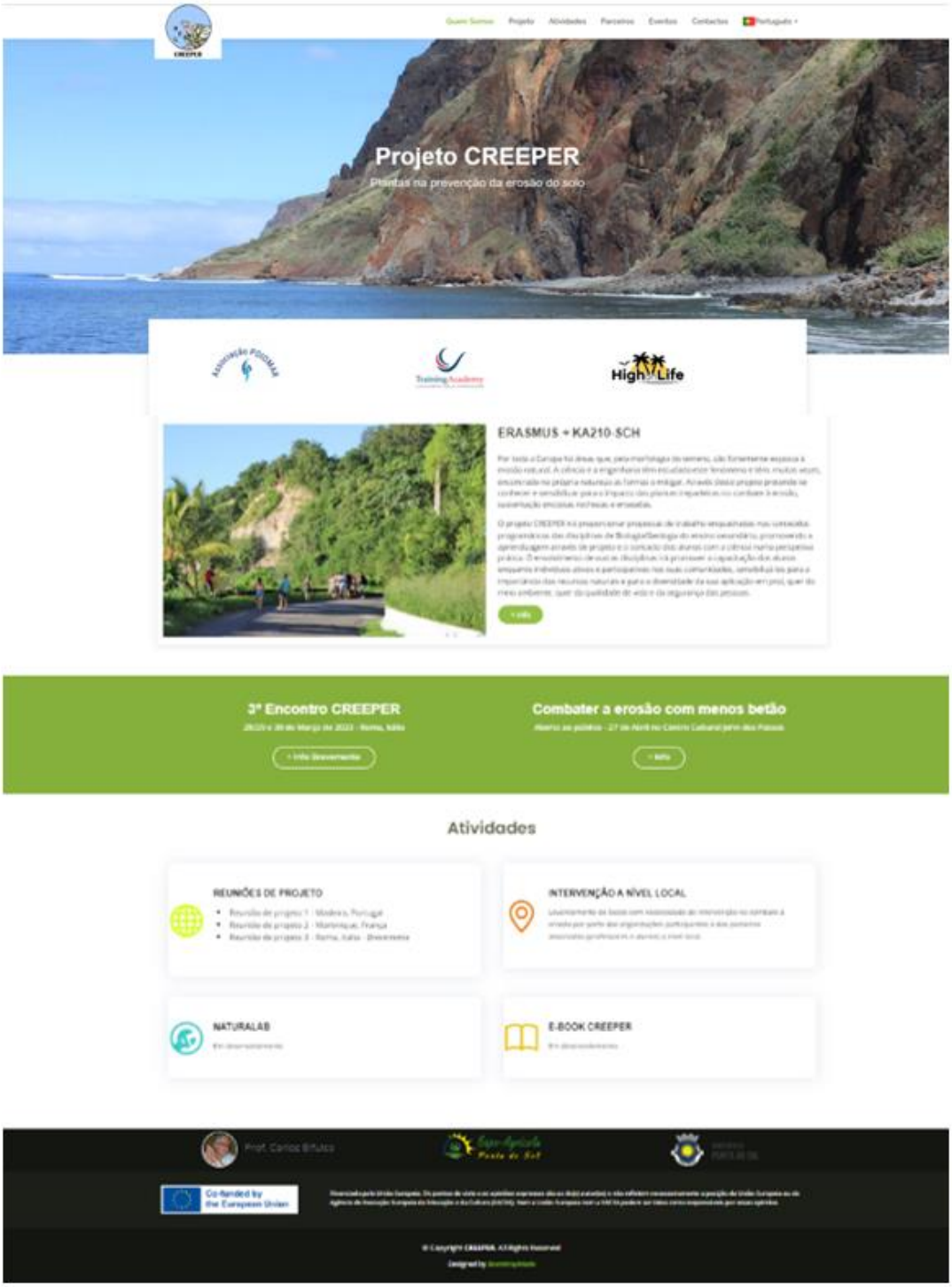
CREEPER Online

CREEPER Website: https://creeperplants.eu/



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PEDAGOGICAL APPROACH

Creeper Methodology

Framed in the European and national priorities of the program, and in the central objectives of the project, we intend with its implementation achieves the following results:

- Develop a study plan on creeper plants and their potential in conserving and sustaining soils and natural walls.

- Identify areas exposed to erosion in the geographical proximity of participating organizations.

- Carry out interventions to combat erosion based on the results of the aforementioned study plan.

- Create NaturaLab, a test laboratory for the growth of creeper plants.

- Carry out training activities within the scope of the project's problems.

- Build an e-Book with the results of the project, at a pedagogical and technical level.

- Carry out actions to disseminate project results.

- Promote exchanges/partnerships of young Europeans.

- Strengthen the working networks of participating organizations.

Nature, civic participation and pedagogy are the three vectors of the project, on which the entire plan will be developed of implementation and respective actions and activities. The issue we are focusing on refers to the physical environment in in which we live and move and the solutions we propose to find are part of environmental protection.

We intend to develop CRREPER in collaboration with associated schools, expanding the ability to civic participation and intervention and sharing of common values. At the same time, we intend to produce an innovative methodological proposal that cuts across the curriculum.

Associated partners involvement description

Involving students in projects can be a valuable experience for both the students and the project. However, to properly execute their involvement, a few pointers should be taken note of:

- The project must undoubtedly be suitable for student involvement and be aligned with their skills and interests to achieve maximum participation;
- Delegation of to ensure that the required competences are acquired or put to test based on the project's results;
- Provision of adequate resources and support to ensure that all the tools are present for the completion of given tasks;
- Encouraging of collaboration to promote the sharing of ideas and confidence; where achievements are celebrated to boost their involvement;

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- Evaluation of progress to give feedback for betterment and motivation.

Student involvement in practical projects is crucial as it can help them develop valuable skills and knowledge while contributing to the success of the project.

Having a proper methodology is essential in practical learning as it provides a structured framework for teaching and learning activities. It ensures a consistent and organised learning environment and promotes skill development.

By following a specific methodology, educators create a cohesive and comprehensive learning experience. This helps with a better understanding of the course, which leads to a more organised and efficient learning process.

A good methodology fosters active student engagement and participation as it entails interactive and hands-on activities that allow students to apply theoretical knowledge in practical contexts. This approach encourages critical thinking, problem-solving skills, and the ability to transfer learning to real-world situations.

In the construction of a methodology consideration must be made to allow for students to practise and refine skills that are relevant to the subject matter as through practical learning activities, students can enhance their data collection, analysis, and experimentation competences. By incorporating a well-designed methodology, educators can enhance the learning experience and help students acquire the necessary knowledge and skills for their academic and professional growth.

The associated partner organization was actively involved in project activities concerning:

- Creation of the project Logo
- Promotion of discussion contexts on soil erosion on the neighbourhoods
- Identification of the site exposed to soil erosion in the vicinity
- Promotion of discussion contexts on natural engineering and plants based solutions
- Identification of useful plants to combat the erosion problem
- Visit to the place subject to soil erosion
- Participation in online meetings with the project partner and associated partner organizations
- Organization of one or more events to raise awareness and disseminate the project
- Collaboration with external organizations in the development of alternative pedagogical contexts;
- Development of project based learning contexts;
- Promoting the civic participation of students and young people;
- Organize events with the participation of local, regional and national bodies and entities;
- Promoting scientific development and cross-sectoral cooperation;
- Cooperate with European organizations in creating new opportunities for the organization and its students, young people and staff.

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Tasks performed by students

The first involvement activity for students in this project involved the creation of the project logo. A contest was held for the students. The CREEPER logo, in order to be evaluated as the best, had the following requirements:

1. Reference to the project title;

2. The theme of the project, namely creeper plants;

3. Can be done by hand or digitally;

4. Can include the colours/flags of the 3 partner countries (Portugal, Italy and France). The logo that was visually most suitable and included these requirements would be declared the winner.

The students did a very important job, collaborating with each other and creating something that came from their own imagination and originality. In the end, the winners of the contest were awarded a prize of 100 euros as recognition.

Identification of places exposed to erosion was the second activity carried out by the students, which were involved in the identification of places subject to soil erosion in neighbouring areas.

Initially, students and teachers discussed and reflected on possible areas in the vicinity of the school that could be prone to soil erosion, such as hilly areas, maritime areas or slopes. After a thorough discussion, a particularly vulnerable areas were identified and selected.

The students and teachers then analysed the information gathered and drew up a detailed strategy for the site identified as prone to soil erosion. The strategy included information on topographical features of the terrain, vegetation present, weather conditions and areas at high risk of soil erosion.

Finally, the students used the information gathered to identify possible solutions to the problem of soil erosion in the selected area and worked with the teachers to develop an action plan to implement these solutions to be discussed with the expert during the in-person visit.

The activity of identifying the site prone to soil erosion in the vicinity thus formed a solid basis for the development of the subsequent CREEPER project activities. The identification of the location was then discussed with an expert so that an inspection could be conducted and an assessment of the actual presence of erosive material could be made. Once erosive material was identified, the expert made a line-up to be explained to the participating staff and the students themselves.

Each participating organisation made in a personal and individual way the identification of locations exposed to erosion and did so according to the degree of danger that the phenomenon itself represented in that particular area. The identification of sites was a very important activity carried out by the students during

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their active participation, and it fostered the study of the territory and surrounding areas. This identification activity was made in total collaboration between teacher and students and was a reason for learning and personal growth for each of them.

Teacher field Trips

After the identification of a site and establishing the need for a field trip, there are a few factors to consider after selecting a site for any project, among which are:

Additional research; it is necessary to find out more information on the site like the cost be transported and if applicable the entrance fee. Another very important aspect is the legal requirements for transporting the learners to the site and the regulations, equipment and protocols which are necessary to adhere to.

In-person visit; once the site has been identified after having done the necessary research, it is important for the educator to see it themselves to better understand its accessibility and test its suitability.

Get expert advice; it is imperative to find someone who is well versed in the field of study of the project who can better guide the educator on this practical aspect.

Field trips are an integral part of the learning experience in practical learning. They allow students to learn in a hands-on way, outside of the classroom. They promote the development of a deeper understanding of theoretical learning as aforementioned and help in engaging with the intricacies of a tangible environment.

Many field trips provide learners with the opportunity to learn hands-on skills, such as cooking, gardening, or simply just observation. These skills can differ based on the project at hand but are very valuable in the workplace and in everyday life. They also serve to increase learner participation and information retention in practical learning, which are two of the main aims of any project.

To execute a productive field trip there are some things to take into consideration. The relevance of the site as mentioned in the previous section is of utmost importance. The selection of the site also relies on the topic, age and interests of the general group, and the aim of the trip. Planning and research are also imperative to organise the necessary logistic factors like transportation and budgeting. It is also recommended that the educator visits the site to ensure that it is meeting the requirements of the needs analysis.

Field trips are great enhancers to the overall experience of practical learning and the obtaining of knowledge and skills for any specific topic, however, it is also important to have at least one debriefing session after, to ensure that the goal of the visit is met.

The Identification of useful plants to combat soil erosion

The activity of identifying useful plants to combat the problem of erosion was an important initiative of the CREEPER project in which the students from the schools involved played a key role. The aim of the activity was to identify the most suitable plants to combat soil erosion, so that they could be used in the subsequent field intervention phase. First, the students were instructed on the main factors influencing soil erosion, including climate, soil type, topography and land use. Subsequently, they were able to accumulate detailed information on the different types of plants that can be used to combat erosion, such as creeper plants. The

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students then researched the different types of plants used to combat erosion around the world, referring to scientific and technical sources. After identifying a number of suitable plants, the students examined the properties of each one and classified the plants using a specific methodology offered by Poiomar, which allowed them to differentiate one from the other based on their characteristics. Based on the information gathered, the students then identified the most suitable plants to combat soil erosion in the area. They also drew up a list of criteria for evaluating the effectiveness of each plant and for selecting those most suitable for the project's needs. The activity of identifying useful plants to combat the problem of erosion was very important because it enabled the students to gain detailed knowledge about plants and their roles in soil conservation. In addition, it gave them the opportunity to develop research, analysis and evaluation skills, which will be useful for their future involvement in environmental and social projects.

When it comes to combating problems in a project, a structured and methodical approach is imperative for identifying potential solutions. The identification and definition of the problem come first; this comprises the understanding of its cause, the impact on the project, and scope. Conducting research helps with the gathering of all relevant information and data to gain a better understanding of the problem.

The brainstorming of possible solutions follows to test out different approaches that could effectively address the problem at hand. This activity is usually more effective in group discussions but depends on the nature of the project.

Having found different possible approaches to combating the problem, an evaluation process is necessary to assess each one to experiment based on its feasibility, effectiveness, and potential impact on the project. Factors such as cost, timeline, required resources, and associated risks and benefits should be taken into consideration during this evaluation.

After evaluating the solutions, prioritisation becomes essential. Solutions should be ranked based on their feasibility, effectiveness, and potential impact, allowing for the selection of those most likely to succeed and have the greatest positive influence on the project.

The development of an action plan should be subsequent to implement the chosen solutions taking into consideration the necessary steps, tasks, timeline for implementation.

Developed skills

The soil erosion site visit activity was an opportunity for the students to directly see the problem of erosion and understand its severity and consequences. The visit was organised in collaboration with an expert in the field who guided the students through the site and explained to them the causes of soil erosion and possible solutions to combat it. During the visit, the students had the opportunity to see how soil erosion has caused soil loss and destabilisation of the area. Experts explained how lack of vegetation cover and excessive exposure to sun and rain can contribute to soil erosion. The students also had the opportunity to see the consequences of erosion, such as falling rocks and the collapse of maritime soil. During the visit, the students were shown how plants can be used to combat soil erosion. The students had the opportunity to see plants that have been successfully used to prevent soil erosion and restore the ecological balance of the area. Our expert also explained how an efficient artificial maritime situation can affect the effectiveness of waves, decreasing them. The students also had the opportunity to ask questions and discuss the problem of soil erosion and ways to combat it. The visit was a valuable opportunity for the students to learn about the field and to see how human actions can affect their environment. It also provided them with

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ideas and knowledge useful for the CREEPER project and future activities related to environmental conservation.

As aforementioned, field trips are integral to practical learning as they provide hands-on experiences outside the classroom, fostering a deeper understanding of concepts and engagement with real-world environments. They enhance practical skills, promote participation and retention, and require careful planning based on relevance, logistics, and needs analysis.

Although the central actions of the CREEPER Methodology are based on the areas of Biology, Geology and Geography, several disciplines will be involved:

• Mathematics and Geometry in the calculation of areas, duration of intervention and useful life, weight and resistance of plants, statistics.

• Foreign language given that the official language of the project is English, as well as the productions but also because of the collaborative work situations in transnational teams and the project's mobility activities.

• Informatics provide support in terms of products and online dynamics and in data collection and processing processes.

• Other disciplines make their contribution in the elaboration of the products, in the support to the activities of mobility/reception, and dissemination actions.

Therefore, students developed the following skills: -Study of the morphology of the territory -Recognizing the usefulness of the flora -Apprehension of engineering solutions -Cooperation and active participation -Study of botany and plant selection.

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Fighting soil erosion

Locations in need of combating erosion are areas where the soil is susceptible to loss by erosive processes, resulting in erosion and removal of topsoil. These areas can vary in scale and include different types of environments, such as urban areas, farmland, riverbanks, hillsides, and road embankments. Erosion can be caused by many factors, such as heavy rainfall, strong winds, deforestation, poor soil management practices, poorly planned construction, and changes in the natural environment.

Some examples of places in need of erosion control include:

- Slopes and slopes: Areas with steep slopes, road slopes, embankments or cuts in land that are subject to landslides and erosion caused by the force of gravity and the action of water.
- Banks of rivers and streams: Areas along the banks of rivers, streams and streams where river water can cause bank and bed erosion, resulting in instability and habitat loss.
- Beaches and coasts: Coastal areas exposed to wave action and sea currents, where coastal erosion can occur due to sediment removal and sea level rise.
- Urban Areas: In urban areas, expansion of concrete and removal of natural vegetation can lead to soil sealing, increasing runoff and erosion. Locations such as construction sites, industrial areas and vacant lots may require measures to control erosion and prevent environmental damage.
- Agricultural land: Areas where intensive agriculture, poor soil management practices, removal of native vegetation and excessive use of agrochemicals can lead to soil erosion, reduced fertility and loss of nutrients.
- Areas affected by forest fires: After forest fires, the burned areas are vulnerable to erosion, as the vegetation that held the soil is lost. These areas may require reclamation and stabilization measures to prevent soil erosion.

Combating erosion in places like these is important to protect the soil, preserve biodiversity, ensure the safety of communities and maintain the health of ecosystems. The natural engineering techniques mentioned above can be applied in different contexts to mitigate the effects of erosion and promote environmental sustainability.

Natural Engineering in Combating Erosion

Natural engineering in combating erosion is an approach that uses techniques based on natural processes and materials to control and prevent soil erosion, to stabilize slopes, riverbanks and areas affected by erosion. This approach aims not only to control erosion, but also to restore and preserve natural processes in the environment. Rather than relying entirely on artificial structures such as concrete retaining walls, natural engineering seeks to mimic natural processes and take advantage of vegetation and other elements in the environment to stabilize the soil.

Here are some common techniques used in natural engineering to combat erosion:

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- Planting vegetation: Vegetation plays a key role in preventing soil erosion. Strategic planting of suitable plant species helps to stabilize the soil through their roots, which trap soil particles and prevent their erosion by wind or water. Grasses, shrubs, and trees are commonly used for this purpose, depending on site-specific conditions.
- Vegetation cover: Maintaining a dense vegetation cover on the soil is important to prevent erosion. This can be done through no-till (no tillage), using mulch (such as straw) or implementing conservation farming practices such as crop rotation and cover crops.
- Living Structures: Certain plant species, such as rhizomatous grasses and deep-rooted plants, have dense, extensive root systems that help anchor the soil. These plants can be used in combination with engineering techniques such as bioengineered building, which uses living plant materials to create support structures and soil stabilization.
- Inert structures: In addition to living elements, inert materials such as logs, stones or woven straw can be used to create structures that slow the flow of water and prevent erosion. These structures help to dissipate the energy of the water, slowing it down and allowing the ground to stabilize.
- Controlling Water Runoff: Soil erosion is often caused by uncontrolled water runoff. Natural engineering involves designing techniques that reduce the speed and amount of water reaching the ground, such as building retention basins, dikes, or drainage channels.

Natural engineering in the fight against erosion promotes sustainable practices, preserving natural resources and improving the resilience of ecosystems. This approach seeks to minimize negative environmental impacts and offer lasting solutions to soil erosion problems.

Creeper plants

Creeper plants are a group of plants that have the ability to cling or wrap around supporting structures such as trees, trellises, fences or walls in order to grow vertically. They have specialized organs, such as tendrils, hooks, aerial roots, or spines, that help them attach and climb surfaces. They have several strategies for clinging to supports. Some species have tendrils, which are spiral-shaped or branching structures that wrap around an object to provide support. Other plants have hooks or spines that attach to surfaces, allowing them to climb.

These plants have an advantageous adaptation to compete for light and space in densely populated environments. By growing vertically, they can better access sunlight and increase their chances of reproduction. In addition, many creeper plants also produce attractive flowers and fruit, making them popular in rockeries.

Some common creeper plants include ivy (Hedera spp.), grapevine (Vitis spp.), bovine (Passiflora spp.), jasmine (Jasminum spp.), and honeysuckle (Lonicera spp.). These plants can add beauty and vertical interest to a garden or landscape, as well as provide shelter and food for wildlife.

Creeper plants are characterized by several distinguishing features that help them adapt and grow vertically. Here are some of the main characteristics of creeper plants:

- Support Structures: Creeper plants have specialized organs that allow them to cling to support structures. These structures can include tendrils, hooks, thorns, aerial roots, or even adhesive shoots.

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- Vertical growth: Unlike many other plants that predominantly grow sideways, vines have the ability to grow vertically. They can extend from the ground to great heights, making the most of available sunlight.
- Flexibility: Creeper plants are generally flexible and able to bend and adapt around supporting structures. This flexibility allows them to move and grow as needed to reach light and attach to surfaces.
- Attachment Organs: Creeper plants have specialized structures that help them attach to supports. These structures can be tendrils (spiral-like or branching structures), hooks, spines, or aerial roots that attach to surfaces to provide stability.
- Reproduction and dispersal: Many creeper plants have colorful, showy flowers, as well as attractive fruit or seeds, which are important for reproduction and dispersal. The flowers attract pollinators, while the fruits and seeds are consumed by animals that disperse them in different areas.

These characteristics of creeper plants make them adapted to diverse habitats and help them compete for light and space in environments with limited resources. In addition, these plants can also offer aesthetic benefits, provide shade, habitat and food for animals, as well as contribute to the biodiversity of an environment.

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Creeper plants description system

Technical application

The technical application relied on a plant classification methodology, which allows the recognition of the plant itself and all its functions. The functions implemented were:

- ➢ Origin
- ➢ Longevity
- ➢ Growth
- ➢ Pest potential
- ➢ Reproduction
- ➢ Presence of flowers
- ➢ Smell of flowers
- ➢ Root type
- ➢ Fixation mode
- ➢ Toxicity
- ➢ Usefulness
- ➢ Water requirement
- ➢ Sun tolerance
- ➢ Minimum temperature
- ➢ Soil type
- ➢ Chemical sensitivity
- ➢ Salinity tolerance

This chart was used for the students' classification of plants. A correction was then made by the expert regarding the characteristics posed by the students themselves, in order to improve their personal knowledge on the subject.

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CREEPER PLANTS

PLANTS DESCRIPTION METHODOLOGY

ONLINE VERSION HERE

You may shoose to fill in the chart online

Scientific name	Gender	Species	Subspecies	Common name

Origin (continent or region)	Longevity			Growth			Infestive potential			Reproduction (1)		
	Annual	Biennial	Perennial	+	++	+++	0	+	+++	A	B	C
	Obs:			Obs:			Obs:			Obs:		

Presence of flowers			Flowers smell			Leaves description	Root type (2)				Fixing mode (3)		
0	+	+++	0	+	+++	Description:	A	B	C	D	A	B	C
Description and seasonality:			Obs:				Obs:				Obs:		

Toxicity (fruit, sap,...)			Utility (4)				Water needs			Solar tolerance			Minimum temperature °C		
0	+	+++	A	B	C	D	+	++	+++	Shadow	Mixed	Solar	- 0	0 - 15	+ 15
Description:			Description:				Obs:			Obs:			Obs:		

Soil type (5)					Chemical sensitivity (6)			Salinity tolerance			Relevant specifications (7)
A	B	C	D	E	A	B	C	0	+	+++	Obs:
Obs:					Description:			Obs:			

LEGEND

1. A - Briophytes+Pteridophytes / B - Gymnosperms / C - Angiosperm
2. A - Pivotante / B - Branched / C - Fasciculated / D - Tuberculous
3. A - Suction cups / B - Root type / C - With support (wire, net,...)
4. A - Fruits / B - Seeds / C - Flowers / D - Other
5. A - Smooth Stone / B - Rough Stone / C – Earthy / D - Sandy / E - Other
6. A - Salinity / B - Atmospheric pollution / C - Other
7. Example: is a climber up to 20 meters high, infesting, always green, with black flowers from April to July and eatable fruits from September to October.

Creeper plants data base

CREEPER PLANTS

	Carimbo de data/hora	Scientific name	Common name	Origin	Longevity	Longevity	Growth	Growth	Infestive potential	Infestive potential	Reproduction	Reproduction	Presence of flowers	Presence of flowers	Flowers smell	Flowers smell
2	2023/03/21 17:57:25	Chrysopogon zizanioides	vetiver	asia			+++	2.5 meters max	+						+	essential oil
3	2023/04/18 13:04:00	Bromus	Bromus Erectus	Africa-Middle East	Annual		+++		+++		B - Gymnosperms		+			0
4	2023/04/18 13:07:32	Trifolium	Trifolium Alexandrinum	Asia	Annual		+		+		C - Angiosperm		+++		+	
5	2023/04/18 13:10:07	Vicia	Vicia Sativa	Europe - Mediterranean	Annual		+		+		C - Angiosperm		+++		+	
6	2023/04/18 13:13:09	Phleum Pratense	Coda di Topo/Erba di Tin	Europe/Asia/Mediterrane	Perennial		+++		+		C - Angiosperm		+			0
7	2023/04/18 13:17:09	Alopecurus Pratensis	Coda di Volpe	Europe/Asia	Perennial		++		+		C - Angiosperm		+			0
8	2023/06/28 12:45:39	Coccoloba uvifera	Sea grape	Regiões costeiras da Am	Perennial		++		0		C - Angiosperm		+	As flores são esbranqui	+	
9	2023/06/28 12:56:45	Carissa macrocarpa	Ameixa do natal	nativa de regiões costei	Perennial		++		0		C - Angiosperm		+++		+	
10	2023/06/28 13:09:19	Carissa carondas	Carandá	da Ásia, incluindo Índia,	Perennial		++		0		C - Angiosperm		+++		+	
11	2023/06/28 16:27:00	Cocos nucifera	Coqueiro	nativo das regiões tropic	Perennial		+++		0		C - Angiosperm			0		0
12	2023/06/28 16:37:51	Phoenix dactilyfera	Tamareira	zona desértica do norte (	Perennial		+++		0		C - Angiosperm		+			0
13	2023/06/28 16:44:40	Tamarindus indica	Tamarindo	savanas africanas, embo	Perennial		+++		0		C - Angiosperm		+		+	
14	2023/06/28 17:05:14	Syzygium cumini	Jamelão	Sul da Ásia	Perennial		+++		0		C - Angiosperm		+		+	
15	2023/06/28 17:13:29	Eleagnus pungens	Oleagno	Ásia	Perennial		++		+		C - Angiosperm		+			0
16	2023/06/28 17:19:20	Aegle marmelos	Fruta de Bael	Bangladesh e Índia	Perennial		+++		0		C - Angiosperm		+		+	
17	2023/07/05 17:32:46	Agrostis obtusissima	Gramínia	RA Madeira	Perennial		++		+		C - Angiosperm		+		+	
18	2023/07/05 17:38:57	Brachypodium distachyon	Gramínia	Portugal (continente e ilh	Perennial		+		0		C - Angiosperm			0		0
19	2023/07/05 17:43:46	Brachypodium sylvaticum	braquipódio-bravo	Portugal (continente e ilh	Perennial		+		+		C - Angiosperm		+		+	
20	2023/07/05 17:48:34	Briza maxima	Abelhinhas	Portugal	Perennial		++		+++		C - Angiosperm		+++		+	
21	2023/07/05 17:52:44	Briza minor	Chocalhelinha	Portugal	Perennial		++		+++		C - Angiosperm		+++		+	
22	2023/07/05 17:57:00	Cynodon Dactylon	Relva das bermudas	Portugal continental e Ilh	Perennial		+		+++		C - Angiosperm			0		0
23	2023/07/05 18:00:36	Cynosurus cristatus	Rabo de cão	Portugal	Perennial		++		+++		C - Angiosperm		+++		+	
24	2023/07/05 18:05:41	Scandix pecten-veneris	Garfinhos	Portugal continental e RA	Perennial		++		+		C - Angiosperm		+++		+	

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Conclusion

In conclusion, hands-on learning is a valuable approach to education that provides students with practical, real-world experiences that enhance their understanding and retention of subject matter. By actively interacting with the material they are learning, skills like critical thinking and problem-solving skills are developed. The incorporation of practical learning experiences into the syllabus, can help to create an environment that fosters student engagement, creativity, and overall involvement. This learning approach allows students to be able to apply the concepts they are studying in the classroom, in the real world. They are able to bridge the gap between theory and practical learning which in turn creates a dynamic and effective learning environment that prepares students for success in the future.

The CREEPER project demonstrated the effectiveness of natural engineering techniques and creeper plants in combating soil erosion. By identifying suitable plant species and implementing specific actions based on local conditions, the project demonstrated how erosion can be addressed in a sustainable and environmentally friendly way. The project also stressed the importance of cooperation between participating organisations in achieving this goal. By involving local communities and promoting knowledge sharing, the project has created a network of stakeholders committed to preserving and enhancing the region's natural resources. The e-book created within the project is a valuable resource for anyone interested in natural engineering techniques and plant solutions to soil erosion. It provides a detailed overview of the project results, including the identification of suitable plant species and the implementation of specific interventions, and offers insights into the technical and pedagogical aspects of the project. Overall, the CREEPER project is a successful example of how natural engineering techniques and local knowledge can be used to address environmental challenges and how cooperation between different actors can lead to a more sustainable and resilient future.

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