Deliverable 2.1

Report on Ecological Restoration Needs

Hochschule Anhalt (HSA), Lead Beneficiary
Work Package # 2

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TEAM#UP- Knowledge on Ecological Restoration to Maximize Benefits for Nature and People

Summary

Work Package 2 (WP2) of the TEAM#UP project works in the cooperative development of modules and is led by the Hochschule Anhalt (HSA) and the Agriculture Technical School of Saxony-Anhalt (HDL). VET schools have teamed up with scientific organisations and private sector or civil society partners to work together in 1) analyzing educational needs, 2) designing curricula and approaches and 3) developing course material in national CoVEs.

This document, Deliverable 2.1, focuses on the analysis of educational needs in three distinct, but interrelated, ways.

First, WP2 partners from TEAM#UP summarize the results of TRAIN#ER, a former ERASMUS+ project (2022-2023), which conducted surveys, hosted focus groups and initiated a community of practice, to better understand training needs of VET students and lifelong learners in the field of ecological restoration. Take-home messages and final project recommendations are presented.

Second, this report outlines the structure and methodology of TEAM#UP project-level and national teams in the scoping of educational needs. National teams outline their unique but overlapping methods for analysing current curricula and assessing how to best incorporate educational materials on ecological restoration to the VET program.

Last, an overview is presented of how scientific partners began the process to identify the most important pillars of restoration ecology in order to define learning objectives of the TEAM#UP project. General learning objectives were defined in a common way, among all WP2 partners combining the pillars of ER with the results from the TRAIN#ER project. Nationally, specific learning objectives were further defined to reflect the unique aspects of ER within participating nations and local ecosystems.

1. List of Abbreviations

COP	Community of Practice
CoVE	Centre of Vocational Excellence
DERTO	Digital Ecological Restoration Toolbox
EC	European Commission
ER	Ecological Restoration
EU	European Union
GA	Grant Agreement
HSA	Anhalt University of Applied Sciences
OER	Open Educational Resources
SER Europe	European Chapter of the Society for Ecological Restoration
USB	University of South Bohemia
VET	Vocational Educational and Training
WP	Work Package

2. Overview of the project

TEAM#UP will contribute to promoting, through innovative educational schemes, the transition to greener and climate-resilient economies, as called for in the Green Deal. It underpins educational programs liaising with practitioners via green VET that includes a wide range of learnings, to name a few:

Digital tools (e.g., visualisation of demonstration sites with augmented/virtual reality); Standards, protocols and priority of actions; Ecological restoration methods and approaches; Monitoring and surveying techniques; Financial mechanisms; Stakeholder engagement and Science-education-industry interface.

Our main goal is to mobilise extensive knowledge and skills in ecological restoration to fill gaps in green VET. Overcoming the barriers to knowledge transfer and improving training in ER will be critical to upscaling the practice of ER across Europe to counteract biodiversity loss and habitat degradation in the face of climate change.

2.1 Objectives

TEAM#UP has set up eight specific objectives. Its work is organised in 7 Work Packages. For more details, visit https://teamup2restore.eu/workplan

1. **Develop ecological restoration curricula** for VETs targeting pressing needs of future professionals across sectors to successfully implement European green strategies, engaging multiple actors from the public, private and non-profit sectors.
2. **Implement four specific curricula** as OER (Open Educational Resources) in ecological restoration for VET.
3. **Use and advancement of demonstration sites** to spur hands-on skills, responsibility and autonomy in VET on ecological restoration.
4. **Foster reciprocal exchange** of needs, knowledge, skills, and competences between secondary and tertiary education providers, scientists and practitioners at regional and national level

5 **Initiate international knowledge exchange** and collaborative curricula development of students and teachers at nationally-oriented VET providers.

6 **Showing the added-value of ecological restoration** as a business model and career opportunity (Ideathon)

7 **Communicate on education of ecological restoration** in the context of VET and transfer to other countries.

8 **Sustainability and long-term impact** of TEAM#UP on education in ER.

2.2 TEAM#UP Consortium

The consortium comprises 15 institutions and organisations from 5 European countries: Belgium, the Czech Republic, Germany, Norway and Spain. Among them are researchers, educators, practitioners and communicators passionate about ecological restoration and its benefits to society and our planet. Learn more about them on our website: https://teamup2restore.eu/partners

2.3 About Work Package Two (2)

Work Package 2 of the TEAM#UP project works in the cooperative development of modules and is led by the Hochschule Anhalt (HSA) and the Agriculture Technical School of Saxony-Anhalt (HDL). VET schools have teamed up with scientific organisations and private sector or civil society partners to work together in 1) analyzing educational needs, 2) designing curricula and approaches and 3) developing course material in national CoVEs. Additionally, WP2 is tasked with the exchange and cross-validation of educational course material.

2.4 Centres of Vocational Excellence

To support the transfer of knowledge and innovation to practitioners via VET schools, TEAM#UP national partners are establishing four CoVEs:
(1) Germany - multifunctional and sustainable land use in agricultural systems
(2) Norway - restoration of infrastructure, ecological compensation & landscaping
(3) Czech Republic - restoration across urban and rural landscapes
(4) Spain - forest restoration and disaster risk management

2.5 Workplan

TEAM#UP partners are developing teaching materials and implementing ecological restoration curricula with VET schools in Spain, the Czech Republic, Germany, and Norway to fill gaps in knowledge and skills in the agricultural, forestry, landscaping and gardening sectors. TEAM#UP aims to remove barriers between research in restoration ecology and these sectors by serving this knowledge in ways suitable to VET education.

The following figure shows how TEAM#UP organises its work, the interaction among WPs and the flow of information.

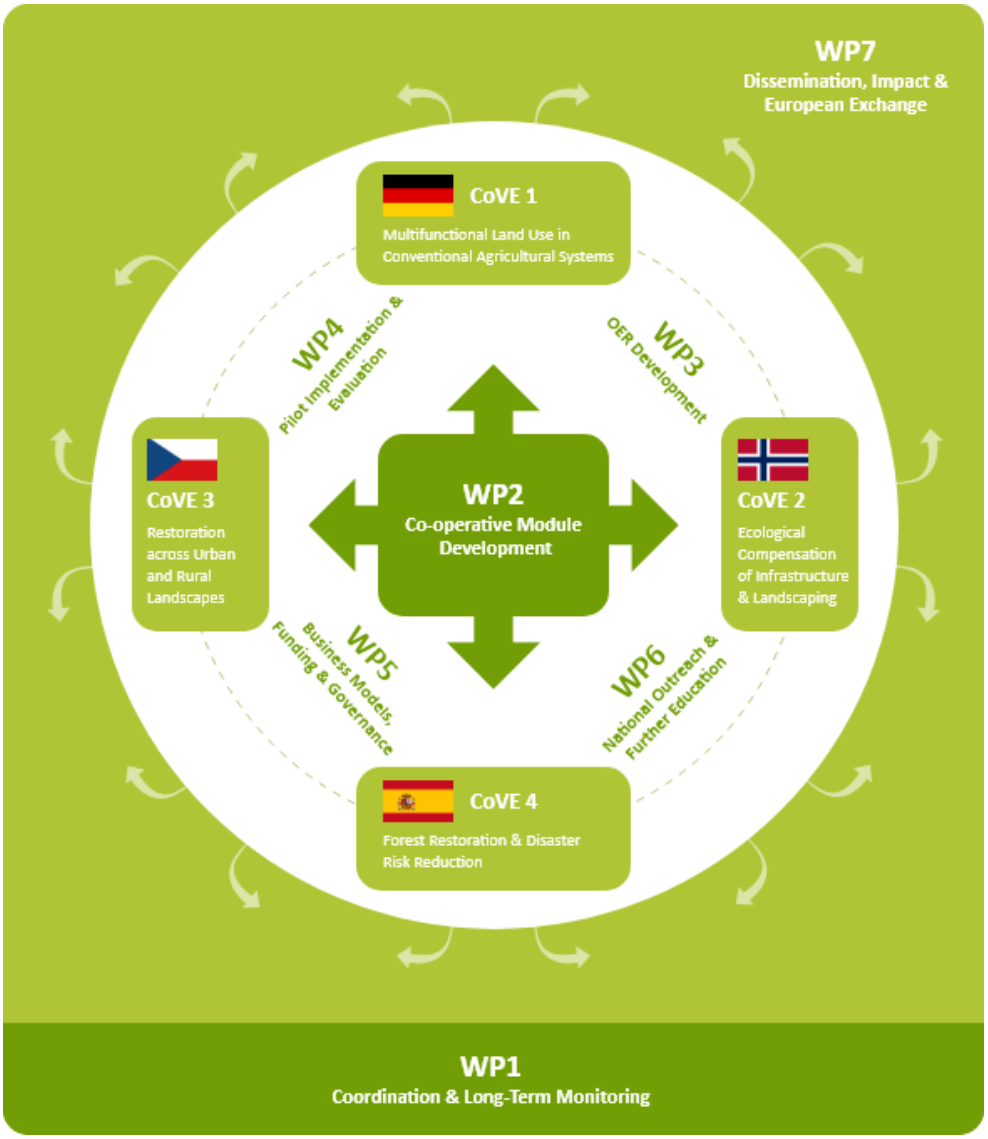

Figure 1: TEAM#UP Workplan

3. Summary of Results from TRAIN#ER

3.1 About the TRAIN#ER project

The TRAIN#ER project (2021-2-BE02-KA210-VET-000049240) aimed to achieve a shared model for vocational training needs in Ecological Restoration (ER), based on a common analysis of knowledge production and use in the participating countries and a final joint definition of recommendations.

Implemented by a consortium of 8 organizations, TRAIN#ER had the aim of identifying knowledge from educators and users, detecting gaps in knowledge production and transfer, and contributing to designing effective vocational training programs that integrate the specificities of the different socio-ecological systems, scientific and technical skills, including language, inclusion and cultural barriers.

The TRAIN#ER project had a five-step process as indicated in the figure below.

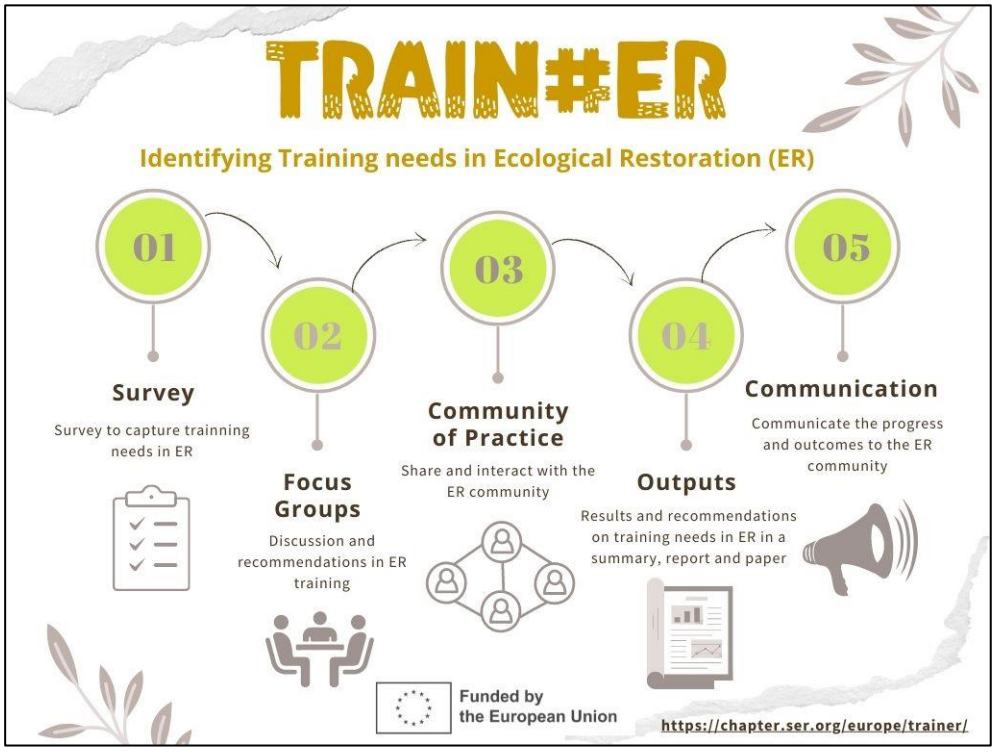

Figure 2. Workflow diagram of TRAIN#ER Project.

3.2 Main Results of the TRAIN#ER project

After the successful completion of the surveys, focus groups, and interactions within the Community of Practice, the primary outputs of TRAIN#ER were developed.

From the national and EU-wide surveys, several important results emerged. As shown in Figure 3 (from Kirmer et al. 2023), participants from both VET programs and continuing education showed a high demand for basics in ecology, restoration methods, planning, basics in ecological restoration, case studies, and sector-specific measures.

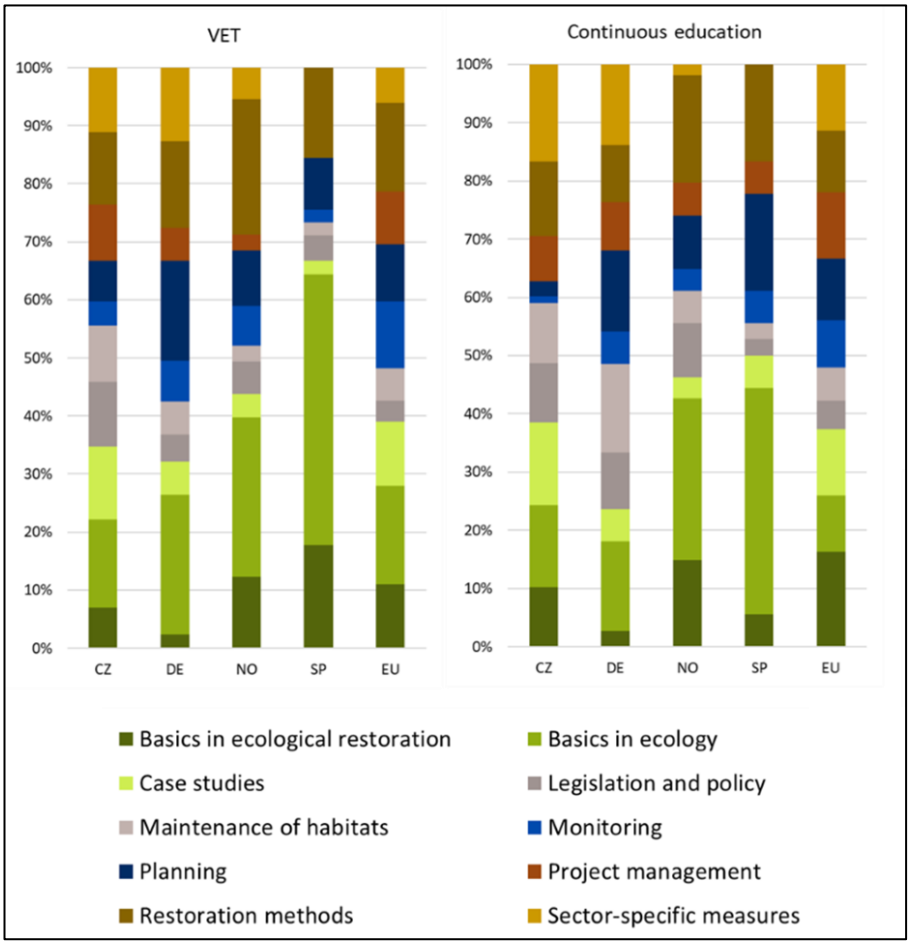

Figure 3. General demand (%) for topics related to ER in VET and continuous education from the participants' perspective. CZ= Czech Republic, DE= Germany, NO= Norway, SP= Spain, EU= European Union.

These take-home messages from the TRAIN#ER project helped to inform educational tasks for the TEAM#UP project.

1. Improved cooperation within European and national networks is most important to broaden and strengthen opportunities and outcomes in ER education.

2. Tailored learning materials on ER topics are necessary to improve ER training in education.

3. Internet platforms are useful to facilitate access to relevant ER materials as Open Educational Resources, which should be easily accessible and easy to understand.

4. Demonstration sites and examples of good and bad practices are highly useful for knowledge transfer into VET and continuous education.

5. There is a need to improve existing VET and continuous education curricula and to qualify teachers in ER-relevant topics.

6. New education programs focused on ER are in great demand.

3.3 Recommendations and Guidelines from TRAIN#ER

The following recommendations were derived from the TRAIN#ER project for education and training of emerging professionals.

- There is an urgent need to qualify secondary school and VET teachers in ER topics and supply innovative educational materials to support their work, including compact summaries of the science and practice of ER, and access to well-documented demonstration sites.

- A network of demonstration sites should be built, showing examples of good and bad practice, distributed across Europe to facilitate physical access to emerging and experienced professionals. Sites and outcomes should be thoroughly documented, so practices can be replicated, and mistakes avoided.

- New VET and higher education programs focused on ER must be developed, although intensity and topics of interest differ between different countries. In addition, knowledge on different aspects of ER should be integrated into the educational curricula for gardeners, landscape gardeners and architects, machine operators, agronomists, and foresters.

- New programs and courses should encourage a holistic multidisciplinary approach to ER, promoting critical thinking.

- VET programs should focus on a wide diversity of topics, including the basics of ecology and ER, ER methods, and planning.

- A suitable environment must be created to promote ER studies in secondary education and VET and engage new generations. Awareness raising actions should highlight the importance of nature for human well-being, the potential benefits that ER can deliver, and ER approaches and methodology.

4. Scoping of Educational Needs in TEAM#UP

4.1 Project-Level and National Teams

A main component of the TEAM#UP project is to create curricula and teaching material on ecological restoration subjects for vocational education and training (VET) schools, thus establishing four Centres of Vocational Excellence (CoVEs). Starting with the take-home messages and final recommendations gathered from the TRAIN#ER project, partners within TEAM#UP began scoping the educational needs of national VET providers. This was done in two ways. First, work package 2 (WP2) members were selected based on their abilities to provide expert knowledge to inform the creation of educational material in ecological restoration (ER). Second, national teams formed in order to tailor general knowledge on ER into ecologically relevant and CoVE-specific educational material.

4.2 Methodology

At the project level, WP2 members met once per month to discuss the various methodologies used in scoping educational needs and knowledge gaps at national levels. While some VET partners preferred to integrate knowledge on different aspects of ER into existing educational curricula (e.g., IES El Palmeral in Spain), others saw an opportunity in adding content on ER to new VET programs (e.g., Benešov in Czech Republic).

A summary of scoping methodologies by each national team is provided below.

In the **Czech Republic**, the partners met approximately once a month. First, it was necessary to study the existing curricula of several study programs where the content of the new ER curriculum would potentially fit the best. This was done from both sides, USB and the Benešov VET school. Together, we detected several subjects where there was a potential to include the ER topics. In the next phase, USB started to prepare a teaching plan covering the ER topics. This draft was

deeply discussed with the national partners to best cover the VET school needs. The finalized teaching plan consists of the topics covered by the ER course, the format of the materials, and the number of teaching hours per topic. The Benešov VET school then allocated a particular topic to their study programs where it would fit the best. A new study program (Design of Urban Greenery and Landscape) had been previously developed and most of the ER content of the teaching plan will be added to this program. The teaching plan reflects the learning objectives defined for the ER course.

In **Germany**, VET (Haldensleben) and scientific partners (Hochschule Anhalt) looked at the VET curricula for „Economist in the Agricultural Sector“ and „Agricultural Business Manager“ to determine the extent to which ER content is already taught in vocational school lessons. It was found that the current challenges and problems of land use are discussed, legal framework conditions are defined, measures for ER are named and funding opportunities are discussed, but in different learning fields at different points in the school year. The teaching of how ER measures are established on the farm has not yet taken place. Basic knowledge of ecosystems was assumed from general schooling.

It was concluded that the basics for understanding ER should be taught as a part of the program. To ensure added value for the students, it was decided to integrate a basics of ecology & ecological restoration course (30 lesson units) into the mandatory English lessons of the „Agricultural Business Manager“. This way, students will improve their language skills while deepening their prerequisite knowledge of ecology and ER. The content of the course is to be harmonised with the requirements of the framework directive for technical schools.

In addition, Haldensleben is planning a voluntary, advanced course (approx. 30 lesson units) in which in-depth knowledge about ER (e.g., land history, selection of wild seed mixture, seedbed preparation, timing of sowing, post-planting maintenance, ecological effects) will be learned. This applied learning will be carried out on a demonstration area (for example, one strip will be planted in autumn (externally as part of the plant production lessons at the technical school) and one strip in spring (as part of the advanced course). This will allow students to observe and analyse different stages of development. Furthermore, the observations and results will be captured and presented as part of a digital tour using virtual reality.

VET schools and scientific partners in **Norway** have been working closely together to ensure that ER material is incorporated into educational programs through both monthly and weekly meetings.

Initially, existing curricula in relevant studies were worked through to see how they could be adapted to ER. It was found that minor changes were needed to better highlight ER. Next, it was looked at which ER courses could be offered at Vea, the Norwegian VET school. Through weekly meetings, curricula for the courses were developed in collaboration with researchers from NINA and teachers from Vea. For one of the courses, there has also been dialogue with the Norwegian Nature Inspectorate about the curriculum. Course plans have been drawn up for courses in Introduction to Nature Restoration, Flower Meadows, Peatland Restoration and Stream Opening. The possibility of combining the courses into a study within ER has also been discussed.

In **Spain**, the teams from CIDA and IES Palmeral conducted a thorough review of Medium and Higher Degrees relevant to ecological restoration, including Emergencies and Civil Protection, Landscaping and Rural Environments, Agro-ecological Production, and Management of Forests and Natural Environments. Following an initial assessment by all Spanish teams, we focused on three specific degrees: the Medium Degree in Agro-ecological Production, and the Higher Degrees in Management of Forests and Natural Environments, and Landscaping and Rural Environments. This decision was made because we streamlined administrative and logistical burdens by narrowing our focus, these degrees encompass the majority of topics related to forest restoration, and they are widely present in VET schools across Spain.

Subsequently, IES Palmeral, AGRESTA and UA undertook a detailed analysis of the contents of these degrees, identifying and emphasizing topics pertinent to ecological restoration. Upon comparing and aligning our findings, we established a cohesive set of contents organized into blocks and sessions to ensure consistency with our TEAM#UP partner countries and to outline a coherent learning pathway.

The University of Alicante team supplemented this list with additional topics beyond the existing curricula, potentially leading to the development of a series of microcredentials. IES Palmeral then allocated the learning sessions to either the Medium Degree (30 hours) or the Higher Degree (42 hours) and determined the duration of each block. These blocks were subsequently assigned to members of IES Palmeral, AGRESTA, and UA teams based on their expertise and interests, ensuring representation from IES Palmeral across all learning blocks. Finally, the group of trainers responsible for each learning block collaboratively developed a draft index of contents for discussion among all participants. This process aimed to enhance the coherence of the program, identify any gaps and overlaps, and foster connections, interactions, and interdisciplinary activities.

Once each VET school and associated scientific, private sector and civil society partners had examined the existing curricula, determined knowledge gaps in ER, and discussed approaches for introduction of educational material, it then became necessary to properly define the VET learning objectives, both at project and national levels.

5. Defining Learning Objectives

5.1 The Pillars of Restoration Ecology

What are the pillars of Restoration Ecology that should be included in all curricula, regardless of country or ecosystem? This was the question posed to all scientific partners. Using the interactive Miro board system and a variety of scientific material related to ecological restoration (see Citations page), a draft of ER pillars began to take shape. Specifically, we started with persistent and emerging themes of ER found in the Foundations of Restoration Ecology, 2nd Ed. Textbook (Palmer et al. 2016). The textbook provided a comprehensive list of general questions, from which we were able to collectively derive the pillars of ER (see Figure 4).

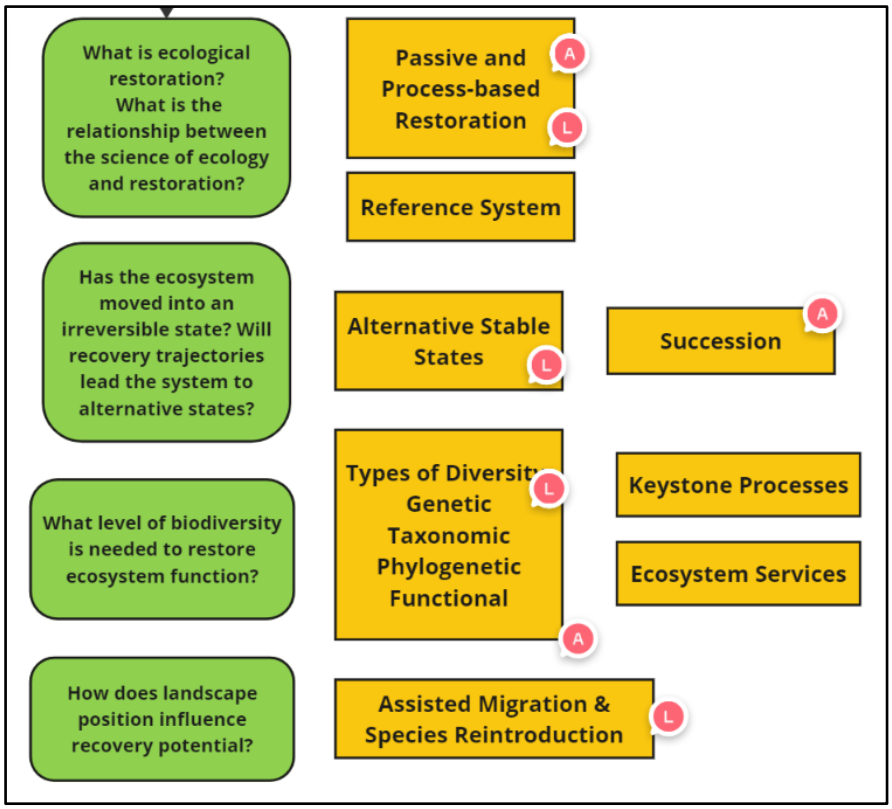

Figure 4. Examples of ER Questions (green), Associated 'Pillars of ER' (orange), and Comments from Scientific Partners (red).

Once a consensus-based list of pillars was agreed upon, we summarized these pillars from the Miro board into a working PowerPoint document, with each slide being a different pillar. From these slides, we further refined pillars of ER and provided some general examples.

5.2 General Learning Objectives

With the pillars of ecological restoration defined, that is, having a definitive answer to the posed question, 'What are the pillars of Restoration Ecology that should be included in all curricula, regardless of country or ecosystem?', the WP2 members began to scope and define the general learning objectives of curricula to meet the educational needs of VET on the subject of ecological restoration.

This was accomplished by categorizing objectives into the different focus modules provided from the TRAIN#ER survey and results. Examples of primary general learning objectives included 1) basics of ecology, 2) basics in ecological restoration, 3) restoration methods and monitoring, 4) visualization of demonstration sites using augmented and virtual reality, and 5) training in business development. For a full list of general learning objectives, see Annex 2.

The exercise to define the pillars of ecological restoration was used to ensure the basics were covered in the summary descriptions of each objective, particularly basics in ecology, basics in ER, and restoration methods and monitoring (Annex 2).

5.3 National-specific Learning Objectives

While all VET schools are taking the general learning objectives into account while creating national educational material, there are specific learning objectives unique to each country and their corresponding ecosystems and ER needs. These form the basis for each unique CoVE (refer to section 2.4 of this report).

In Norway, for example, the national teams emphasized soil, stormwater management, and stream and riverine restoration. In Spain, learning objectives were aimed at case studies in wildfire-prone ecosystems and their restoration, soil-plant relationships, geographic information systems (GIS), and marketing and entrepreneurship in the field of ER. Since VET students in Germany specialize on agriculture, the specific learning objectives focused on agro-environmental schemes, historical agricultural landscapes, funding sources and business development. In the Czech Republic, courses are planned to be developed highlighting urban ecology (greening) for biodiversity conservation, ecological restoration of post-mining sites, and the restoration of species-rich grasslands.

Additionally, two distinct glossaries were created, in English and all partner languages, to ensure comprehension and understanding are reached across potential language barriers. The first glossary is composed of educational terms and the second glossary is focused on terminology relevant in the field of ecological restoration.

6. Moving Forward with Educational Material Development

6.1 The Path Forward

Consistent with the final recommendations from the TRAIN#ER project, TEAM#UP is moving forward with tailored educational material on ER at local and national levels while simultaneously working on the creation of ER courses and modules to be used at EU and international levels through the Open Educational Resource, Digital Ecological Restoration Toolbox (DERTO) platform.

Citations

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Annex 1

General Learning Objectives

Learning Objectives- General	Summary Description
Basics in Ecology	Starting from the concept of ecosystem functions and services, students have learnt the value of intact ecosystems, what threatens ecosystem integrity (intensive use, invasive species, pollution) and what makes ecosystems more resilient to different stressors, (especially related to a changing climate). They are familiar with most basic vegetation types in their region and understand the importance of management to maintain their biodiversity (landscape variability and structural diversity). Students are able to define and give examples of basic ecological concepts such as: biodiversity, niche, succession, habitat, population, community, ecosystem, food webs, predator/prey, keystone species, symbiotic relationships, carbon sink vs. source, pollinators.
Basics in Ecological Restoration (ER)	Students are able to define ER and can explain various motivations for ER. They know what a reference ecosystem and a target state is and the different approaches of ER with their benefits (biodiversity) and limitations, e.g., (i) single large or several small sites (habitat connectivity and wildlife corridors), (ii) passive restoration (restoring keystone processes and utilizing natural regeneration) vs. assisted restoration (species reintroduction, assisted migration, trophic rewilding, reclamation). They know the benefits in using regional and native wild plants and what an effective population size is. They know important aspects of the ecological recovery wheel (appendix 2, 2019 Gann) and important success parameters for ER (e.g., using intermediate levels of disturbance to manage for a habitat mosaic & patchiness). They can name some examples of ER in different ecosystems (including waterways), related to their field of work as well as benefits of ER for environment, economy and society.
Restoration Methods and Monitoring	Students know how to assess a site's conditions (i.e., abiotic and biotic constraints) prior to ecological restoration as well as implementation steps (i.e., site preparation, species introductions, first year management) of restoration methods typical in their field of work. They can design and plan an ER project and conduct simple monitoring and evaluations (for plants, wildlife, or both). Students gain a broad overview of technology used in restoration (i.e., GIS, Lidar, Plant Identification Apps, etc.). Students can explain what adaptive management is and why it is important for long-term success of the ER project. In addition, students know the most important target species as well as the most detrimental invasive species in their region that are important to distinguish the state of a restoration area.* Students can provide examples of stakeholders in ER projects and types of social participation to improve chances of project success (volunteers, scientists, indigenous, government, educators, etc.). Students have learnt the ways to engage with other ER practitioners regionally (e.g., field days, meetings) to share knowledge and continue learning new methods for ER.
Case Studies	Students have learnt several important ER case studies (relevant to their home country and ecosystem types) in the classroom. The students have visited different demonstration sites of ER in their region, led by restoration scientists and/or practitioners of their field of work. They have a deeper understanding what influences restoration success and what difficulties may occur during implementation.
Student led demonstration sites showcasing ecological restoration practices	Students are given the opportunity to implement their new knowledge about ER and ER methods in a self-performed restoration action. The proximity to the school allows students to continuously observe the development and be involved in monitoring and maintenance measures.
Visualization of demonstration sites using augmented and virtual reality	Students are able to create virtual guided tours of demonstration sites, making them accessible online for a broader public, and thereby deepening their own knowledge.
International Treaties on nature conservation and ecological restoration	After the course, students will know about current funding (e.g., LIFE, CAP, AES) and other financing possibilities for ER and where to find this information. Students will have learnt the very basics of the laws that guide ER (e.g., Birds and Habitats Directives, IUCN Red List, UN Decade on Ecosystem Restoration 2021-2030) within the European Union.
Training in business development	For the implementation of ER in working life, financing is a key issue. The TEAM#UP Ideathon will help identify realistic business models related to ecological restoration. Students will be able to understand career opportunities in ER based on broad and detailed market analysis, identify key regional partners and customer segments, possible products and services, unique selling points and marketing channels, value propositions and sources of income. Students can cite case studies and successful examples of businesses in the field of ER and will know about business options in ER for compensating construction activities.
Sector-specific knowledge (passed on to country CoVEs)	* to be specified for the individual CoVEs (see Tabs below)

Annex 2

National Learning Objectives

Learning Objectives- Czech Republic	
CoVE: Restoration across Urban and Rural Landscapes	English
Learning Objectives	**Summary Description**
Basics in urban ecology	Students know basic concepts of urban ecology, specificity of the urban environment (biotic and abiotic conditions), types of urban habitats and the biodiversity protection in cities. Students are familiar with the socio-economic, conservation and aesthetic requirements of the urban planning.
Urban greening and benefits for biodiversity conservation	Students know the benefits of urban greening and are able to give examples. They are familiar with the basic approaches to near-natural maintenance of urban greenery (grasslands, shrubs, trees). They can describe limitations of particular approach and explain the effect of unsuitable management on biodiversity in urban environment. They are able to design measures to support target groups of organisms. Students can describe the differences between extensive, intensive and biodiversity green roofs.
Ecological restoration of post-mining sites	Students are familiar with specificities of ER in post-industrial/mining sites. They are able to describe the process of spontaneous succession in the Czech republic on a selected mining site. Students are able to explain under which conditions and in which habitat type spontaneous succession could be used for the restoration of post-industrial sites. Students know examples of ER in the Czech repiblic and abroad.
Restoration of species rich grasslands	Students have an overview of the history of grasslands in Europe, the causes of their loss or degradation. They know how to restore grasslands to increase their species diversity. Students are able to describe what a regional seed mixture and seed biomass is. They know the ways how the regional seed mixtures can be obtained and their limitations. They know the difference between production and species rich grassland. Students are able to describe the effect of management measures (e.g. grazing, mowing), and their limitations.
Funding in ecological restoration (country-specific)	Students are able to find relevant information about country-specific funding sources related to the ER.
Basics overview of nature conservation laws (country-specific)	Students are familiar with basic country-specific laws related to nature conservation and ER and know where to find other or up-to-date information.
Landscape protection	Students have a basic overview of landscape protection and biodiversity support in the landscape. They can recognize the importance of water in the landscape (e.g. water pools, wetlands). They are able to link the topics with relevant legislation.

Learning Objectives- Germany	
CoVE: Multifunctional Land Use in Conventional Agricultural Systems	**English**
Learning Objectives	**Summary Description**
Historical agricultural landscapes	Students know about historic land use and how it affects todays biodiversity.
Restoration Methods and Monitoring (Sector-specific)	Students know the steps to establish and maintain e.g. hedges, erosion protection strips, perennial wildflower strips and areas, field margins as well as measures that bring more biodiversity to the entire arable area. They know how to use the ToBi tool (Biodiversity Toolkit) and are aware of its benefits and limitations.
	Student have knowledge of valuable native (KENNARTEN) and problematic invasive species that are important to distinguish the state of a site (Agro-Environmental Schemes (AES), grassland, xxx).
	They know how to assess the impact of ER on landscape level --> important to make the most of AES, where to place it, minimal and optimal density per landscape unit, distance to natural areas to function as stepping stones.
Funding Sources	Students are aware of German and federal state-specific funding sources and contact persons for restoration measures in arable lands.
Training in business development	Students learn about different business areas in the ER sector and how they can apply for start-up support. Students in agriculture will understand the 'Biodiversity Business Plan'.
Basics overview of nature conservation laws	Students are familiar with basic country-specific laws related to nature conservation (e.g., Federal Nature Conservation Act) and ER and know where to find other or up-to-date information.

Learning Objectives- Norway	
CoVE: Ecological Compensation of Infrastructure & Landscaping	English
Learning Objectives	**Summary Description**
Landscape gardening techniques	
Landscape	Has knowledge of conditions related to the conservation of natural and cultural landscapes and can assess this against the establishment of new green areas.
Plants	Has knowledge of invasive species in Norway, control methods and has an understanding of the importance of choosing plants that do not threaten native plant material
	Has knowledge of factors that contribute to promoting biological diversity and what development opportunities lie in this
	Has comprehensive expertise about plants, their properties and application possibilities for different green areas and for use in landscape designs
Soil/masses	Has knowledge of soil improvement measures and facilitation for the reuse of local masses in a sustainable perspective
	Can describe the composition and properties of suitable growing media for different types of vegetation
	Knows classifications and handling of contaminated masses and is proven in the exercise of this in relation to requirements and industry recommendations
Local stormwater management	Has knowledge of how the process in various storm water measures contributes to the three-step model and of the measure's ability to purify water (First Flush)
	Has an understanding of the importance of natural open waterways, reopening of old waterways, ponds, wetlands and has insight into the importance of preserving these and knows how various stormwater measures can be linked to these
	Has knowledge of how grass and natural areas can be designed to be used as infiltration areas and controlled areas for flooding
	Knows the topographical and climatic differences in Norway, and the variation in the groundwater level
General	Can identify professional issues in green facilities and refer to specialist material to assess different solutions
	Can map different growth conditions and situations that affect the establishment and development of vegetation and explain the professional choices
	Can take responsibility for planning, implementation and follow-up of a maintenance project and carry this out in collaboration with the client, employees etc.
	Can analyze and assess different plant types and prepare operation and maintenance plans for different green plants
	Has an industry-ethical attitude to sustainability, the environment and biological diversity within the operation and maintenance of green facilities
	Can make local assessments of topography, geology and, based on the need for materials and resources, utilize local advantages in the best possible way
	Has knowledge of processes and provisions in regional and municipal planning and how these lay down guidelines for the landscaping profession
Circular disposal of water	
	Has knowledge of the natural cycle of water, and can see how this is affected by social development with densification and urbanisation, and the need to recreate this cycle.
	Has an understanding of the importance of nature-based solutions such as ponds, wetlands and streams, as well as insight into the importance of preserving, restoring and maintaining these
	Has knowledge of the importance and function of vegetation in local stormwater management, regarding biodiversity, storage and purification of various substances as well as evaporation.
Construction management	
	Knowledge of the public regulations for natural diversity, organisms and plant species regarding vegetation and mass handling.
	Know the Natural Diversity Act and the invasive species list and know when you should seek help from professionals in the area, to assess whether special measures are necessary in connection with the removal of native masses or plants on the construction site
Short courses	
Stream/river opening	
The potential of stream/river opening. Mapping (2 days)	Map the potential and opportunities they have by opening streams that have been laid in pipes that apply to stormwater and nature restoration.
	Day 1: Background to stream closures in Norway, consequences and challenges with closed streams, the potential and positive effects of stream opening, framework conditions and law.
	Day 2: Mapping. Registration and documentation. Determine the current situation and objectives. Prepare checklists and requirement specifications as a basis for stream opening.
Project planning of stream opening (3 days)	Get up-to-date knowledge about designing a stream opening
Course in stream/river opening (3 days)	Learn how to carry out a stream opening and the establishment of catch ponds.
Operation and maintenance of stream courses and care of edge zones. (2 days)	Introduction to operation and maintenance tasks related to streams, catch ponds and edge zones.

Learning Objectives- Spain	
CoVE: Forest Restoration & Disaster Risk Reduction	**English**
Learning Objectives	**Summary Description**
Basics I. *Basics in Ecology*	Students know the basic concepts of ecology (including biodiversity, keystone species, ecological niche, habitat, population, community, ecosystem), as well as the main interactions between species (competition, positive interactions, predator/prey, parasitism), and understand the variability of ecosystems in space and time (including succession). Students know the main disturbances, their variability and the response of ecosystems (resistance, resilience). Students know the main threats and degradation drivers of ecosystems (intensive uses, exotic and invasive species, pollution, climate change, etc). Students understand the functioning of ecosystems and the provision of ecosystem services. Students are able to analyze landscapes, and understand the concepts of fragmentation and connectivity.
Basics II. *Basics in Ecological Restoration*	Students know the history of restoration, and the different approaches and basic concepts of this discipline (including the analysis and diagnosis of degraded landscapes, the reference ecosystem and the different phases of restoration). The student understands the basic concepts of restoration at a landscape scale, in the context of land planning.
Instrumental	Students know the composition, structure and functioning of soils, and the basic concepts of soil-plant relationships, and are able to differentiate the main types of soils. Students learn about the main cartographic and remote sensing tools and their application in ecological restoration. Students are familiar with the basic principles of geographic information systems. Students understand the carbon cycle in ecosystems and are able to carry out basic carbon inventories.
Methodological	Students know and understand different methodologies related to restoration, such as those related to the design, control and documentation of the work, the methodology for the management and storage of plant reproductive materials, the methodology for the reestablishment of the vegetation cover, the methodology for the control of unwanted species and the modification of the structure of the vegetation, methodology for monitoring/follow-up, and methodology for the management of fauna and its habitats.
Marketing and entrepreneurship in ER	Students are able to detect business opportunities in the ecological restoration sector. Recognize career opportunities through entrepreneurship. Learn about good practices of entrepreneurial culture, the importance of entrepreneurship in the conservation and restoration of degraded ecosystems. Learn about entrepreneurship tools: development of design thinking. Students are able to carry out an analysis of interest groups involved in the development of a project. Students are able to detect problems and needs and develop critical thinking. Students are able to develop a business project, use entrepreneurship tools (business model) and use Canvas for the development of new projects. Students are familiar with the principles of corporate social responsibility.
Case Studies	Students understand the different phases of restoration projects in different socio-ecological contexts (desertification, fire-prone forests, agroecosystems, quarries, linear infrastructures and urban environment), and are able to make decisions to develop the different phases of restoration, taking into account business opportunities.