



TRAIN#ER GUIDELINES

Recommendations for Integration of Ecological Restoration in vocational training in Europe



TRAIN#ER GUIDELINES: Recommendations for integration of ecological restoration in vocational training in Europe – February 2023

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[TRAIN#ER at the Erasmus+ Project Results Platform](#)

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TRAIN#ER take home messages

The results of the project TRAIN#ER will be used to advance the knowledge transfer between science and practice by identifying key issues in the field of Ecological Restoration (ER) for vocational education and training (VET) and continuous education. Detailed recommendations are provided at the end of the document. The following take home messages for ER in VET and continuous education were derived:

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.

Why do we need ecological restoration in vocational training?

Over the last 50 years, a wealth of knowledge of various kinds (scientific, technical, local, traditional) about ER has been accumulated by scientists and restoration practitioners in Europe. ER is crucial to protect biodiversity, reverse degradation, mitigate climate change and adapt to its consequences (Rey-Benayas et al. 2009, Teske et al. 2019, Decler and Bijlsma 2021). This has been increasingly recognized by international institutions resulting in the declaration of the UN Decade of Ecosystem Restoration 2021-2030, and the European Commission's commitment to work towards a European Restoration Law, as part of the European Biodiversity Strategy 2030 (Decler et al. 2022).

Upscaling and integration of ER have been identified as key to overcome biodiversity loss, combat the effects of climate change, and secure peoples' livelihoods (IPBES 2019). Yet, ER has progressed slowly over the last decade (EFTEC et al. 2017), and it is urgent to call for ambitious education and training programs to overcome barriers, such as poor communication and insufficient knowledge exchange (Cortina et al. 2021). Despite the increasing relevance of ER and the growing demand for skilled professionals, there are still significant gaps in vertical and horizontal knowledge transfer across different sectors, regions, and countries, especially in vocational education and training (VET) schools and continuous education programs. However, the transition to a more sustainable and resource-efficient society requires new concepts for green jobs based on specific green skills. Neglecting the skills training and provision for green jobs is a major conceptual flaw, as the implementation of environmental policies also depends on the availability of skilled human capital.

To meet the emerging demand of the labor market for green skills that support environmentally, economically and socially sustainable development (e.g., large-scale forest restoration to mitigate and adapt to climate change and reduce disaster risk, agri-environmental measures, and communal services to restore landscapes across urban and rural areas), specific knowledge in ER needs to be incorporated into VET programs related to forest and agricultural management, nature conservation, landscaping, and gardening.

TRAIN#ER, a project to identify training needs in ecological restoration

The TRAIN#ER project main task was to identify knowledge gaps in ecological restoration across countries and sectors. In **online surveys and focus group interviews**, we approached knowledge producers and users in Europe, to gain a deeper understanding about barriers and tools for knowledge access and about important topics for VET and continuous education in the field of ecological restoration.

The **surveys** were conducted in the project partner countries, the Czech Republic, Germany, Norway and Spain in the respective national languages. The European Chapter of the Society for Ecological Restoration (SERE) additionally distributed an English version of the survey in their networks reaching participants from 25 countries. In total, 333 professionals participated: 101 from the education and research sector, 63 from the private sector, 113 from the public sector, and 56 from the third sector and civil organizations (Fig. 1). Participants from tertiary education level were overrepresented, with 95%, and only 5% of respondents came from secondary education level. 43 % of the participants were female and 56 % male. Intermediate age categories had the highest participation rates (Fig. 2).

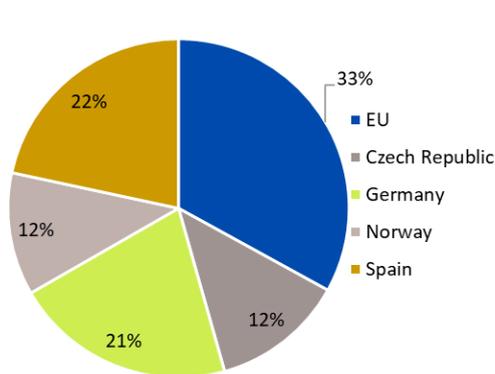


Fig. 1. Participants per partner country and EU.

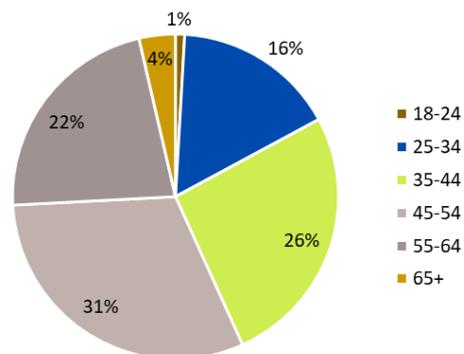


Fig. 2. Age structure of survey participants.

For a more detailed insight into the knowledge transfer gaps and training needs in ER, **focus group** interviews were held in cooperation with practitioners, and restoration ecologists from academic and training centers in each of the four participating countries and SERE. All focus groups had 8-13 participants, allowing for a diversity of opinions and experiences, giving time and space for everyone to speak out (see Krueger and Casey 2000). Altogether, 54 professionals participated: 15 from the education and research sector, 12 from the private sector, 16 from the public sector, and 11 from the third sector and civil organizations. The TRAIN#ER focus group interviews included questions covering the following topics:

- Types of knowledge needed to guide and ensure successful ecological restoration
- Actors and networks involved in ecological restoration
- Current status of VET and recommended improvements
- Barriers to implement demanded knowledge
- Improved exchange of knowledge

Training needs in ecological restoration: The results

Online surveys

Of all survey participants, 78% are directly involved in various steps of ER projects. Among the participants, the public sector and the education and research sector were the most strongly represented, with about one third each. Especially in the private sector, knowledge not acquired in previous studies was needed regularly (Fig. 3). When asked about knowledge they needed in the last year but did not learn in their studies, participants most frequently mentioned the topic of project management. Other frequently needed knowledge that they could not acquire during their studies were sector-specific practices, software and hardware skills, knowledge on legislation and policy making and restoration methods.

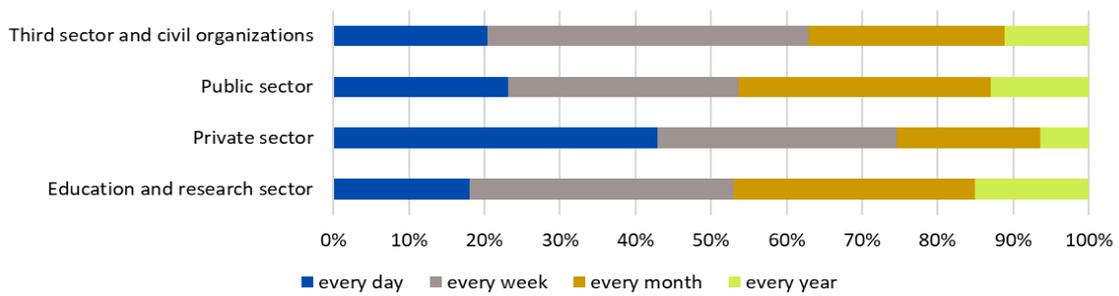


Fig. 3. Frequency of required knowledge not learned in former education, divided according to the sectoral origin of survey participants.

Participants stated that the main barrier to acquiring new knowledge was a lack of time. This is consistent across all sectors and countries (Fig. 4). Lack of suitable education material and expensive access were also prevalent, whereas technical difficulties, improper format or inappropriate language were of minor relevance.

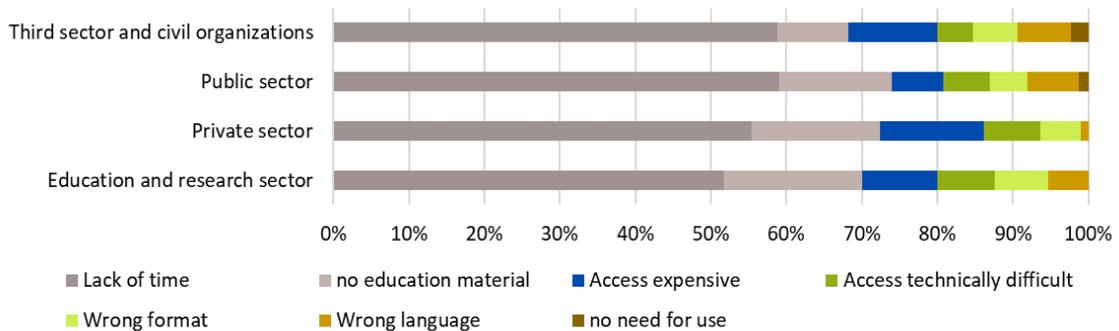


Fig. 4. Barriers to acquiring new knowledge, divided according to the sectoral origin of survey participants.

As main sources of knowledge, survey participants identified scientific articles, webpages, books and book chapters, followed by talks and interactions with peers, local practitioners or non-specialists (Fig. 5). The relevance of direct onsite evidence and good practice in the field highlighted the importance of ER demonstration sites in knowledge transfer. While divulgative journals, technical digests, online courses, social networks, blogs and repositories were of medium importance, lectures in formal or informal vocational training or University courses were of little importance as a source of knowledge for the survey participants. Interestingly, the different sectors largely coincided in their opinions, except for scientific conferences, which were particularly favored by the education and research sector.

Of all participants, 73% (VET) and 75% (continuous education) claimed that new VET or further education programs specialized in ecological restoration are needed, and only 5% and 2% disagreed. The remaining participants answered they did not know.

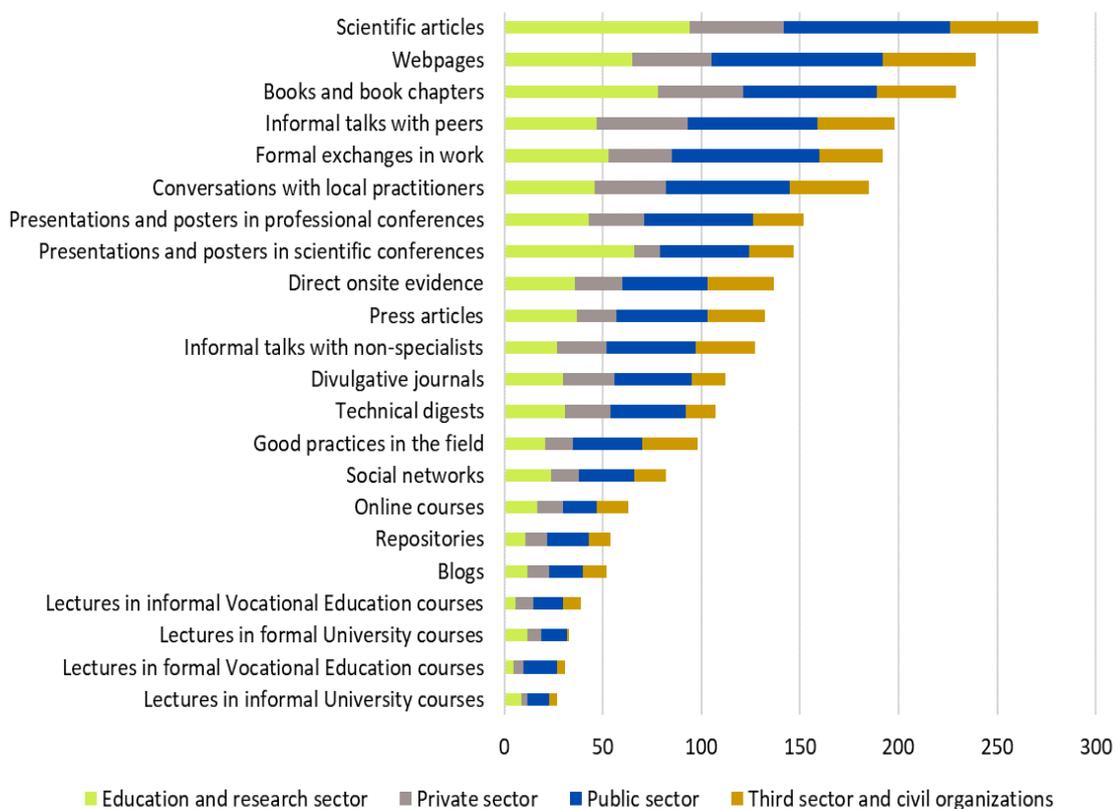


Fig. 5. Reported tools for accessing new knowledge, divided according to the sectoral origin of survey participants.

In the case of new programs, the provision of basics in ecology were the most demanded topics in VET and continuous education in all project countries (Fig. 6). In the **Czech Republic**, case studies were most important, followed by project management, restoration methods and sector-specific measures. In **Germany**, planning, restoration methods and sector-specific measures were selected. In **Norway** and in **Spain**, the focus was on basics in ecological restoration and restoration methods. Interestingly, the participants in the **European** survey distributed their demands fairly evenly, with a slight preference for the basics of ecological restoration.

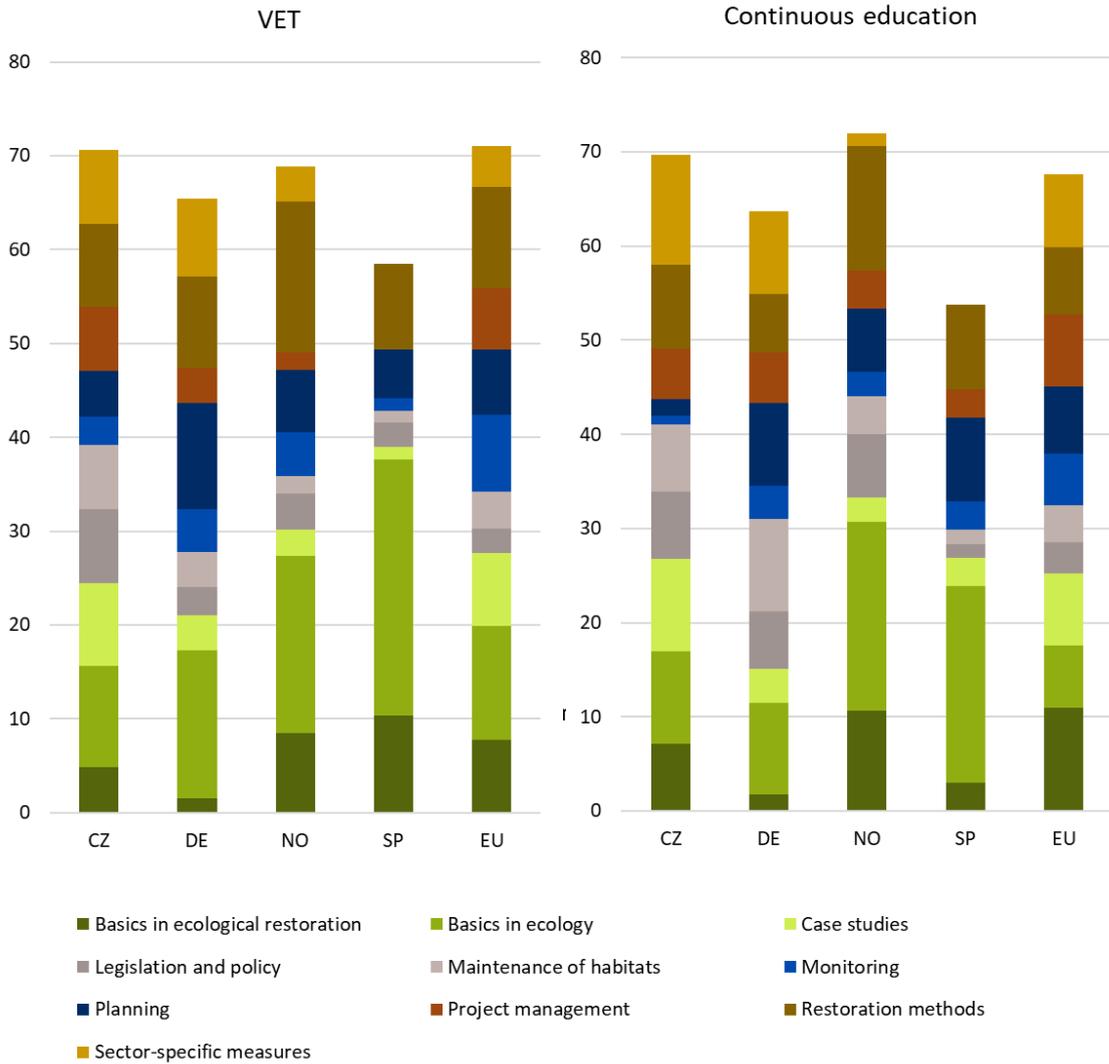


Fig. 6. General demand for topics related to ER in VET and continuous education from the participants' perspective. The percentage in the country-wise surveys of the ten most frequently mentioned codes identified from inductive coding is shown.

About one third of all survey participants were interested in participating in new ER training courses as students. The third sector had the highest proportion of interested participants and the education and research sector the lowest (Fig. 7).

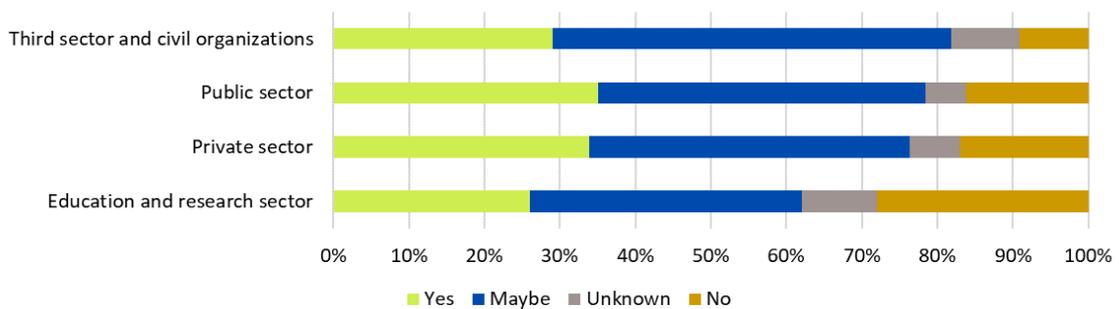


Fig. 7. Interest in participating as students in new ER training courses for continuous education, divided according to the sectoral origin of survey participants.

Focus groups

The discussions of the focus groups in the four countries gave insights into perceived knowledge needs, actors in ER and their network, existing and future VET, barriers to knowledge implementation and factors to improve the exchange of knowledge. We summarize the findings for five main questions:

1) What types of knowledge are needed, in your view, for a successful ER?

There was a consensus that all types of knowledge, i.e., technical, scientific, and traditional are crucial for successful ecological restoration. The link between scientific and technical knowledge and ER practice was particularly emphasized. In addition, skills and knowledge in communication (with landowners or stakeholders), socioeconomic knowledge, and knowledge of project financing were mentioned as essential. A need was also expressed in the municipalities about planning and prioritization, execution and maintenance of ER.

2) Who are currently the actors in ER in your country, and how should their networks be improved in the future?

The main actors in ER are public administration at the municipal, regional and state levels, including the agricultural, forestry, transport and energy sectors, but also private actors, such as developers, consultants, contractors, landowners. Also research and higher education institutions played a major role. NGOs held a country-wise status as actors for ER. In the Czech Republic, for example, they are of utmost importance, while in Norway, they were not even mentioned in the focus group interview. A general consensus was reached on the need to strongly improve the interaction between the key actors in ER. Some highlighted linkages were a better collaboration between restoration, agriculture and forestry, as well as between research projects and on-site restoration challenges. Restoration plans at a broader geographical scale are needed, so that small projects can be integrated as part of upscaled ER efforts. A more efficient use of the existing restoration networks (e.g., the German Restoration Network, the Spanish AEET-ER and mine restoration networks) and platforms (e.g., Society for Ecological Restoration Resource Center, Agricultural Knowledge and Innovation Systems - AKIS) were more demanded than the creation of new ones.

3) What is the current state of VET in your country and what types of VET knowledge are needed but not available at present?

In general, the focus groups identified that availability of VET courses in ecological restoration is either non-existent (e.g., Norway) or perceived as moderate or low. There is often no didactic content on biodiversity and restoration in the curricula of green professions. ER courses should be integrated in the curricula of future gardeners, landscape gardeners, machine operators, and future professionals in agriculture and forestry. At present, integration of ER topics is mainly done by dedicated teachers/lecturers. Many of these VET courses lack educational modules in basic ecological knowledge. The focus groups also identified that education in restoration must be included in other VET studies to form landscape architects and designers of ecological restoration projects, who are currently largely unfamiliar with updated ER knowledge. There is a perceived need for a more holistic understanding of the restoration process, and this to be integrated in VET-training. In general, it would also be relevant that VETs address how appropriate levels of biodiversity are beneficial to solve pressing problems for society and the environment.

4) What are the barriers to implementing the demanded knowledge and improving ER?

The perceived barriers mentioned, as discussed in the focus groups, are mainly related to strategic, financial, legal and educational factors:

Strategic barriers include the fact that land use planning frameworks do not (always) support cross-sectoral decision making (between forestry, agriculture, water, transport, etc.), something that would favor the implementation of ER. A pending issue is how to institutionalize the cross-sectoral management of ecosystem services. A perceived barrier is the lack of a holistic approach to integrate natural and social sciences, and foster collaboration between experts from both sectors.

Financial barriers include the scarce integration of business opportunities and business models in ER planning. Moreover, economic benefits of ecosystem services in restored areas are often very complex and mostly not of interest to industry. In addition, grant schemes for implementing restoration activities, especially in agricultural landscapes, are perceived as too complex to be widely used. Knowledge sharing between consultants and advisors is sometimes hampered due to perceived competition between business companies in the field of ER.

Legal barriers involve the lack of attention of current regulations to maintenance works, systematic monitoring and success evaluation of ER activities. Integrating these phases of ER projects is necessary to advance the theory, education and practice of ER. The focus groups found it unclear how they could be facilitated within the existing legal framework .

Educational barriers relate to the reluctance of the public to change, a lack of awareness of the necessity and usefulness of knowledge on biodiversity and ER, lack and fragmentation of information, and scarce promotion of ER. The most important obstacle to implementing demanded knowledge is a lack of trained teachers in secondary and VET schools. Updating University/VET courses currently relies on the decision of individual teachers, while overarching strategies for ER education are lacking. Compact summaries from ER practice and science are not easily available or accessible to teachers. The broad mass of students is perceived not to be reached, and contents are often too abstract and hard to comprehend by students.

5) *How could the exchange of knowledge types between different professions be improved?*

The focus groups highlighted that the exchange of knowledge between different professions would be considerably improved by holding regular events – workshops, seminars, conferences, field visits, and online information platforms gathering relevant knowledge, including a database of examples of good and bad practices. Seminars are recommended that address concrete issues and problems, showing well documented examples. The best way to transfer scientific knowledge into practice is through personal sharing, and regular meetings with experts and workers in ER would be beneficial. On-site discussions with different actors was recommended to enable knowledge exchange and feedback between ER practice and theory.

Sharing of knowledge on ER will facilitate exchange among practitioners (architects, designers, secondary school teachers, Administration officers, etc.) and the society. Knowledge sharing is essential to upscale ER. VET education should be able to arouse student fascination and generate enthusiasm and motivation to work on ER. Hereby, simulation models, short videos and knowledge platforms could be used to advantage. In general, awareness of the benefits of ER in solving pressing problems of our time should be raised in VET and continuous education.

For boosting transfer of knowledge on a wider geographical scale, the SERE focus group particularly recommended the “train the trainer” concept, whereby specialized ER experts train educators (VET education) and local officers (extension services), who can then train students and local practitioners.

Recommendations for the training of experienced professionals

- Promote training opportunities for professionals in the field of ER, based on different types of knowledge (scientific, technical, traditional, local). The topics of interest are diverse and context specific. Topics of greatest interest are a basic knowledge on ecology and ER, and methods of ER execution and maintenance. Additionally, there is a high demand for learning about project management, legal issues and project planning.
- Courses should contribute to bridging the gap between scientific and practical knowledge, encouraging multidisciplinary and interdisciplinary approaches.
- Innovative training materials must be developed to address the pressing need for new knowledge experienced by the majority of experts. Materials should be easily accessible and highly focused, to meet the endemic lack of time of most professionals. The diversity of languages and socio-ecological contexts must be considered to facilitate access of emerging and experienced professionals to education and training materials. Existing platforms should be used preferentially to host and provide access to this information.
- The nature of knowledge resources can be diverse. Scientific articles are commonly used, even by professionals outside academia, but also books, book chapters, webpages, simulation models, and short videos. Conversely, lectures in formal and informal education programs, repositories and blogs are not as popular among professionals.
- Further channels should be promoted to facilitate knowledge exchange, particularly professional meetings, workshops, seminars, conferences, and field visits to well documented demonstration sites for ER, addressing specific topics and problems.
- Promote knowledge exchange, fostering dialogue and encouraging collaboration between different actors, different sectors engaged in ER, and practitioners involved in different phases of restoration projects, to overcome current silos and self-referentiality. Experts in promoting such exchanges are needed.
- Promote monitoring, reporting and success evaluation as intrinsic parts of restoration projects. In addition to other benefits, the information generated during these phases of restoration projects is essential to increase our understanding of socio-ecological systems, provide feedback into adaptive restoration, train young and experienced professionals, foster communication (see above), and scale ecological restoration up and out. To maximize these benefits, access to this information should be made available to the widest ER community. In addition to examples of good practice, illustrating failures is deemed of particular importance, as these are often concealed, despite their extraordinary educational value.
- Extension services and knowledge hubs have proven successful in identifying knowledge gaps, analyzing, synthesizing and disseminating ready-to-use knowledge, and promoting targeted research. The potential of existing networks of Agricultural Knowledge and Innovation Systems (AKIS) to integrate ER in agroecosystems should be explored, and their functioning analyzed and replicated in other ER sectors. Similarly, knowledge hubs should be promoted at European, national, and regional levels, providing expert advice on ER topics at different scales and socio-ecological contexts.

Recommendations 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.

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Annex: Summary of TRAIN#ER products openly available

The following products are openly available at these two sites:

[TRAIN#ER at the Erasmus+ Project Results Platform](#) (as of April 2023)

[TRAIN#ER webpage](#) (currently and updated)

- TRAIN#ER Guidelines (this document)
- TRAIN#ER Community of Practice approach Report
- TRAIN#ER Demo Sites for Ecological Restoration Training Report
- TRAIN#ER Catalogue of Ecological Restoration opportunities in participating countries (Czech Republic, Germany, Norway, Spain)
- TRAIN#ER Survey templates on Ecological Restoration Training Needs
- TRAIN#ER Videos
- TRAIN#ER ePostcards