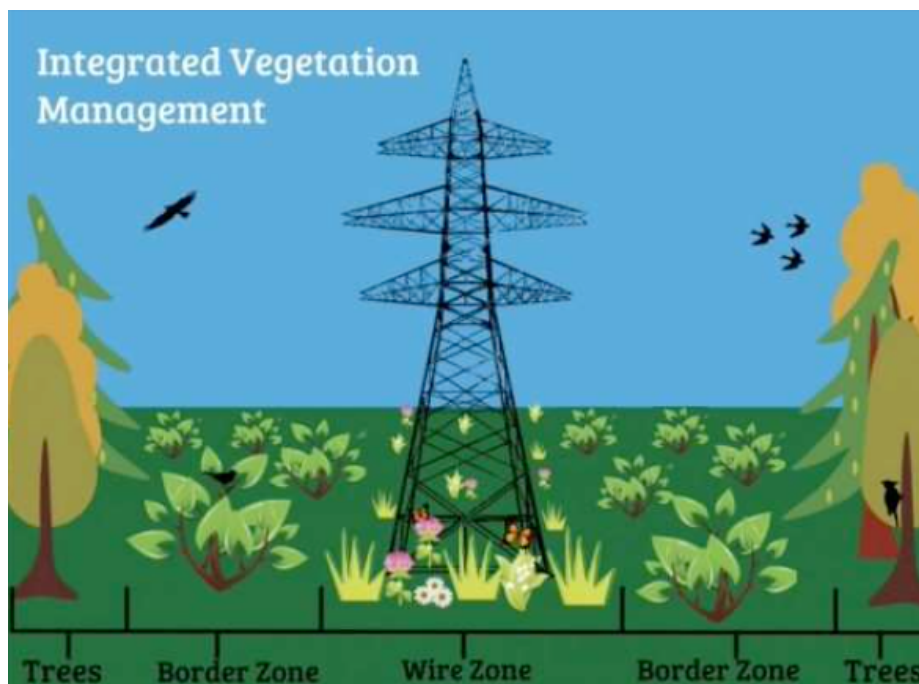


OPTIONS AND OPPORTUNITIES FOR ECOLOGICAL POWERLINE CORRIDOR MANAGEMENT IN SLOVAKIA WITH POSSIBLE TRANSBOUNDARY EFFECTS



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List of Abbreviations

CBD	– Convention on Biological Diversity
COP	– Conference of the Parties
GBF	– the post-2020 Global Biodiversity Framework
LIFE	– EU funding programme focused on environment, nature and climate protection
Natura 2000	–EU network of protected areas
UNEP	– United Nations Environment Programme
SAC	– Special areas of conservation – part of Natura 2000
SPA	– Special protection areas conservation – part of Natura 2000
VSD	– E.ON operator in Slovakia - Východoslovenská distribučná, a.s.
ZSE	– E.ON operator in Slovakia - Západoslovenská energetika, a.s.

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Cover picture by VSD

1 Introduction

Tackling climate and biodiversity crisis can only succeed through collaboration and partnership at all levels. Several flagship initiatives started or are under development to facilitate further cooperation.

UN Decade on Ecosystem Restoration 2021-2030¹ is a remarkable attempt to further boost global implementation of UN Biodiversity policy and support Sustainable Development Goals among other objectives. Although, governments are responsible for implementation primarily, substantial change cannot be achieved without involvement of business sector.

In the face of unprecedented biodiversity loss after failing to achieve 2020 Aichi Biodiversity targets, international community, at the moment, is negotiating new targets to halt ecosystem decline by 2030 and shift into biodiversity restoration by 2050. The new goals—called the post-2020 Global Biodiversity Framework (GBF) —are far from settled (CBD, 2021), and are expected to be adopted at Conference of the Parties to the Convention on Biological Diversity (CBD COP) 15 in 2022². Once globally adopted, the GBF, although negotiated by governments, is expected to provide a space for all peoples to engage in sustainable lifestyles and actions. This is yet another opportunity for businesses to pledge their individual contributions to the global effort.

E.ON partnered with UNEP to join global support for biodiversity and make an important contribution to preventing, halting and reversing the destruction of ecosystems³. As the largest distribution system operator in Europe, E.ON operates more than 1.6 million kilometres of electricity grids and maintains the vegetation below the overhead power lines and ensures that managed infrastructure is not damaged. With ecological corridor management, E.ON uses a sustainable approach and thus combine security of supply with environmental protection.

As contribution to the UN Decade on Ecosystem restoration 2021-2030 E.ON pledged an ambitious goal to roll out ecological corridor management across Europe by 2026 and invest a double-digit million Euro budget into this project. Along 13,000 km of high voltage power lines in predominantly in forest areas, E.ON committed to creating and maintaining healthy ecosystems and increasing biodiversity. This corresponds to an area of about 70,000 hectares⁴.

E.ON have also helped to develop a platform for the United Nations Environment Programme (UNEP) that gives #GenerationRestoration a digital home and brings together a global community for ecosystem conservation: Initiatives from all over the world can present their projects on the platform, network and gain supporters to protect and restore different

¹ <https://www.decadeonrestoration.org/>

² <https://www.cbd.int/conferences/post2020>

³ <https://www.decadeonrestoration.org/partners>

⁴ <https://www.eon.com/en/about-us/sustainability/people-and-environment/unep-eon-partnership.html>

ecosystems worldwide. The digital hub is intended to inspire various players, encourage action and make knowledge and experience accessible.

This report, commissioned by UNEP, is intended to focus on the possibilities and opportunities for fulfilling E.ON's goals, with an emphasis on Slovakia with the possibility of cross-border cooperation within Europe. There are two E.ON grid operators in Slovakia where one is more experienced in ecological corridor management with build capacity and the other is less experienced with limited capacity. These two examples can represent preparedness of various E.ON operator across Europe for fulfilling E.ON overall goal. Thus, there are opportunities to replicate recommendations from Slovakia to other countries where E.ON operates (AT, CZ, CR, DK, HU, IT, NL, RO, SL, SU and UK).

The main methods used for preparation of this report was desk study and interviews with the representatives of E.ON operators in Slovakia which took place in November and beginning of December 2021.

2. Current situation in the ecological powerline corridor management in Slovakia

2.1 General situation and approach to powerline corridor management

Powerlines with overhead wires connect various points of interest of the society in order to distribute electricity. Powerline corridors pass through the countryside across various types of land use including agricultural land, forests and other landscape features. While farmed agricultural land is taken care off by its owners for farm production, forests and other natural types of vegetated areas need to be regularly managed by powerline operators. On the other hand, powerline operators do not own the land bellow the electric wires. As a burden, landowners have to accept the necessary management under powerline, or they can do it themselves and request the payment of the work from the powerline operator. This cause a special challenge for the management as the rights of landowners should be fulfilled and it can mean a lot of communication with landowners.

Traditional management of powerline corridors

Traditional approach to powerline corridor management in Slovakia, but elsewhere in Europe as well, is to regularly cut the growing trees and vegetation in 2-5 years cycle (depending on the type and speed of vertical growth of tall vegetation). This is mainly to avoid technical problems caused by shortcuts, failing of trees on electric wires (in bad weather events) or to assure accessibility of the powerline infrastructure in case of other types of technical failure in order to be able to achieve smooth and undisturbed supply of electricity to households and other customers.

Typically, vegetation is removed by big cutters capable to cut young trees and bushes and the wooden biomass is chipped or left out on the side, some areas with weed type of vegetation are mulched. Usually, this management should be done during non-vegetation season to avoid disturbance of breeding birds and other animals.

Business as usual approach causes several environmental problems. It is mainly regular disturbance of the vegetation and species using it as habitat, regular disturbance can support spread of the invasive alien species along the powerline corridors, removal of vegetation cover can cause wind and water soil erosion, especially in slopy terrain. Many times, this management is not compatible with the management which would be required in a given locality. Because of historic reasons, powerlines cross protected areas of various types and designations (national, Natura 2000 and international protected areas). Obviously, this type of powerline corridors management is not in line with the requirements of protection in the protected areas, but it is widely accepted as traditional technical approach.

Ecological alternatives to powerline corridor management

There are several options how to manage powerline corridors in line with the ecological requirements of the surrounding habitats / ecosystems. At the same time the security of electrical transmission and people need to be assured (especially access in the event of technical failure). In general, we recognise two main types of change to ecological management. First is change from so called “U” to “V” type management of tree vegetation (Figure 1). Second type is change to different type of vegetation like grassland or wetland vegetation / habitat / ecosystem.

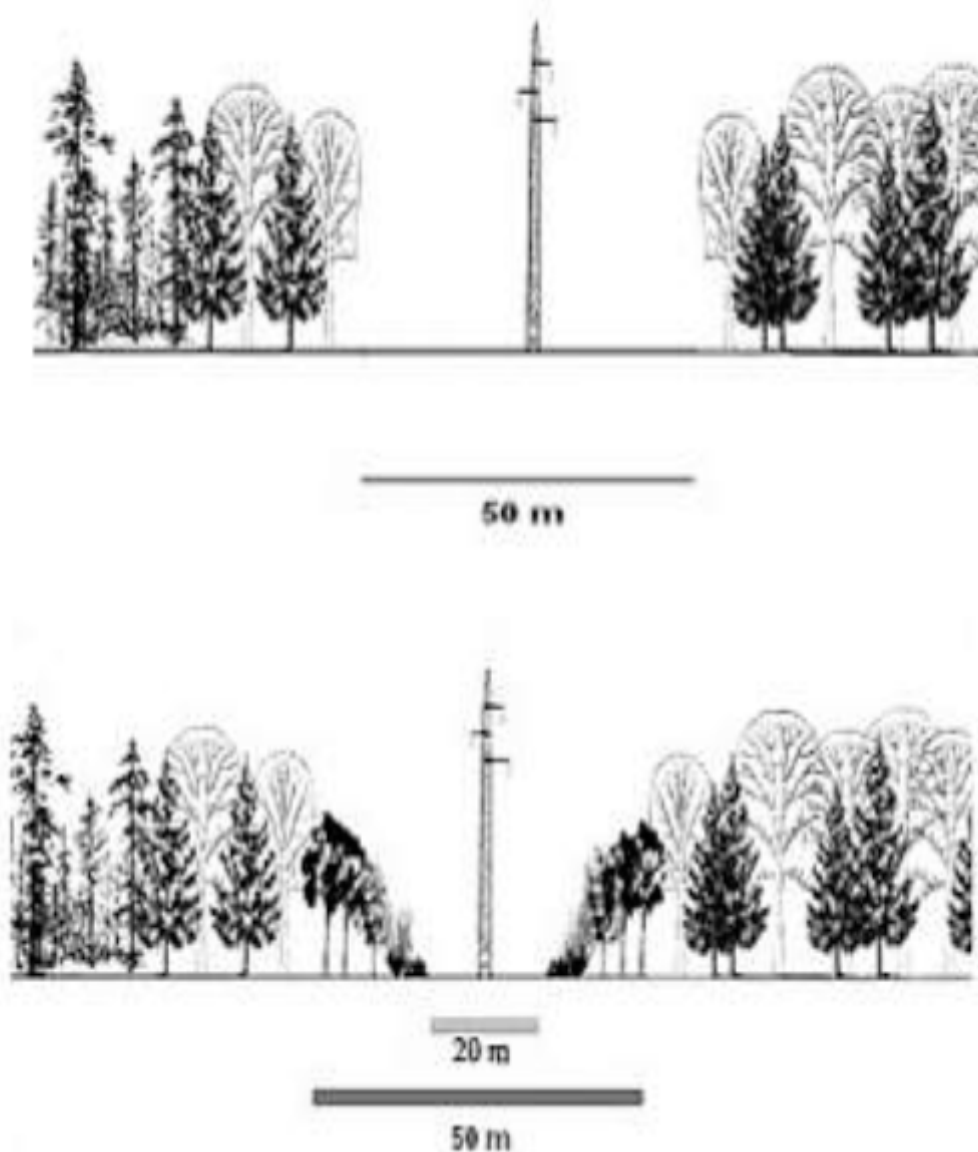


Figure 1 Traditional (top) and ecological management (bottom) of powerline corridors in forested areas

(Source: VSD)

First type of ecological management is suitable to forested areas of where the powerline crosses forested patches in the open countryside. Instead of clear-cutting trees in 50 m wide strip in whole area below powerline plus its protection zone (altogether 50 m for 110kV powerlines and 23 m for 22 kV powerline) the edges in protection zone are planted with low canopy trees and bushes usually wild fruit trees and berry bushes, which will not obstruct overhead powerlines and fill not damage wires in event of falling. The central are of approx. 5 - 20 m is transferred to grassy areas, which are easily accessible in the event of technical failure, but other ways are used by biodiversity, small animals, game, pollinators and birds. These kind of edge habitats can be very diverse. Exact mixture of trees and bushes can be selected in order to restore local habitats using local species of trees, bushes and grass species.

Second type of ecological restoration of powerline corridors is change to other type of habitat of the provenience, which will not grow so tall to obstruct electrical wires. Typically, these would be grassland and wetland habitats. However, these types need regular management which can be taken over by local farmers (mowing for hay and grazing). Sustainability of long-term management needs to be assured. Benefits for biodiversity can be very similar to the previous type of management and habitats types can be chosen according their threat status and rarity in the area but with prospects for regular use.

E.ON's commitment and operators in Slovakia

In line with the E.ON's commitment, both E.ON operators in Slovakia expressed their preparedness to contribute to the shift to more sustainable types of management and their understanding of the corporate responsibility. However, as every change this shift brings its own challenges for operators. The main problems they encounter are:

- Initially ecological management is more labour and cost intensive than the usual clear cutting. Long term data are not available yet, therefore full picture on the economics of ecological corridor management is still unclear.
- The long-term sustainability of ecological corridor management is challenging as it requires long-term engagement of landowners or stakeholders.

Situation and approach to corridor management differs for both Slovak E.ON operators and details are described following chapters.

2.2 Situation in Východoslovenská distribučná (VSD)

Východoslovenská distribučná, a.s. (VSD, a.s.) is an energy company, whose main activity is the electricity distribution via its own distribution system to the end customer. VSD, a.s. was established in November 2005 and it commenced its activity on 1 July 2007, when it unbundled from the company Východoslovenská energetika a.s. (VSE). VSD, a.s. is a member of VSE Holding Group. In the area of Eastern Slovakia, the company owns a distribution system with the length of almost 21,000 kilometres. It distributes electricity into more than 600,000 supply points.

Type of management

VSD maintains their power lines corridors with their internal management team. Team members are responsible for site monitoring - identifying corridor sections that need to be managed, obtaining permits, communication with land owners and stakeholders, and contracting services to implement needed vegetation management. They are also responsible for regular monitoring of vegetation growth. The VSD corridor management team has overall overview of the ongoing cyclical management and established communication with landowners. This allows them to select the most suitable sites for ecological management together with owners and establish long term plans for sustainable maintenance of the respective sites. VSD works in this way for several years already and this approach already brought several examples for sites where traditional full cutting of the vegetation under powerlines transferred to sustainable ecological vegetation management (see examples below).

The extent of the powerline facilities operated and the extent of VSD management affected by the vegetation that needs to be maintained cyclically is presented in Table 1 below.

Table 1 Length and number of sites of managed powerlines by VSD

Type	Length / No. of sites
Overhead 110 kV powerlines	1 381 km
Overhead 22 kV powerlines	7 729 km
Regular vegetation management needed	2 720 km (both types of powerlines)
Number of total managed sites	approx. 4 000 sites
Potential number of sites managed ecologically	approx. 1 000 sites

Examples of VSD ecological corridor management

VSD manages several sites that are already converted from tradition to ecological corridor management or are in the process of the ecosystem / habitat restoration. Some of the sites were selected on the basis of VSD or landowner interest and other are part of the projects in which VSD took part. Some examples are discussed further below.

VSD is one of the partners in the international EU Life Project „Conservation of the Eastern Imperial Eagle by decreasing human-caused mortality in the Pannonian Region” (acronym: PannonEagle). Partners from Hungary, Slovakia, the Czech Republic, Austria and Serbia joined forces to stop negative human influence on the endangered Eastern Imperial Eagle. Among others, VSD participates in the activities to create game-and-bird-friendly habitats along power lines which should support small game species as prey for Eastern Imperial Eagle. Altogether, restoration of 25 ha of suitable habitats is planned in Natura 2000 sites. The project started in 2017 and is expected to finish in 2022. Project sites in Slovakia are presented on Figure 2.

Map of project SPAs

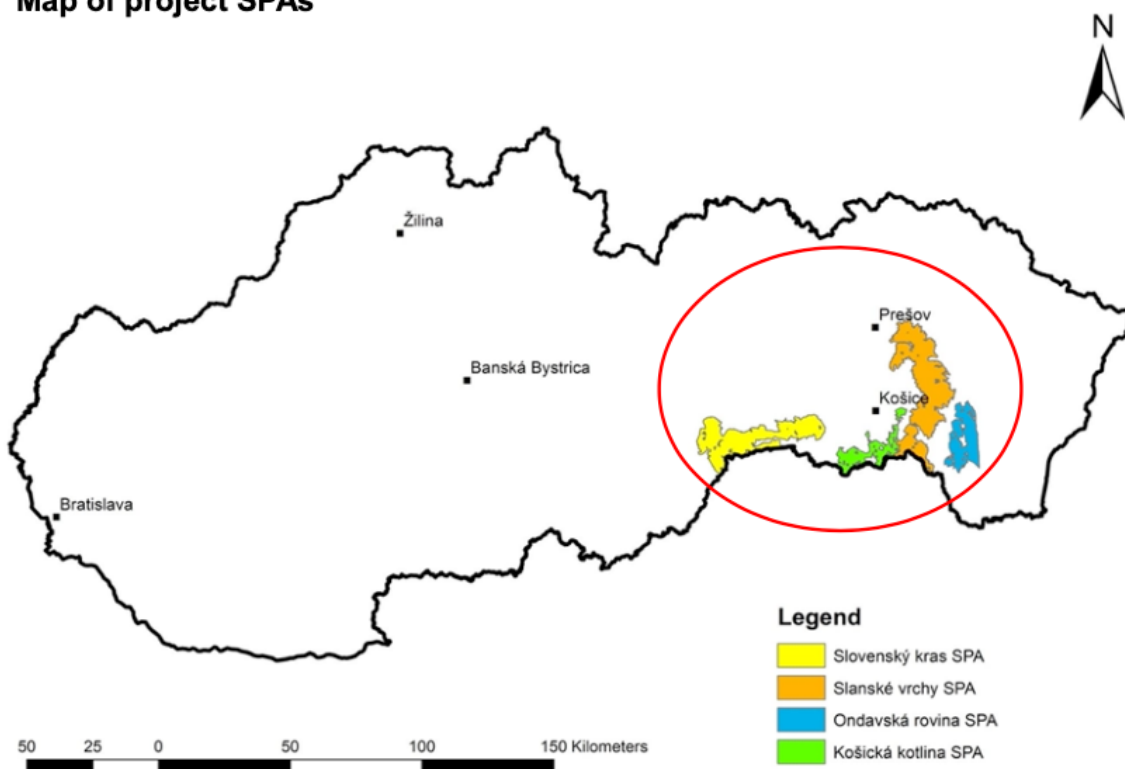


Figure 2 Natura 2000 sites (SPAs) where VSD implements restoration in the LIFE project PannonEagle in East Slovakia

(Source: VSD)

In the frame of the PannonEagle LIFE project VSD restored several sites and shifted from traditional management into ecological corridor management mainly in the Natura 2000 areas (SPAs).

Table 2 Examples of VSD ecological corridor management sites and activities implemented to restore habitats

Site / Natura 2000 site name	Area	Description of activities
Seňa SPA Košická kotlina	0,6 ha	<ul style="list-style-type: none"> - Elimination of invasive species (<i>Robinia pseudoacacia</i>) - Clover culture - Deep rotary milling and dredging to reduce Robinia and its roots to allow next tillage - 2020/2021 – local farmer established temporary corn field to reduce and shadow remnants of Robinia trees and thereby support suppression of Robinia species on the site - 2022 - clover culture

Haniska SPA Košická kotlina	4,15 ha	<ul style="list-style-type: none"> - Transfer to regular mowing condition - Revitalisation of small pond - Planting fruit trees - Conservation / restoration of ditch reed vegetation (<i>Phragmites australis</i>)
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(Source of information: VSD)

Analysis of VSD capacity to contribute to ecological corridor management

Based on interview with VSD representatives we analysed strengths, opportunities, weaknesses and threats for VSD ability to substantially contribute to E.ON restoration commitment (Figure 3).

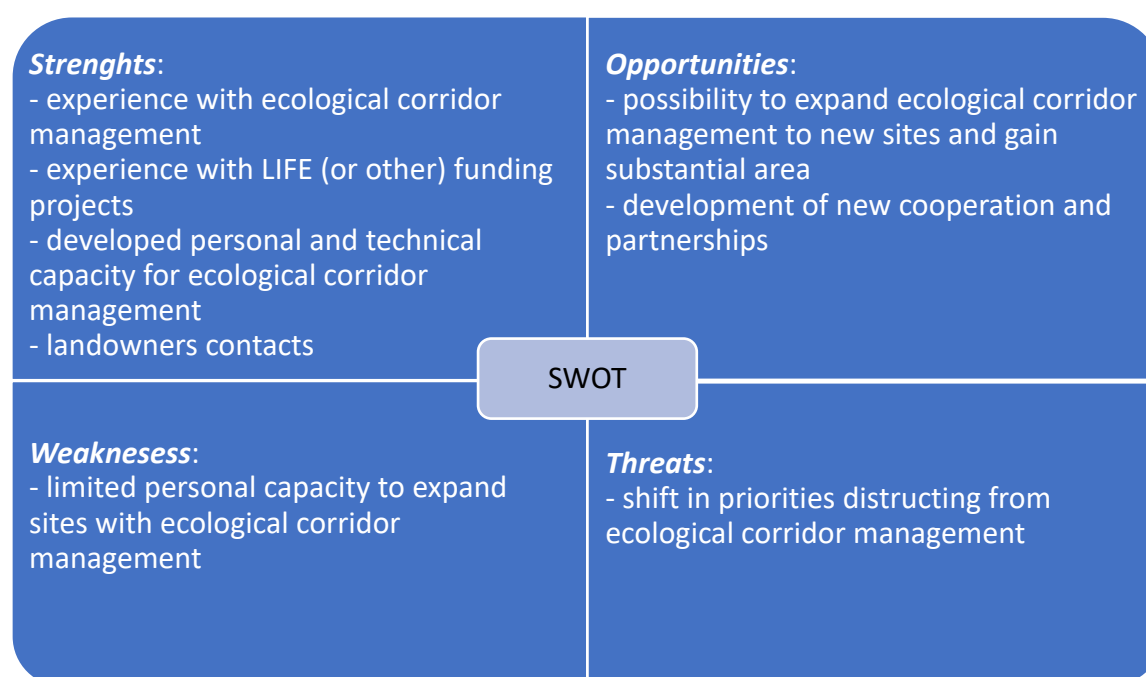


Figure 3 SWOT analysis of VSD experience and ability to perform large scale ecological corridor management

The analysis shows good prospects for overall VSD contributions to E.ON restoration commitment. VSD has experienced team already in place which has direct experience with various types of ecological corridor restoration and management and participation in conservation projects like LIFE Programme. Also, equipment and local contacts with municipalities, owners and local services providers are largely developed. There is also commitment and understanding of relevant VSD employees to continue with the change to the ecological corridor management where possible and feasible. They are also aware of potential challenges of this new approach.

VSD already intimated cooperation with other operators and prepared a proposal for a new LIFE project (acronym: Grid4Life). Unfortunately, the project t was not selected for funding. The proposed project was led by French lead partner and VSD proposed a series of new

project sites within Natura 2000 network to be restored using their already gained experience. Despite the project was not funded, VSD is committed to continue in these restoration efforts.

VSD is interested in sharing their experience with ecological corridor management and also potentially holding a workshop on the topic. They organise this type of activities on national level already for some time.

2.3 Situation in Západoslovenská energetika (ZSE)

Basic information about ZSE

Západoslovenská energetika, a.s. is the holding company of the ZSE Group, it has been part of the German energy Group E.ON since 2002. Via its 100% owned subsidiaries Západoslovenská distribučná, a.s. and ZSE Energia, a.s. it provides for electricity distribution in the Western Slovakia to more than 1 million supply points and so supplies electricity and gas to households and companies. It also provides additional services and complete solutions to energy customers aimed at using renewable energy sources and technologies for intelligent households

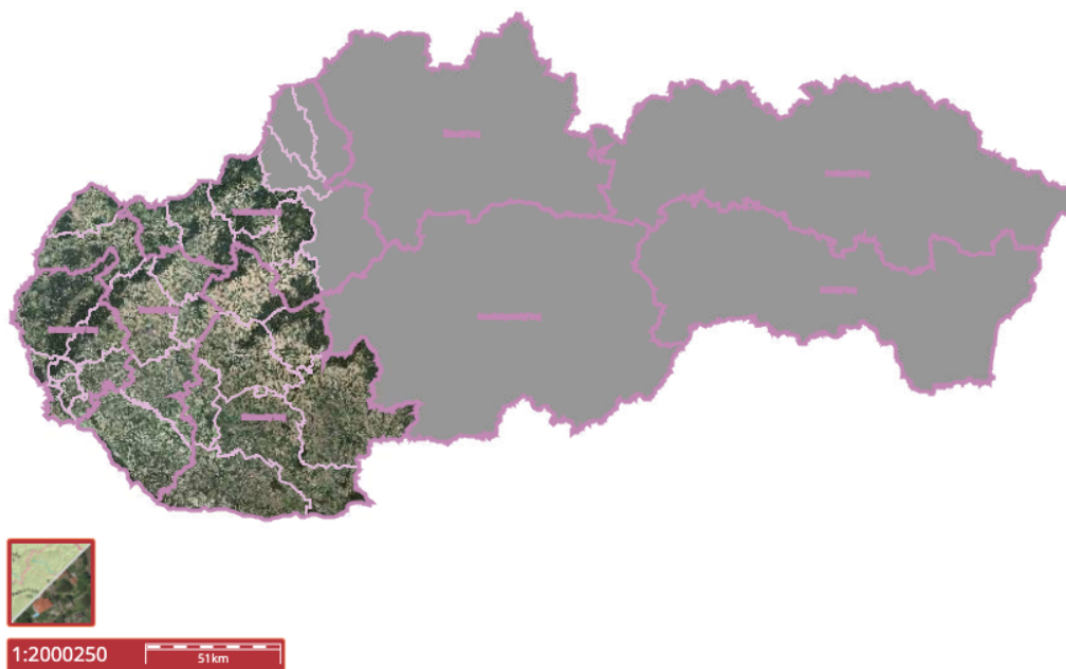


Figure 4 Operational area of ZSE in West Slovakia

(Source: ZSE geoportal <https://geo-portal.zsdis.sk/>)

Type of powerline corridors management

Currently all the power corridor management services are provided to ZSE by an external companies divided in 5 regions. External companies are responsible for whole corridor

management cycle starting from obtaining permits, communication with land owners and stakeholders to implementation of management and mentoring of vegetation growth. This approach might be less management intensive for ZSE, but on the other hand, they do not have detailed information and local contacts with land owners and local managers.

ZSE is preparing a new programme starting next year (2022) and will reorganize itself by starting internal management of powerline corridors in the Nitra region. At the moment they are preparing personal and technical capacity for this organisational change. ZSE expect to gain experience with the internal powerline corridor management which could lead to further organisational changes.

The extent of the powerline facilities operated and the extent of ZSE management affected by the vegetation that needs to be maintained cyclically is presented in Table 2 below.

Table 3 Length and number of sites of managed powerlines by ZSE

Type	Length / No.
Overhead 110 kV powerlines	1 618 km
Overhead 22 kV powerlines	9 666 km
Regular vegetation management needed	- 110 kV powerlines – approx. 566 km - 22 kV powerlines – approx. 4 350 km
Number of total managed sites	approx. 5 000 sites
Potential number of sites managed ecologically	Unknown yet

Examples of ZSE ecological corridor management

At the moment ZSE has a little experience with ecological corridor management. Currently, they are starting to plan three sample projects in cooperation with Mestské lesy Bratislava (Bratislava's Forestry company) and Lesy SR (State Forestry company) which are relatively large landowners in the region of Bratislava. Three sample projects were developed on the basis of mutual interest- Some experience with VSD was mutually shared as well when preparing concepts and approach to these sample projects. Basic details are provided in Table and some parameters (like area of restoration) are not known yet. Hopefully, ZSE will gain some long-term experience through the implementation of these smaller projects which will lead to change of the approach on large scale in the near future.

Table 4 Examples of ZSE ecological corridor management initial projects

Site / Natura 2000 site name	Area	Description of activities
Bratislava 1 Mestské lesy Bratislava	??	- Restoration of grasslands - Restitution of European Suslik (<i>Sperophilus citellus</i>) population - Management of grasslands for European Suslik - Planning of the restoration in progress with Bratislava Municipal company

Bratislava 2 Mestské lesy Bratislava	??	<ul style="list-style-type: none"> - Transfer of clear-cut areas under the powerline to natural habitats for dog walking - Planting mosaic of small trees and shrubs and grasslands - Site will be constructed for the benefit of biodiversity and citizens of Bratislava - Planning of the restoration in progress with Bratislava Municipal company
Pečniansky les SAC Bratislavské luhy – Natura 2000	??	<ul style="list-style-type: none"> - Creation of habitats for game grazing and biodiversity - Elimination of invasive alien species spread and natural regeneration of native endangered plants (e.g., orchids) - Planting small trees and shrubs on the edges

(Source of information: ZSE)

Despite ZSE is only in the initial phase of ecological corridor management the operator is applying ecological approaches already in its rather traditional way of corridor management. For example, they just prepared a new technical manual for the companies, who provide cutting and management services for ZSE. In the manual ZSE tries to limit negative impacts that are connected with the traditional corridor management (Figure 4). This activity is noteworthy because even with the highest commitment, there will still be a proportion of corridor management where ecological approach is not feasible or possible from various reasons (technical issues, ownership). This change of manuals and protocols can be suggested to other E.ON operators in whole Europe and its application will mean further benefits for biodiversity (see Chapter 5 for more details).

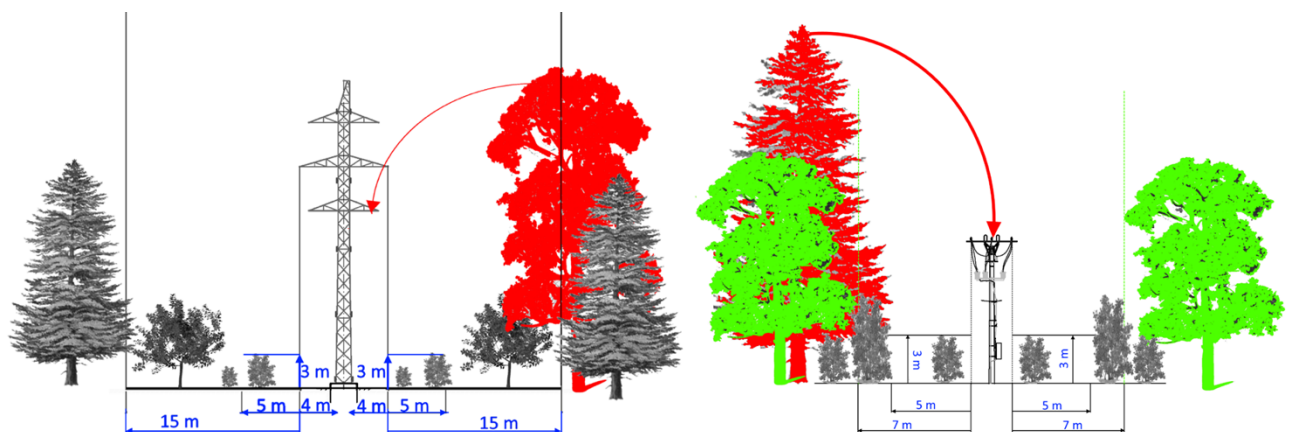


Figure 5 Example form new ZSE powerline corridor management manual - recommendations for service companies

(Source: ZSE)

Analysis of ZSE capacity to contribute to ecological corridor management

Based on interview with VSD representatives we analysed strengths, opportunities, weaknesses and threats for VSD ability to substantially contribute to E.ON restoration commitment (Figure 5).

ZSE is not as experienced in ecological corridor management as VSD. ZSE only started with some initial sample ecological management projects and decided to implement partial organisation structure change to move from outsourcing of all corridor management services in Nitra region. Depending on outcome of this change, ZSE might implement it on other regions as well. The analysis shows good potential for ZSE to develop its capacity and experience in ecological corridor management. This will require further building of its personal and technical capacity for ecological corridor management. At the moment ZSE does not have full range equipment and local contacts with municipalities, owners and local services to be able to switch to ecological corridor management on larger scale. ZSE lacks experience with the conservation or other type of projects from public sources which can contribute to systemic change of corridor management. On the other hand, ZSE is committed to ecological change and there is good chance that after internal change and capacity building ZSE will be fully capable to contribute to E.ON commitment for ecosystem restoration. ZSE is also aware of potential challenges of this new approach.

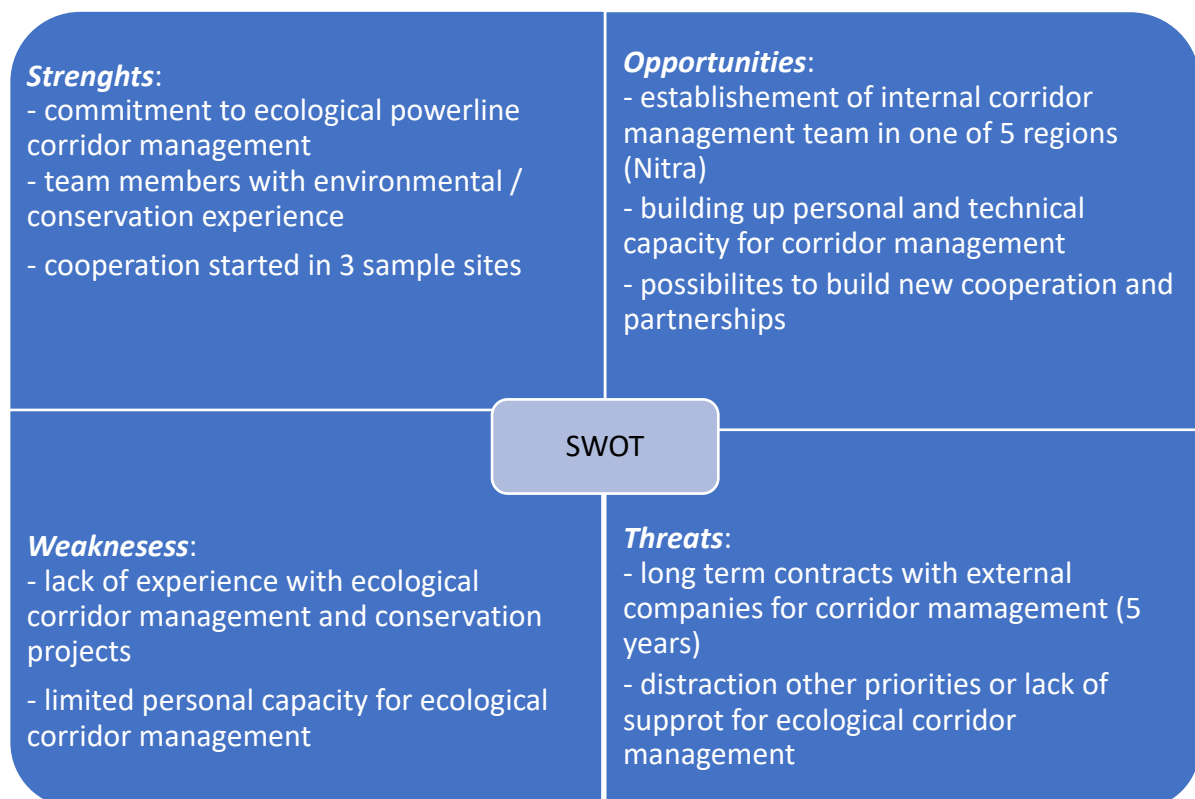


Figure 6 SWOT analysis of ZSE experience and ability to perform large scale ecological corridor management

3. Preconditions and barriers for ecological restoration of powerline corridors

Ecological restoration and management of powerline corridors represents a change from traditional approach to powerline corridors maintenance. As such, new approach and methods are not fully reflected in current conditions for power grid operators. Some conditions can be crucial for implementation of ecological corridors management on larger scale. Among important preconditions following ones are the most important: national legislation, land owners and their response to ecological management, attitude of local players like municipalities and farmers, service providers and level of cooperation with nature protection authorities and conservation NGOs.

Legislation

The rules set out for powerline corridor management and rights and responsibilities of landowners in this process may differ across European countries and grid operators can have different conditions related to the level of administration processes attributed to the change of management practices. These processes can relate to permits from landowners to manage / change or alter management on respective land, rules and standards for the powerline corridor management or specific procedures to cut trees or vegetation under the powerlines due to grid maintenance. It is important to explore these conditions and estimate administrative burden which might be a barrier for some operators to shift to more ecological and sustainable management. In Slovakia, two permits are important for management (1) no objection or agreement of landowner, and (2) permit from Nature protection or forestry administration to cut trees. It is possible to assume, that if legislation favours ecological powerline corridor management, grid operators will be able to manage more sites in sustainable way in the future.

Relationship with land owners

Relations and opinions are absolutely crucial for ecological corridor management. As operators rarely own the land in the corridors, they rely on the permissions from owners to implement ecological corridor management or to alter land use practices. In Slovakia, fragmented ownership structure of land often undermines to achieve agreement on the form of corridor management. In many cases, only possible way for operators to change the corridor management to ecological ecosystem / habitat restoration is often restricted to owners of large land blocks or state land which is managed / administered by state companies. This of course limits the scale of change to ecological corridor management. Therefore, complicated land ownership structure is a barrier for sustainable corridor management. It would be possible to favour ecological corridor management in legislation, which could help the operators and boost the total area which will be managed ecologically.

Attitude of municipalities and stakeholders

Important local players as municipalities and local farmers can often support or stop ecological corridor management depending if this change is or is not in line with their interests. Therefore, good contacts and relations with important players will be a decisive moment in some localities.

In many cases, cooperation with local farmer is essential for sustainability of proposed ecological measures where regular mowing or pasturing is necessary for long term management of the corridors. Unfortunately, livestock sector is not in good shape in Slovakia, but this can vary country to country. Lack of capacity of local farmers or missing interest to cooperate can be a barrier for ecological corridor management in some areas. This barrier will be difficult to overcome and location of alternative sites will ne necessity.

Local collaborators and management services providers

Somewhat connected to previous paragraph, local collaborators and management services providers can limit shift to more sustainable practices. This barrier or obstacle, can be however, solved by services providers from other areas where capacity or interest to cooperate is available (in contrary to farmers, which need to be active locally).

Cooperation with nature conservation authorities and NGOs

Ecological restoration and management would not bring any added value if it means only quantity and not quality of habitats / ecosystems restored. Close cooperation with nature conservation authorities and NGOs is important to identify the most important types of habitats to be restored on local level. It is not to be expected from the operators to choose the most feasible and best fitting habitat type and method of restoration for local conditions. Experience from Slovakia, but elsewhere from Europe confirms that cooperation with nature conservation authorities / agencies or NGOs is essential. It also brings added value of interdisciplinary approach which is needed in many individual cases. On the other hand, nature conservation authorities and agencies often lack capacity to get involved in these processes. NGOs are also limited in their capacity to cooperate. This barrier can be solved by better coordination, enhanced cooperation, soft type of activities (manuals, guideline documents etc.). This is where UNEP can also contribute with its experience and more strategic approach.

The level of protection or conservation importance of sites which operators choose for ecological management is also important for quality of restored habitats / ecosystems, but it can be also breaking point for availability of addition public funding for the shift to ecological corridors management. UNEP can help E.ON and its operators to identify the most important parameters for sites / restoration areas selection (tools like decision making trees for site selection can be prepared for operators).

There might be other less important barriers in other countries as this analysis is based mostly on the experience in Slovakia. Exchange of experience and best practice examples sharing among E.ON (but also other) operators can be very helpful. Coordination and sharing of experience should be in the centre of UNEP – E.ON partnership and cooperation with E.ON operators.

4. Options and opportunities for further work in Slovakia with possible transboundary effects

Both E.ON grid operators in Slovakia are able to contribute substantially to E.ON restoration commitment. We assume that similar situation is in neighbouring countries. This chapter focuses on the enhancement of cooperation in Slovakia, but proposed activities can be implemented in other countries in Europe as well. Even better results can be achieved through some level of coordination among all relevant E.ON operators in Europe.

It should be noted that direct transboundary cooperation (i.e., at the same transboundary sites) among E.ON operators is not probable as this level of operators do not usually manage trans-national powerline grids. However, this does not prevent E.ON partners from close cooperation in border regions on sites which will support the same species of habitat / ecosystem of particular important for a region in question.

Options and opportunities

The most relevant option for further work relevant for Slovakia will be improvement of the cooperation among E.ON operators in the area of ecological corridor management. Activities listed below or elaborated in chapter 5 can be used and further developed to turn options into opportunities in Slovakia as well as in other European countries with E.ON presence.

When focusing on actual opportunities for restoration in Slovakia, there can identified many suitable sites for ecological corridor restoration and management with added value for nature and biodiversity. VSD identified for long term approx. 1000 sites where ecological management would be possible in long term with average are 1ha this can represent about 1000 ha of restored and ecologically managed corridors. ZSE does not have similar estimates yet, but given the similar situation we can assume similar potential for ecological restoration and management of corridors for ZSE as well. Rough estimate would be 350 – 750 km of restored corridors in Slovakia. More detailed overview would require more deep investigation with both operators which can be done for example in the frame of preparation of joint funding proposal.

Possible activities

Following activities will further facilitate UNEP and E.ON joint work:

- Coordination and exchange of best practice among E.ON operators
- Preparation of guidelines and manuals for ecological corridors management
- Organisation of joint workshops and study tours
- Preparation of joint projects for ecological powerline management
- Using results for corporate identity and communication

As these points are further discussed in the next chapter we focus on their implementation as recommendations for further focus for UNEP E.ON cooperation.

There can be different models for facilitation of the cooperation between UNEP and E.ON and among operators on these activities: UNEP can support E.ON headquarters on high coordination level with high level conservation advice and facilitation.

It would be good if E.ON organises or provides coordination in ecological corridors management among their operators. Model of Task Force or coordination group consisting from relevant operators and nature conservation / restoration experts can be a good way forward. The coordination can have one or two levels in order to reflect regional and operational differences in the corridor management in Europe.

If overall coordination is not feasible, E.ON can advise its operators to form peer groups in neighbouring countries and coordinate and share experience on regional level with minimal input from E.ON. regardless of coordination model selected, E.ON should communicate its commitment to operators support its implementation across management structure, through capacity and financing. Last but not least is mutual understanding of the share responsibility to fulfil E.ONs commitment among operators. If implementation is fully supported in E.ON, we assume the overall commitment in terms of km of managed corridors can be achieved and even

If any of the above activities cannot be implemented, as a minimum, we will suggest to facilitate cooperation between various E.ON operators on national level. In case of Slovakia, it will be between VSD and ZSE.

5. Focus of UNEP activities in the Carpathian region and for cooperation with E.ON operators in Europe

5.1 Opportunities for work on ecological powerline corridor management in the Carpathian region

Alignment and promotion of ecological powerline corridor management among countries in Carpathian region communicated and facilitated through the Carpathian Convention for which UNEP provides secretariat services can be an interesting way for support of UNEP partnership with E.ON and ecological restoration in the UN Decade of Ecosystem Restoration as well. Provided that the Carpathian Convention Parties will agree, the joint work can focus on overall national support for ecological corridor management, limiting preconditions like legislation and administration of shift from traditional to ecological powerline corridor management.

This work will contribute to different working streams of the Carpathian Convention and from different perspectives. Following issues and topics can be discussed in several working groups (WGs) of the Carpathian Convention:

- WG on Conservation and Sustainable Use of Biological and Landscape Diversity – the core outcome of the ecological corridor management – better management of habitats and restoration of ecosystem is in primary interest of this WG. In addition, the Carpathian Convention is dealing with ecological connectivity for migration and dispersion of Carpathian species and well managed powerline corridors can serve as ideal corridors in the absence of other better suited natural habitats. For some species groups, on the contrary, sustainably managed powerline corridors can serve as corridors through areas which will otherwise represent barriers for their dispersion. For example, specialised grassland species cannot migrate through large forest complexes, but would be able to disperse through managed grasslands along powerline corridors. Spread of invasive species should be avoided through appropriate management.
- WG on Sustainable Industry, Energy, Transport and Infrastructure – this might be the most relevant WG from the view of various preconditions which could limit implementation of ecological corridor management in the Carpathian Convention countries. Important and complementary is the issue of ecological corridors management of trans-national powerline grids, which are often managed by state operators and will not be managed ecologically if there is not additional incentive on the level of regional cooperation. Issue of ecological connectivity is very relevant for this WG as well.
- WG on Adaptation to Climate Change – the issue of ecological management of corridors might be relevant for this WG from the perspective of the implementation of possible mitigation and adaptation activities. Restored habitats in powerline corridors will contribute to carbon sequestration and can help with localisation and interconnection of climate change adaptation actions in landscapes in the Carpathian region.

5.2 Focus of UNEP work in relation to the E.ON's restoration commitment

Complementary to the UNEP work under the Carpathian Convention, UNEP can focus on realisation of its partnership with E.ON. Depending on capacity, resources and level of integration of this work into short to medium term priorities, UNEP can focus on various types of activities to support E.ON in its initiative. The most relevant activities are discussed below.

Implementation of easy and soft activities

Boosting the initial implementation of ecological corridor management does not require a lot of time and resources. Relatively easy activities can be applied first:

- Preparation of guidelines and manuals for ecological corridors management – this can be relatively quick action which will build on the experience of more advanced E.ON operators and it can help sharing best practice and recommended methods across Europe. Ideally guidelines or manuals are prepared in consultation with operators and restoration experts.
- Organisation of joint workshops and study tours – practical first-hand experience exchange is very valuable, but yet relatively cheap and easy to organise activity for peer support among E.ON operators. Study visits can also facilitate building of partnerships among interested E.ON operators which would like to join preparation of the EU level funding project proposal (see below for more details). Also, VSD already presented willingness to organise a workshop with the main topic of Ecological management of corridors with site visits. It would be interesting to support this initiative on E.ON level.

Replication of best-case examples and experience

Exchange of best-case examples and experience is not limited to E.ON operators. There might be valuable examples ready to be shared by other grid operators in Europe.

Using E.ON results for support of the ecological corridor management Europe wide can contribute to presentation of positive corporate identity of E.ON operators across Europe and positive communication about E.ON in general.

Coordination of restoration activities

On more practical level, coordination and regular exchange among E.ON operators on the implementation of ecological corridor management can further facilitate implementation of E.ON commitment.

Joint conservation project preparation among E.ON operators in Europe

Even E.ON committed to invest into the ecological management of corridors it manages, more work can be done with additional funds. Especially restoration work will be more resource dependant and will require long-term commitment. Initial investment into removal of invasive species from a site and its full restoration and conversion to more sustainable long-term management will be costly and not every operator has personal capacity and resources to

contribute at required level. Therefore, joint preparation of projects for ecological powerline management has a potential to fulfil gaps in funding and restoration capacity.

There might be some resources available at national level as well. As coordination for national level funding will be challenging and differs country to country this should be subject to activities on E.ON operator's level. In Slovakia, the national option can be seen in Structural and Cohesion funds, but at the moment new programme cycle is under preparation and detailed priorities are not known yet. The next cycle can be operational from 2022-23.

Several options would be fitting and available for funding of joint project on EU level. Some operators have already experience with implementation of EU LIFE projects (LIFE ELIA, LIFE PannonEagle). However, LIFE nature project focus on Natura 2000 sites as priorities and to find good project sites within Natura 2000 sites in some countries can be challenging. Also, certain level of skills and expertise is required to prepare a good LIFE project. Example of preparation of non-funded project Energy4Life shows that investment into good project proposal fully fulfilling all the rules and LIFE Programme priorities is a must in order to receive funding. We would recommend appropriate partners from NGOs and state authorities and agencies to be involve in the project preparation and implementation. Funding on the level of 50% can be granted to private partners in LIFE.

6. Conclusions and recommendations

- In Slovakia, E.ON has two operators (VSD and ZSE) who are active in West and East Slovakia. Their experience and capacity to implement ecological corridor management was analysed based on desk study and interviews.
- VSD, E.ON operator in East Slovakia is more advanced and experienced with the ecological corridor management implementation. VSD has developed personal and technical capacity for this work and they have even experience with implementation of conservation LIFE project PannonEagle (as partner). This experience and capability will allow VSD to substantially contribute to fulfilment of E.ON commitment.
- ZSE, E.ON operator in West Slovakia is less experienced with practical ecological corridor management as until the end of 2021 all services related to corridor management were outsourced to external companies. From 2022 ZSE will start to build one own team for corridor management in Nitra region. ZSE is also planning first site projects of ecological management in 3 pilot sites. It is expected that ZSE will be able to contribute to the E.ON restoration commitment with some necessary capacity building and experience gathering.
- Important preconditions for ecological powerline corridor restoration and management were discussed in Chapter 3 with some relevant references for Slovakia.
- Many suitable sites for ecological corridor restoration and management can be identified in Slovakia. For example, VSD identified approx. 1000 sites where ecological management would be possible in long term with average area of 1 ha. In total this can represent about 1000 ha of restored and ecologically managed corridors. Estimates for ZSE are not available, but we can assume similar potential for ecological restoration and management of corridors. Rough estimate would be 350 – 750 km of restored corridors in Slovakia.
- Options for activities in the frame of the Carpathian Convention and its bodies on ecological powerline corridor management are discussed in Chapter 5.
- Chapter 5 contains also recommendations for UNEP focus on work with E.ON to further facilitate their partnership. Proposed action can be summarised as follows:
 - Implementation of easy and soft activities:
 - Preparation of guidelines and manuals for ecological corridors management
 - Organisation of joint workshops and study tours
 - Replication of best-case examples and experience
 - Coordination of restoration activities
 - Joint conservation project preparation among E.ON operators in Europe:
 - Joint LIFE project preparation
 - National sources

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