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Development of an ECONET for Lugansk Oblast

Rural development and sustainable development in Ukraine

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Abstract

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There are millions of hectares of land in the Ukraine which either have been abandoned, or are farmed with a low land productivity due to severe land degradation. The Netherlands Embassy has requested a study to assess the opportunities and benefits of restoration of degraded steppe areas. The goal of this project is the restoration of degraded land and to develop more sustainable land use with a higher biodiversity. Through the development of the Ecological Network, ECONET, conservation and sustainable land use can go hand in hand. Innovative farming systems which are both economically and environmentally sustainable agricultural production systems are proposed for pilot farms, which are partly based on use of buffer zones and core areas of the ECONET. Integrated, sustainable farming systems can improve the livelihood of farmers and lead to higher biodiversity.

Keywords: biodiversity, conservation, ecological network, LARCH model, farming system, grazing management, livestock farming, steppe, Ukraine, stakeholder consultation.

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Summary

The Royal Netherlands Embassy in Kiev has requested a study to assess the opportunities and benefits of restoration of degraded steppe areas and the development of ECONET. There are millions of hectares of land in the Ukraine which either have been abandoned, or are farmed with low land productivity due to severe land degradation. The transition from smallholder farming to large agro-industrial systems has resulted in abandoned settlements and lack of viable perspectives for rural communities. The project therefore aims to bridge the gap between nature conservation and production agriculture. The development of ECONET should result in restoration of degraded lands towards more diverse steppe vegetations and new perspectives for rural areas.

A system of areas which are sufficiently large to maintain different wildlife populations is called an ecological network or ECONET. Together with so-called 'core areas' corridors form essential components of ecological networks. The major habitats with regard to biodiversity are steppe habitat, rivers and forest. To assess and evaluate the functioning of the ecological network the landscape ecological model LARCH (Landscape ecological Analysis and Rules for the Configuration of Habitat, developed at Alterra) was used. A number of indicator species was selected to test the ECONET. The focus was on the steppe, as most crucial and fragmented habitat in this territory. Two Raions were selected as pilot areas for the development of the ECONET: Belovodsk Raion and Antracite Raion.

A field assessment was done in August 2010 to check the maps, which form the basis for the modelling work. During the field visit we assessed the areas most promising as corridors, core areas and buffer zones, which form together the ECONET.
Also the enormous land degradation was noted, as a result of illegal mining activities which is rampant all over north-west Antracite Raion.

The modelling shows that the Ecological Network is good (sustainable) for several species like the Ortolan or Isabelline wheatear. Those birds are mobile and there are sufficient natural areas like dry steppe grasslands and wet grasslands along the rivers. However, the populations of less mobile species like Marmot or Marbled Polecat are often fragmented because the steppe areas have mostly disappeared, and what is left are small fragmented areas. The roads results in further fragmentation. Finally, species which occur in low density with a large range like Eagle owl or Pallid harrier are not sustainable since the total territory of steppe is too small.

The ECONET was designed for Belovodsk and Antracite Raions based on the modelling results. For Belovodsk the strategy is to improve the connectivity (cohesion) of the network, by linking fragmented areas and establishment of one larger steppe core area (protected area). Further, to stimulate productive use of steppe in the buffer zones and corridors. Steppe corridors are proposed to link up the steppe fragments with Streltsovskii steppe and major protected steppe areas in Russia. Finally to improve the major connections for other ecosystems like forests and rivers.
For Antracite is proposed to safeguard remaining rocky steppe areas by proper habitat protection, strict control of land use and halting illegal land destruction. It is proposed to establish two core areas as the backbone for the ECONET, and connect rocky steppe in the north and south of the Raion through development of a steppe corridor.

Four farms using steppes in different ways were visited and investigated. The first farm in Belovodsk is a traditional farm and is keeping livestock since long time (as Kolkhoz). The second farm is a bankrupt state horse farm. The third farm in Antracite is a re-established abandoned farm focused now on beef cattle, and the fourth farm is at Verknie Teplie.
Steppe areas which form core areas or corridors in the ECONET can also have productive functions for farming, they provide grazing land at low costs. Extensive grazing is excellent for steppe and buffer zones, as long ascare is taken that no overgrazing take place.
Steppe can be used for profitable livestock production when it is integrated in a system of farms with arable land, situated near steppes. Steppe areas which form core areas or corridors in the ECONET can also have productive functions for farming, they provide grazing land at low costs. Extensive grazing is excellent for steppe and buffer zones, as long as care is taken that no overgrazing takes place.

Steppe can be used for extensive grazing, hay making, and production of concentrates (with barley and maize) which can be integrated in the farm plan. Grazing cattle and sheep are a good mean for the conservation of those steppes that need to be grazed, economic advantages can be combined with ecological benefits. However, there is shortage of beef cows (and calves) in the Ukraine, and this makes it difficult in the short term to start new beef farms. It is not impossible that the present high milk price will also stimulate initiatives on dairy farming in steppe areas.
It seems that all present steppe pastures were mismanaged in the past and show signs of various forms of degradation, of soil and of vegetation. Many valuable forage plants have apparently disappeared from the swath, especially valuable grasses and leguminous forage plants. A real problem will be the training of new pasture specialists, because there are hardly any specialists left that know the steppe plants and know how to manage the composition of the swath.

There are good opportunities for steppe restoration by connecting isolated steppe areas through the ECONET approach, in line with the Ukrainian policy. The development of ecological networks is of particular importance in such fragmented situations as we encounter in Lugansk Oblast, corridors are essential for migration of flora and fauna, and re-population of species that may have disappeared. An ecological network with core areas connected by corridors will facilitate the dispersal of species, and faster recovery of steppe.

Communication can support the implementation of ECONET in Belovodsk and Antracite. It is important to communicate the implementation of ECONET in such a way that stakeholders and the broader public understand the importance of developing ecological networks and are motivated to support the implementation. Stakeholders must engage in the planning process, because it is a process that results in a new form of partnership, which requires effective communication, patience and mutual trust. Good partnership is the most important ingredient for an effective and efficient planning process.
In the ECONET project guidelines on communication were provided during the workshops, on how to communicate with stakeholders. A communication plan was developed with the ECONET Working Group. Finally, brochures were developed to inform farmers, the general public and school children about the opportunities for development of the ECONET and conservation in general.

1 Introduction

1.1 What are steppes?

Steppes are natural grasslands with a typical continental climate, 250-500 mm. rainfall, often on productive Chernozem soils. The steppes have a wide distribution from Hungary to Mongolia and China on the Eurasian continent, and similar vegetation types are found on other continents such as the tallgrass prairies in North America (Coupland, 1992). The steppe region of Central Europe is one of the hotspots for biodiversity, with a unique flora and fauna adapted to semi-arid conditions.

Over the past century, the areal extent of steppe grasslands has shown a tremendous decline due to changes in land use induced by political and economic changes in Eastern Europe. Naturally, the steppes would form some 240,000 km^2 or 40% of the territory of the Ukraine (UNECE, 1999). Due to conversion of natural grasslands, mainly for wheat production, as much as 90% of the former steppe habitat was lost. These extended cultivated areas were prone to erosion and degradation. With the loss of steppe habitat, there was a concomitant decline in its accompanying flora and fauna. Steppes are monuments for biodiversity conservation and provide many other services such as production of fodder for livestock, protection against erosion, carbon sequestration, water conservation, etc. Tishkov (2009) provides an overview of steppe ecosystem services. In the 1990s, the transition of land ownership from large kolkhozes to private ownership resulted in land abandonment.

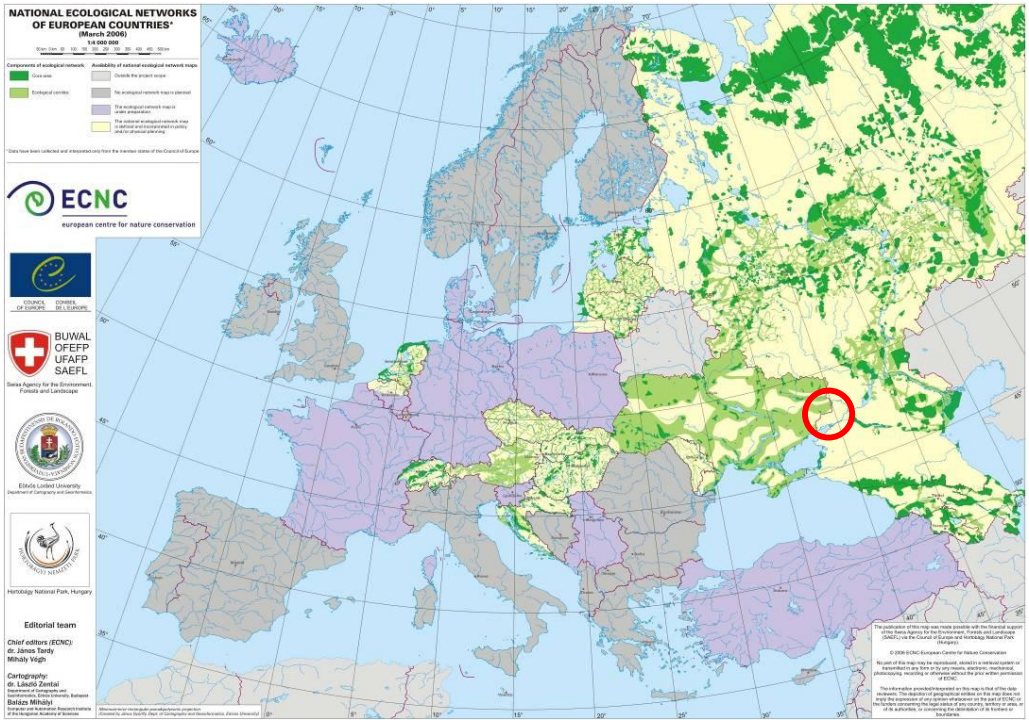


Figure 1

Ecological networks in Europe (www.seenet.info/images/maps). The project area (circle) is located in the border region of Ukraine: Lugansk Oblast (26,700 km^2).

The Netherlands Embassy has requested a study to develop an ecological network, with inclusion of degraded steppe areas. This project falls within the 'Policy support Cluster International' (BOCI) of the Ministry of Agriculture of the Netherlands. The study follows a first assessment of possibilities for restoration of degraded lands and inclusion of steppe in farming systems (Van der Sluis et al., 2009).

There are millions of hectares of land in the Ukraine which either have been abandoned, or are farmed with low land productivity due to severe land degradation. On the other hand, there are farms of thousands of hectares, which are managed at a large scale with intensive land use resulting in land degradation. In both cases biodiversity is very low. Farming expertise is limited, capacity is lacking to adjust management to restore productive systems and increase land productivity. The transition from smallholder farming to large agro-industrial systems has resulted in abandoned settlements and lack of viable perspectives for rural communities. In nature conservation circles on the other hand, thus far the added value of extensive agricultural management for maintaining biodiversity is not appreciated.
To realize conservation objectives, it is aimed to integrate extensive agro-steppe management in nature reserve management, to sustain or increase biodiversity.
The ECONET concept aims at integrating intensive with less intensive farming practices, which results in higher biodiversity but also a more diversified farming system with high-quality products. Increased income from quality products may compensate for a possible reduced production. A more sustainable soil ecosystem and higher biodiversity will result in a more sustainable farming system which maintains it productivity levels.

Leading question for the project is:
How can we develop a land use zoning plan which integrates in the farming system degraded (partly abandoned) agricultural lands, as well as more natural areas, which increases biodiversity and results into a more resilient farming system.
Final aim is to realize more sustainable land use with a higher biodiversity. Innovative farming systems are proposed which are both economically and environmentally sustainable agricultural production systems.
This will improve the livelihood of farmers and lead to higher biodiversity.
This is realized through development of an ecological network, which will focus in particular on steppe ecosystems, with inclusion of degraded, unproductive land.

1.2 The Ecological network

1.2.1 Why ecological networks in the past (Figure 1)

All organisms need a particular type of place to live in: the habitat of the species. For some species this habitat is very large, for others it is rather small, depending on their ecological characteristics and territory size. Due to conversion of land for agriculture, population growth, urbanization and more and more infrastructure, natural habitats have become fragmented. The natural habitat was sometimes destroyed, large part of the current agricultural land in Lugansk Oblast were part of the steppe biome in the past. The remaining steppe nowadays is less than 4%.

Due to this habitat loss and the fragmentation of natural areas many species have disappeared or may disappear in the near future. Fragmentation is the emergence of discontinuities (fragmentation) in an organism's preferred environment (habitat). As natural areas are fragmented, only small populations of species can survive in the small and isolated habitat patches. Figure 2 illustrates the process of fragmentation of natural areas. Extensive natural areas (upper scheme) decrease in size over time as a result of human activity, e.g. deforestation. The habitat is decreased, or broken up into small habitat areas (lower scheme).
Whether species can survive in such a situation or not often depends on a number of factors. For example a number of bad years, an epidemic disease or chance may result in the extinction of a species (Levins, 1970;

Forman, 1995; Opdam, 2001; Andrén ,1996; Fahrig, 2001). Good landscape connectivity will give species a better chance of survival in the long term. The connectivity of the landscape for a species depends on the mobility of a species and the type of the available habitat and its configuration in the landscape. In this respect corridors are very important for certain species.

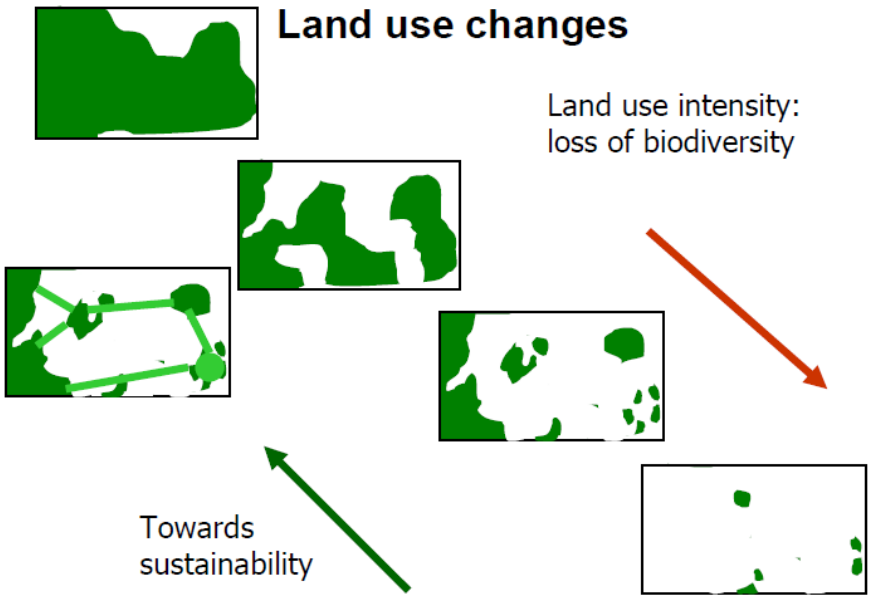


Figure 2

Process of fragmentation of natural habitat, left being the initial stage, right the final stage of loss of habitat (after Van der Sluis et al., 2004).

A system of areas which are sufficiently large to maintain different wildlife populations is called an ecological network or ECONET. An ecological network is connected via ecological links or physical links. The ecological network usually consists of 'core areas', usually protected, corridors, buffer zones and in some cases nature restoration areas. Together with so-called 'core areas' corridors form essential components of ecological networks (Figure 3). In Eastern Europe and Russia this is also called ECONET (экосеть) (www.wwf.ru/resources/publ/book/eng/179/).
The development of ecological networks and corridors is recognized as a positive policy for promoting nature conservation both at European and global levels (Jongman et al., 2011).

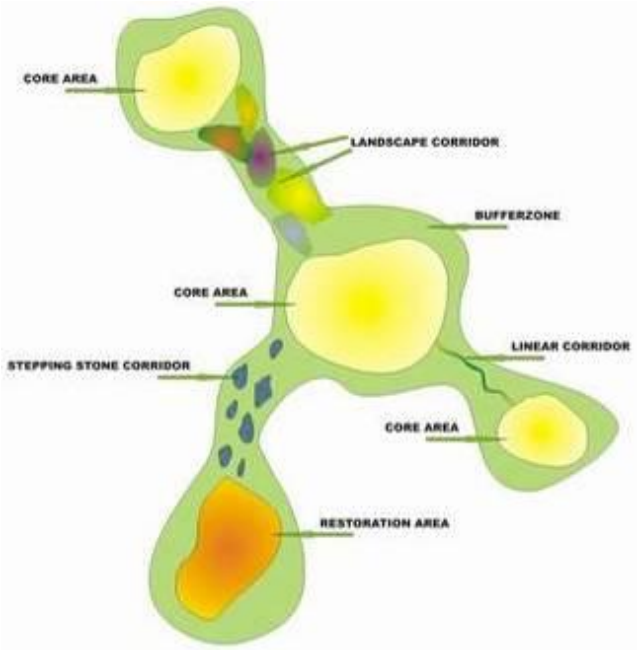


Figure 3
Schematic overview of an ecological network (after Bouwma et al., 2002).

1.2.2 Ecological networks and international policies

The ecological network is a model that has developed over the past 30 years. In the 1980s in Central and Eastern Europe, several national ecological-network programs were developed. The first network developed was in 1987, for Estonia (Bennett, 2004). At around the same time several other countries in the region developed proposals that were also based on the landscape-stabilization approach, most notably Lithuania and former Czechoslovakia. All these programs were characterized by an integrated approach to land-use zoning and environmental management within a strong national development-planning system.
The concept of ecological networks was officially recognized in Europe as an important approach for biodiversity conservation in the Pan-European Biological and Landscape Diversity Strategy (PEBLDS) (Jongman et al., 2011). The PEBLDS was endorsed in Kiev in 1995 by 54 states in Europe and calls for the development of the Pan-European Ecological Network (PEEN). The PEEN presents a visionary approach for the conservation of biodiversity in Europe. It promotes a Europe where nature is truly connected and where all European governments are actively engaged in establishing and maintaining a pan-European ecological network.

Also the Habitat Directive of the European Union (1992) acknowledges in Article 10 the importance of landscape elements that enhance connectivity ('corridors'). Whilst building the EU ecological network Natura 2000, the Directive encourages member states to include those landscape elements in their land-use planning and development policies which they consider appropriate (Van der Sluis, 2011). Furthermore, other global and European policies such as the Bonn and Bern Convention oblige contracting parties to take effective measures in conservation and management of the listed species and habitats. During the first years of the new millennium political attention for the development of ecological networks on a global level has increased considerably. At the World Summit on Sustainable Development in Johannesburg (2002) the importance of the development of regional and national ecological networks and corridors as a way to achieve sustainable development was confirmed in the Plan of Implementation.

Finally, during the Seventh Conference of Parties of the Convention on Biological Diversity (2004) ecological networks were incorporated in the work program on protected areas as a key conservation strategy.

1.2.3 Corridors and species dispersal

Corridors facilitate biological processes such as dispersal, migration or the regular movement of animals. As such, corridors strengthen the spatial cohesion of the network of habitat patches, which is crucial to the survival of many species.
Important for maintaining biodiversity is the protection of existing corridors. However, often the situation is such that corridors were lost due to the same reasons as habitats that were destroyed. On top of that, infrastructure development results into breaches in corridors. Therefore the need arises to restore connectivity, to reassess existing corridors and develop new corridors.
It is important that the individual demands of species are taken into account during the development of corridors. Species differ in their requirements; therefore, corridors have to be tailor-made or species-specific in order to function effectively. However, corridors which are useful to an umbrella species may suit other species with similar requirements, which are typically less demanding than the umbrella species (Groot Bruinderink et al., 2003; Wilcox, 1984).
The most important characteristics of a species that determine the type of corridor that a species requires are: the dispersal capacity of the species, the habitat requirements for its dispersal, its dispersal mechanism and its dispersal strategy.

The distance over which dispersal, migration and commuting movements occur vary greatly according to the species; birds migrate across continents, amphibians move a few kilometres and mice or carabid beetles may move only a few meters. The scale of the corridor and the corresponding ecological network is therefore related to the movement capacity of the species. In general many of the small, immobile species require corridors on a local level. Medium sized species require corridors on a regional level. Large herbivores and carnivores need corridors on the continental scale, and many bird species have migration routes that extend over different continents. Therefore, connectivity for species has to be assessed at various scales. As a consequence networks also need to be developed for different scale levels.

There are two main dispersal mechanisms: species can move actively (walking, flying or swimming) or passively (spread of plant seeds by animals). In the latter case the animals may act as the 'transporting vectors'. For species that disperse passively, the presence of corridors is often more important for the transporting vectors than for the species itself. In general birds, mammals, amphibians and reptiles move around actively. Invertebrates move around both actively and passively, plants disperse at a larger scale level predominantly passively (Van der Sluis, 2004; Bloemmen et al., 2004).

1.2.4 Functions of corridors

Corridors can be classified into three classes according to the functions that they fulfil (Van der Sluis et al., 2004; Foppen et al., 2000; Bennett, 1999).

1) Commuting corridors are used for regular movements from resting/breeding sites to foraging areas. A commuting corridor links elements that have a different function within the home range of a species. It supports daily movements between these elements and acts beneficially because it reduces predation risk, offers guidance and facilitates movement through the landscape. Normally these movements are restricted to short distances (up to a few kilometres) for vertebrates, or to tens of kilometres for wider ranging species. Good examples of species using commuting corridors are badgers and bats (Broekhuizen, 1986; Limpens and Kapteijn, 1991).

2) Migration corridors are used for annual migratory movements from one resource area to another (e.g. from breeding to wintering ground).The biological process of migration is a principal activity for many species groups. The most well known are bird and fish migrations. In their journey from one resource area to another some species will benefit from the use of corridors. This can be in the shape of a continuous linear pathway (e.g. riparian fish species). More often the pathway will consist of a set of areas used during migration as staging places (e.g. marshes for waterfowl and waders) (Elphick, 2007).
3) Dispersal corridors are used for a one-way movement of an individual (usually a juvenile) or population from either its site of birth (for juveniles) or its former breeding area to a new breeding area. Dispersal is an essential process leading to the immigration of individuals into other populations or to (re)colonisation of suitable habitat patches.

In addition to the classification according functionality, corridors can be classified into three to four classes according to the shape that they have: line, stepping stone and landscape corridors.

1.2.5 Climate change

Climate change may result in species and habitats moving north in Europe. Only recently we have realized that our nature reserves, designed and managed to conserve species, may in due time loose a majority of species due to climate change.
Ecological networks can serve as adaptation strategy for climate change, the impact on biodiversity may be decreased if landscapes are well connected (Opdam and Wascher, 2004; Opdam and Luque, 2009).
There are ample examples of species going extinct, or, in some cases, expanding northwards due to climate change. This is exemplified by the large range expansions as shown by species like the Souslik (*Spermophilus citellus*) and Long-eared hedgehog (*Hemiechinus auritus*).There was a western expansion of the range of Souslik and long-eared hedgehog as a result of the drought, whereas currently the territories of these species seem to contract again, which is apparently a result of changes in rainfall pattern (A. Lipkovich, pers. comm.).
A changing climate will affect both temperatures and rainfall patterns, for long time periods. An ecological network can make ecosystems more flexible, species can move and 'follow' the suitable habitat, provided that the landscape is still natural (no large infrastructure and barriers, like highways, cities, industrial areas) or that no major barriers are present (mountain ranges, rivers) (Vonk et al.; 2010; Opdam and Wascher, 2004).

1.3 ECONET in Eastern European context

Ecological networks exist at different levels: from circumglobal networks for birds or whales, to micro level networks for beetles or even smaller organisms. In the development of networks we should therefore also differentiate between these levels. In Eastern Europe ecological networks are often indicated as ECONET.
The development of the ecological network should be done from a hierarchical level: from small scale to large scale level, i.e. the Central and East-European or Eurasian network should be guiding to the Ukrainian network, the national Ukrainian network should be guiding to the Oblast network.

At the regional scale level a study was done on the Pan European Ecological Network (PEEN) from Bouwma, Jongman and Butovsky (2002). Major ecosystem connections run from north-east to a south-westerly direction.
The national ecological network of the Ukraine (Kostyushin, 2003) forms the basis for the regional design of the ECONET, as well as the transboundary connections that were identified towards Rostov Oblast, Russia (Van der Sluis, Demina, Zagorudnik andForosjoek, unpublished).

The national Ukrainian network is in fact based on major geographical features like rivers, coastlines and mountain ranges (Figure 4). An important corridor is the 'Severski-Donetsk', as well as some lateral corridors, Galisco-Slbozjanckii (2) corridor and the Stepovii (3) corridor. The latter is linking the steppe areas of Central Ukraine though the Southern Lugansk Oblast towards Russia, Rostov on Don.

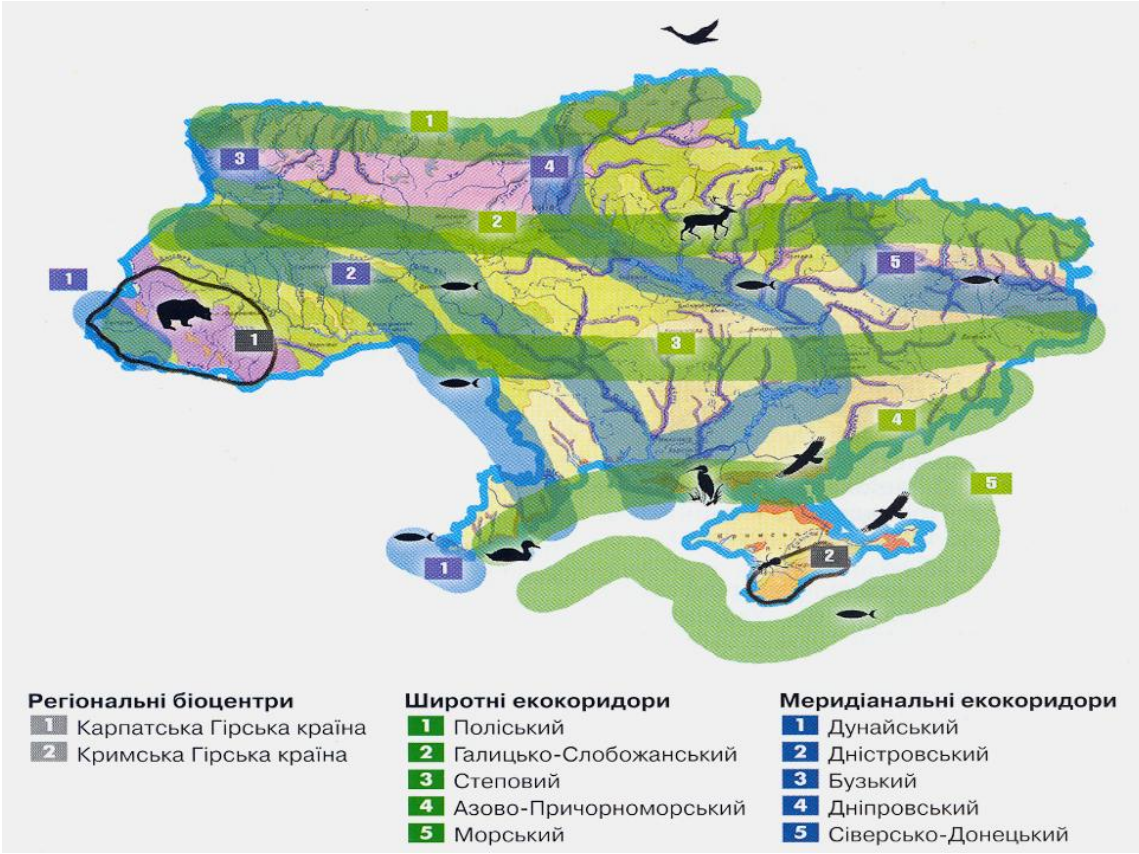


Figure 4

Map of the Ukrainian ECONET (Kostyushin, 2003).

At the Lugansk Oblast level an assessment was done of the ecosystems present for which the ECONET would be developed. Based on this assessment was concluded that major habitats with regard to biodiversity are steppe habitat, rivers and forest (Van der Sluis, 2009). Based on expert opinion was decided how the distribution is of those habitats within Lugansk Oblast and what the priority areas would be for the ECONET (Van der Sluis, unpublished).

The result is a map which indicates where best opportunities are to realize coherent networks for different ecosystems (steppe, forest, and river). Such networks together would form the ecological network ECONET (Figure 5).

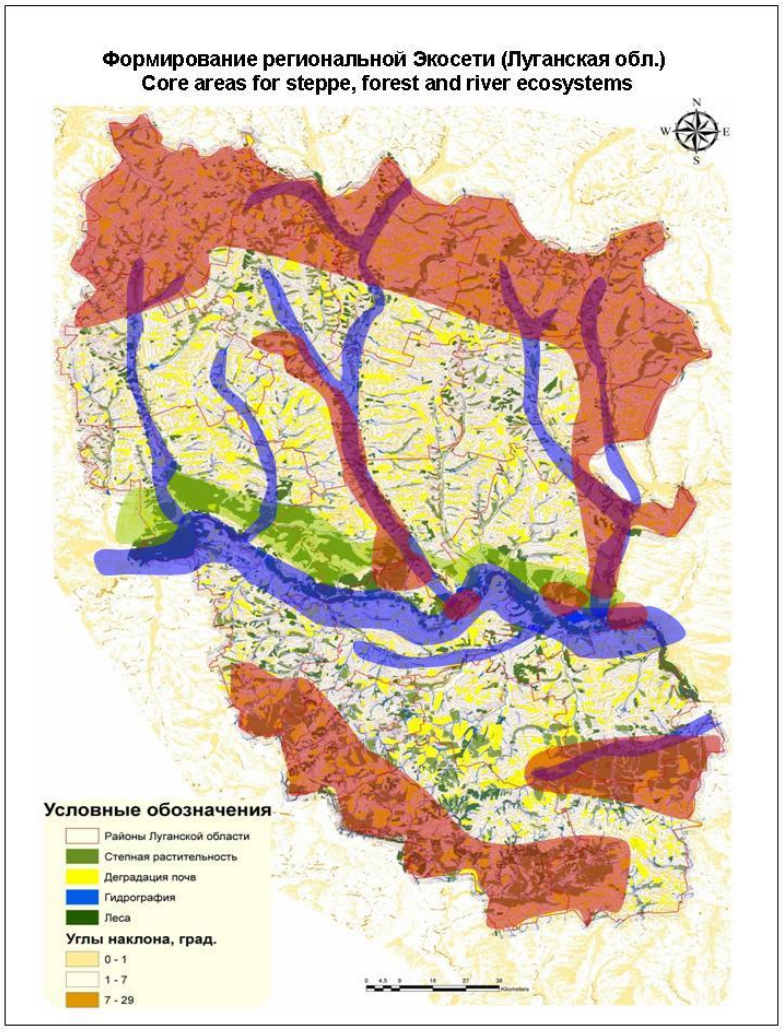


Figure 5

Main ecological structures in Lugansk Oblast (Van der Sluis et al., unpublished).

2 Method for development of the ecological network

2.1 Introduction

The development of ecological networks requires different steps, the definition of scale to work on, the target for the ecological network, and based on that species which are indicative for this network which can be leading in the design.
The following aspects are important:

- A hierarchical approach: work from large scale to small scale
  Define the main structures at international/continental level, than at national level, finally go down to regional or local level (as analogy: if you develop your roads network you first look at the major highways, and start connecting the 'arteries', the secondary roads from there etc).
- Define your target ecosystem(s)
  For effective ecological networks one should connect specific habitat types. It is no use to connect forest with steppe, marshland with mountains. Most species prefer one habitat type, one ecosystem type. Define what your target ecosystems are and define for each ecosystem its current distribution and potential network. For the Eastern Ukraine, and in particular Lugansk Oblast, there are in principle three major types of habitat: Steppe, Forest and Rivers and wetlands.
  A map with the principal ecosystem zones is shown in Figure 5 (Van der Sluis, 2009). This does not preclude combinations of different habitats and ecosystems. Often marshland habitat will be where rivers are, also forests are often found in larger river valleys. Development of ecological networks for this ecosystem may result in combinations of habitat types.
- Species selection
  The ecological network should cater for the range of species typical for an ecosystem. In our case, it means that the network should ensure sustainable populations of those species that are typical for steppe, both small and large species, of different vertebrate and invertebrate groups. The species may range from carabid beetles, specific reptiles, to skylark, bustard, Souslik, jackal and wolf.
  Species must be selected that can be linked to the specific ecosystem type of study.

A base map with the vegetation and/or land use is essential for proper planning and development of the ECONET. Based on the identified ecosystems, a map was developed with the primary natural habitats. Here base line maps from the Oblast environmental Committee were used. Additional field work was done to map natural grasslands and steppe.
Leading for ECONET development is steppe, since this is the rarest habitat present in the Oblast. Species are selected which are characteristic for steppe habitat. Next is assessed whether good habitat is present for these species.

2.2 Landscape Ecological modelling

To assess and evaluate the functioning of the ecological network the landscape ecological model LARCH (Landscape ecological Analysis and Rules for the Configuration of Habitat, developed at Alterra) was used. LARCH is designed as an expert system, used for scenario analysis and policy evaluation. The model has been fully described elsewhere (Groot Bruinderink et al., 2003; Van der Sluis and Chardon, 2001; Chardon et al.,

2001; Verboom et al., 2001; Verboom and Pouwels, 2004; Van der Sluis et al., 2005). The principles of LARCH are simple: the size of a habitat patch determines the potential number of individuals of a specific species it can contain. The distance to neighbouring patches determines whether it belongs to a network. The size of the network determines whether it can contain a viable population. If so, the habitat network is in potential sustainable for the species. The evaluation of the sustainability of an ecological network is based on total network area, on habitat quality, and on the spatial cohesion of the habitat patches.
LARCH provides information on the metapopulation structure and population viability in relation to habitat distribution and carrying capacity. It assesses spatial cohesion of potential habitat, and provides information on the best ecological corridors in the landscape. The model LARCH is run with a land use map or vegetation map, in which the ecosystem of interest is well presented. The LARCH database contains the spatial characteristics of many species (e.g. dispersal distances, home range, densities, spatial requirements for sustainable populations). The database with spatial characteristics is based on extensive literature studies, field studies, and on elaborate population dynamic modelling. The parameters are checked with local specialists (I. Zagorodniuk).
The LARCH-model itself uses a set of rules based on metapopulation theory. The output of the LARCH-model consists of a map which outlines the ecological networks of the species of interest and visualizes the sustainability of the networks and the spatial coherence of the habitat. Effects of barriers (like roads and urban areas) can be included.

2.3 Selected 'key species'

For modelling there are specific requirement regarding the species. The species should also be linked to the habitat information, i.e. in general the vegetation map which is available for the study. Further, the species should not be too rare, nor to common.
The selected species should have a range of spatial requirements, in particular with regard to home range and dispersal range. Usually selection of modelling species of different species groups (i.e. birds, mammals, reptiles etc.) will guarantee results which can be useful for the intended purpose. The information on the species was derived from different sources of literature (among others Zagorodniuk and Korobchenko, 2008; Zagorodniuk, 2009).

A number of indicator species was selected to test the potential of the ecological network. The focus was on the steppe, as most crucial and fragmented habitat in this territory.
Except for the specific habitat requirements of the species, also the size of a core area will be decisive for the result of the assessment of a certain species, as well as the dispersal distance of the species (Table 1).

Table 1

Species analyzed with the LARCH model.

English name	Russian name	Scientific name
Isabelline wheatear	Список птиц Греции	Oenanthe isabellina
Ortolan bunting	Садовая овсянка	Emberiza hortulana
Eurasian Eagle-owl	Филин	Bubo bubo
Pallid Harrier	Степной лунь	Circus macrourus
Souslik	Суслик	Spermophilus citellus
Northern Birch mouse	Лесная мышовка	Sicista betulina
Steppe Marmot	Байбак	Marmota bobak
Marbled Polecat	Перевязка	Vormela peregusna
Grey Wolf	Волк	Canis lupus
Orsini's viper	Степная гадюка	Vipera Orsinii
Predatory bush cricket	Дыбка степная	Saga pedo

The table below shows species typical for steppe ecosystems, with different dispersal ranges/mobility. For this survey some four bird species were selected (Isabelline wheatear, Ortolan bunting, Eurasian Eagle-owl, Steppe Harrier), with a range (dispersal distance) of 10-50 km. Some five mammal species (Souslik, Birch mouse, Marmot, Marbled Polecat and Wolf) ranging from 1-200 km, one reptile (Orsini's viper) and one insect (Predatory bush cricket) with a range of 2 km. Several of the species occur on the Red List, lists of international conventions or on EU-directives.

Table 2

Habitat requirements (km2) versus dispersal capacity (km) for selected key species.

Distance/ Core area	<1	1-3	3-7	7-15	15-35	>35
0-0.1	Spotted Souslik					
0.1-1	Birch mouse				Isabelline wheatear	
1-5		Marmot Orsini's viper				
5-10		Bush cricket Marbled polecat				
10-50				Ortolan bunting		
50-150						
150-1000						Eagle-owl
>1000						Wolf Steppe Harrier

2.4 Selected areas

Since Lugansk Oblast is a large territory the research focused on two Raions, which are different in nature, farming and morphology: anthracite Raion and Belovodsk Raion. These areas were proposed by the Oblast Environmental department.

Maps were prepared for the selected areas, the maps form the basis for the ecological modelling and land use zoning. In the selected study areas we assessed natural habitats for the selected key species.

Proposals are not only made for the smaller portion of the area which is part of the ECONET, or supporting conservation measures. Where possible degraded areas are included in these territories, to be restored through extensive use for agricultural production, such as to raise agricultural production.
Existing steppe areas are often core or backbone of the ecological network. Some areas are protected and form part of a larger steppe complex, other areas are degraded grazing lands from the former period of kolkhozes. Extensively used grasslands and natural areas are important for conservation. In particular the calcareous slopes often have a cover of steppe grassland. Erosion gullies or eroded valleys, so-called balki (balka singular) show a patchwork pattern of grassland, steppe and forest. A balka is a gorge, usually between 10 and 20 meters deep at the bottom and between 20 and 50 metres wide. They can often be steep on the sides but are usually fairly level along the course of the waterbed (which is most of the year dry). The balki are important arteries of natural habitats in larger farming complexes.

To make the ecological network more practical, we did example studies for some pilot farms. Within the framework of sustainable farming practices we propose a system of more intensively and extensively used areas within the farm, in such a way that a mixed farm model is developed where arable farming is included in a livestock management system. This makes the farm a more sustainable system, and this gives also opportunities for extensive and intensive livestock husbandry. The options were explored in an earlier study (Van der Sluis et al., 2009), and are more detailed in the current study.

2.5 Mapping

Maps are very limited in its availability for this region in the Ukraine. We had some maps from the Eurasian steppe project, which were prepared for Lugansk Oblast. Further, we used maps of the Environmental Committee from Lugansk Oblast.
The vegetation and land cover map for the two selected Raions was based on the map from the Eurasian steppe project. However, steppe turned out to be very inaccurate, and a field check and update of the map was required. Therefore the two Raions were visited in spring 2010, and the maps were updated and improved. Added habitat and vegetation types consisted of steppe and grasslands.

Table 3

Maps used for modeling and land use plan.

Theme map	Source
Steppe	Steppe project
Roads	Steppe project
Built-up areas	Steppe project
Rivers	Steppe project
Forest	Oblast Environmental Committee
Wood rows	Oblast Environmental Committee
Protected areas	Oblast Environmental Committee
Natural monuments	Oblast Environmental Committee

3 Results

3.1 Field Assessment Belovodsk Raion

A field assessment was done in August 2010. The aim of the field work was to inspect the maps, check its accuracy. Further, also to inspect the possible core areas and corridors, which were identified as a result of the landscape modelling with LARCH. During the field visit we assessed the areas most promising for amelioration measures (corridors, core areas and buffer zones) which form together the ECONET. The information we gathered were compared with the map (see Paragraph 2.5).
A GPS was used to record the track of the car. This track was later projected on remote sensing imagery of Google Earth, for further assessment of habitat (see Figure 6).
In the western part of Belovodsk Raion (7th of August 2010) we covered some 140 km by car, in the Eastern part of the Raion (8th of August), we drove 110 km. The team consisted of Vitaly Kliuiev and Theo van der Sluis. We were accompanied by local experts that knew the area very well, such as the chairman of the hunting society.

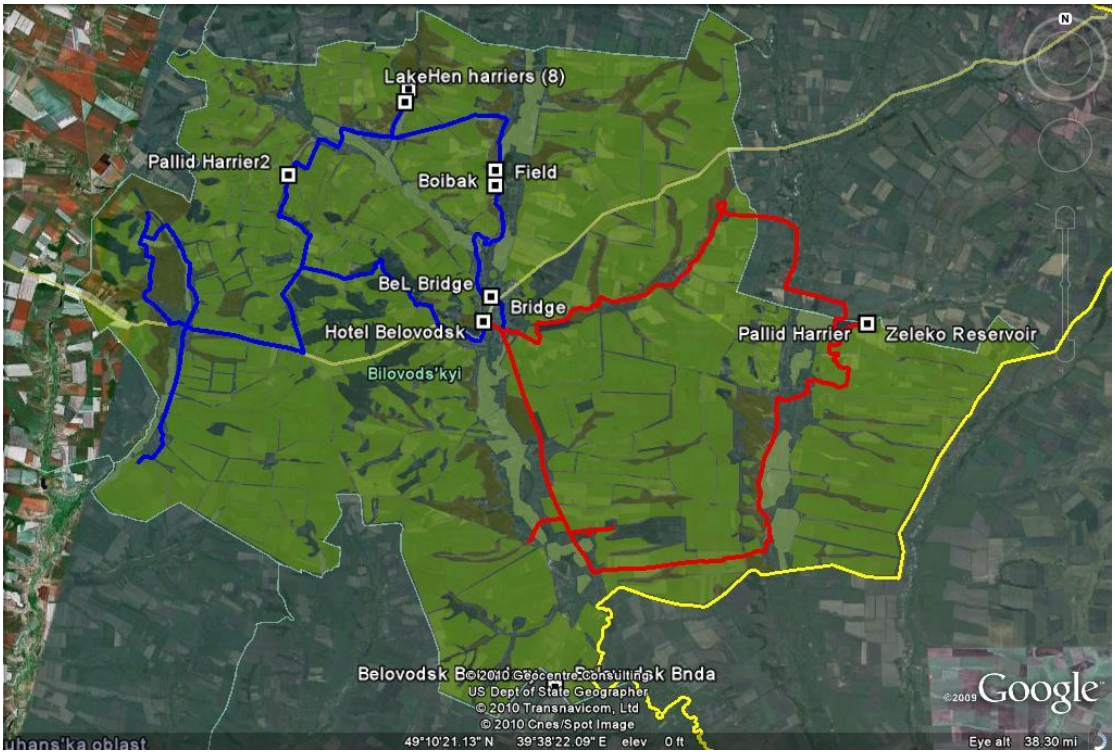


Figure 6
Map of Belovodsk Raion with route during field visit (recorded by GPS), August 2010.

Belovodsk Raion has three protected areas: in the northeast are two botanical reserves Novomilarevski/ Konovodskiii zakaznik (N), in the west is a faunistic reserve, Yovsug zakaznik (Y) and in the southeast is the Bilovodskii regional landscape park (B, see Figure 7). Although these are protected areas, the reality is that this is hardly visible in the field and land use is similar as elsewhere, apparently with limited restrictions.
Strict protection have national parks (Zapovednik), but none is present in the Raion. Just northeast of the Raion is Streltsovskii steppe, a Zapovednik (S).
Below follows the description of different areas in the Raion which were visited during August, and the assessment of these areas for corridor development in the framework of ECONET.

Land use data is provided in Table 4. In Belovodsk Raion 86% is agricultural land (of which 1% lies fallow) and 21% is pasture, grazing land.
In Antracite some 59% is arable land, 18% is pasture. Here 10% is fallow land, however, and 17% is open land without vegetation.

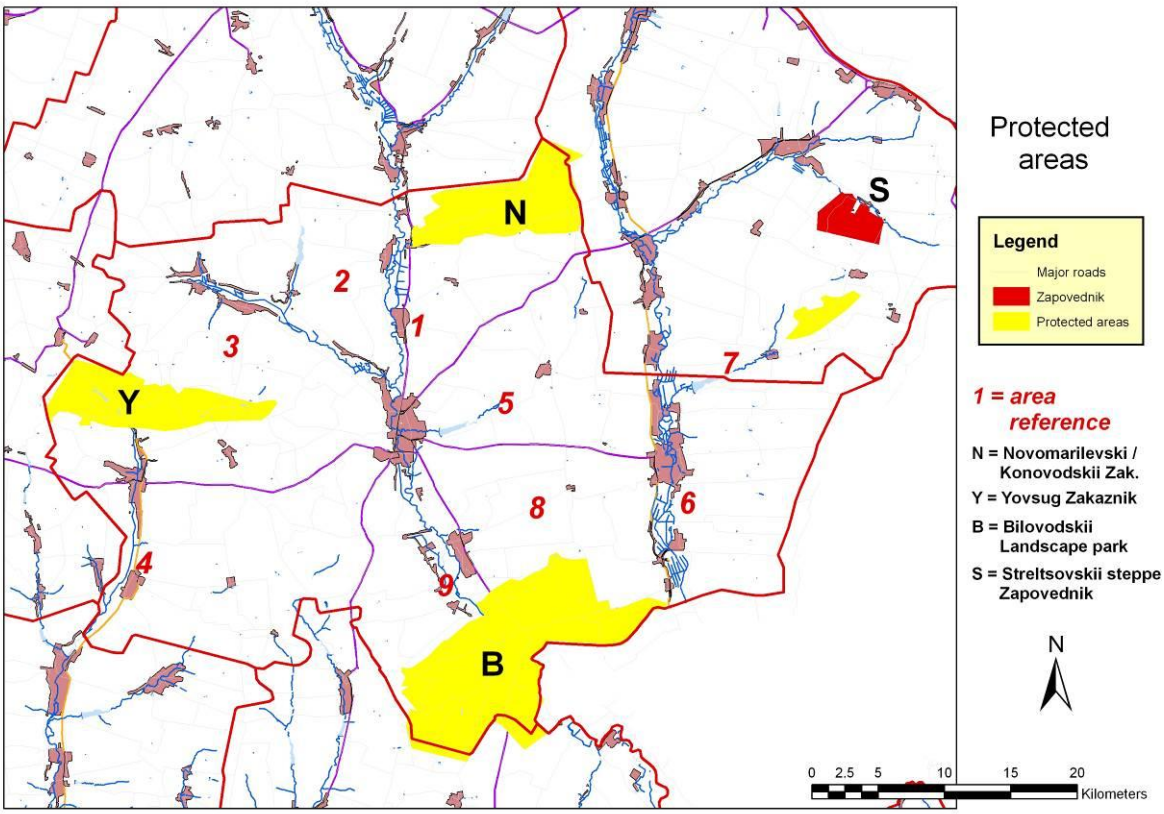


Figure 7
Protected areas in Belovodsk Raion and areas visited (1-9), described in the report.

Table 4

Statistics of land use in Belovodsk and Antracite Raion as of January 2009 (based on internet data).

НАЯВНІСТЬ ТА РОЗПОДІЛ ЗЕМЕЛЬНОГО ФОНДУ В МЕЖАХ АДМІНІСТРАТИВНО-ТЕРИТОРІАЛЬНИХ УТВОРЕНЬ ЛУГАНСЬКОЇ ОБЛАСТІ
AVAILABILITY AND DISTRIBUTION OF LAND AREA WITHIN ADMINISTRATIVE territorial formations Lugansk

Адміністративно-територіальні утворенняkeeseeekeke Administration	Загальна площа земель Total area	Сільськогосподарські землі Agricultural land							Адміністративні утворення Administration	Ліси та інші лісовкриті площі Forests and other forested areas								Забудовані землі Built-up area	Відкриті заболочені землі Open water-logged land	Відкриті землі без рослинного покриву Open land without vegetation	Води Water
		всього All	у тому числі сільськогосподарські угіддя Including agricultural lands							всього All	у тому числі лісові землі Including forest land										
			всього All	з них of which							всього All	з них Of which									
				ріллі Arable	перелоги Fallow	багаторічні насадженняper Ennial crops	сіножаті Hayfields	пасовища Pastures				вкриті лісовою рослинністю Covered with forest vegetation		не вкриті лісовою рослинністю Other covered with forest vegetation	інші лісові землі Other forest lands	чагар-ники Scrubland				
												всього All	у тому числі Including								
													полеза-хисних лісосмуг Forest belts	інших захисних насаджень Other protective vegetation							
Антрацитівський район Antracite Raion	166219.0	98649.4	96454.9	45802.0	17222.1	1517.6	1684.0	30229.2	**Antracite Raion**	31706.7	31294.4	31068.7	1256.1	1003.4	102.0	123.7	412.3	6321.4	397.4	27723.8	1420.2
	166219.0	98649.4	96454.9	45802.0	17222.1	1517.6	1684.0	30229.2		31706.7	31294.4	31068.7	1256.1	1003.4	102.0	123.7	412.3	6321.4	397.4	27723.8	1420.2
Біловодський район Belovodsk Raion	159696.0	138414.5	135502.2	94000.6	2555.3	851.1	4030.4	34064.9	**Belovodsk Raion**	13289.8	12137.2	11475.2	2229.9	710.5	205.0	457.0	1152.6	2086.7	923.2	4342.6	639.2
	159696.0	138414.5	135502.2	94000.6	2555.3	851.1	4030.4	34064.9		13289.8	12137.2	11475.2	2229.9	710.5	205.0	457.0	1152.6	2086.7	923.2	4342.6	639.2

Derkul River, North of Belovodsk (1)

General description: The slopes west of the Derkul River are steppe grassland. The slopes seem slightly degraded by grazing, but otherwise they are well vegetated.

Land Use: The slopes are mostly grazed. Near villages there is more human impact, some rubbish dumps and fires. Some quarries are present where limestone rock is excavated. Hardly any lands are ploughed, only north-west of Novomilarevski lands are ploughed, even on the slopes, where sunflowers are growing. Where the valley is wider the bottom has been ploughed in the past, but was abandoned and is now vegetated with rough grassland.

Fauna observations: Several birds were seen, hoopoes, red-backed shrike, larks, and buzzard. Marmot near Novomilarevski.

Function of corridor: These slopes west of the Derkul River can form a steppe corridor. The corridor is important for connecting steppe habitat; due to its width it is more than a corridor, it provides good habitat. Down in the valley is the river with rough grassland (abandoned fields) and reed land along the Stream Derkul. It is therefore also a wetlands corridor.

Required measures for corridor development: Conversion of the few ploughed fields towards grassland. Protection for rubbish dumping, soil extraction and fires.

Figure 8

Derkul River (1), view towards Belovodsk.

Figure 9

Balka Glinyana (2), view on the lake.

Balka Glinyanaya (2)

General description: The balka is west of the Derkul River, and its upper reaches (the watershed) consists of ploughed fields, the vegetation of the balka is steppe grassland with trees. The Balka ends in the river Skorobna, just below a fairly large artificial lake (not on the map).

Land Use: The slopes of the balka are grazed. Near the lake there is a lot of grazing. Between the Balka and Derkul valley most lands are ploughed. There are remains of old kolkhoz farm buildings. Obvious human impact is near the village Sjulikovka, with signs of overgrazing. At the lake is fishing and watering of livestock.

Fauna observations: Hen harriers, herons, larks, nests of bee eaters (in quarry). Marmots were observed near Sjulikovka (west of lake).

Function of corridor: The corridor could connect the steppe in the central part of Belovodsk with the western and northern steppe through the Litvinovka balka.

Required measures for corridor development: Restore grassland near the Derkul valley, to connect the two watersheds.

Balka Litvinovka (3)

General description: The balka is southwest of Sjulikovka village, runs in a southerly direction. It is a rather narrow valley, with at the bottom former ploughed lands which are now rough grassland. Some dams were constructed but opened. The slopes are rather open, upper reaches are forested.

Land Use: In the past there was ploughing at a small scale, now these areas are abandoned almost everywhere. The western slopes form open, calcareous habitats. Probably extensive grazing takes place. No human habitation.

Fauna observations: Bee eaters, Pallid harrier (!)

Function of corridor: The Litvinovka balka corridor could connect the steppe in the north to steppe further south, finally with the Yovsug River.

Required measures for corridor development: Restore steppe through extensive grazing. Point of attention is the connection across the Busjkon canal, which is almost one kilometre wide with reed land and short grassland.

Figure 10

Old kolkhoz buildings Derkul (1)/Glinyana (2).

Figure 11

Ploughed valley, Balka Litvinovka (3).

Yovsug River (4)

General description: The Yovsug River is in the west of Belovodsk Raion, and runs from the watershed in a southerly direction. It is a wide valley, with at the bottom reed lands and some villages. A dam was constructed in the upper reaches. The western slopes are rather open calcareous grasslands.

Land Use: Ploughing is done mostly east of the valley. Everywhere in the villages are abandoned houses and farms. The western slopes form open, calcareous habitats, probably extensively grazed. At the lake is fishing and some camping.

Fauna observations: Hen harriers, larks, buzzard. Three beaver families are at the lake (not observed). Good populations are present of wild boars and roe deer, which are monitored.

Figure 12
Calcareous slope near Yovsug village (4).

Figure 13
Hen harrier, Circus cyaneus (pict. V. Kliuiev).

Function of corridor: The Yovsug corridor could connect the steppe in the north to steppe further south. It also forms a river/wetland corridor, with wet grassland along the stream.
Required measures for corridor development: Restore steppe through extensive grazing. In particular, restore abandoned/fallow land to grassland.

Pishanu Novospasovskii Yar (5)
General description: The valley starts just east of Belovodsk and runs in a north-easterly direction. It is a wide open valley, soon changing in a steeper balka, with no forest vegetation and a small stream with some reeds and wetland. Near Belovodsk ends the small stream in a large reservoir with reed lands. The western slopes are rather open calcareous grasslands. Some settlements are located in the central part of the valley, the largest being Plugatar.
Land Use: Ploughing is done in some parts of the central valley near Belovodsk and on the plateau. Some old Kolkhoz farms are at the settlements. The western slopes form open, calcareous habitats. Near Belovodsk the grass is short and intensively grazed, further out mostly extensive grazing occurs with signs of degraded chalk outcrops. At the lake is fishing and some camping.
Fauna observations: Bee-eaters, larks, hoopoe, common wheatear and several marmots, beaver families (35 in the watershed, not observed). Occasionally there are wild boars and roe deer, which are monitored.
Function of corridor: The Novospasovskii Yar connects important steppe areas of Derkul and Kamishna watersheds, even up to Streltsovskii steppe.
Required measures for corridor development: Decrease grazing pressure at the lower reaches near the lake. Restore steppe through extensive grazing. Point of attention is the connection to the steppe areas near Streltsovska village, possibly some lands need to be reconverted to grassland here.

Figure 14
Pishanu Novospasovskii Yar (5), near Plugatar village.

Figure 15
Marmot (pict. V. Kliuiev).

Kamishna River (6)
General description: The river is in the east of Belovodsk Raion and runs in a southerly direction; its springs are in Melovskii Raion near the Russian border and runs in a southerly direction. The valley is in the west bordered by a scarp of calcareous slopes, which is partly covered with forest. Along the valley is a road with a large number of villages; further east runs the river with some reed lands (i.e. the road and villages are between the river and slopes). The river drains in Russia. The western slopes are rather open calcareous grasslands.
Land Use: Ploughing is done mostly east of the river. Around the villages and farms is more intensive land use. On the slopes is extensive grazing. Along the Kamishna valley are abandoned farms.
Fauna observations: Common wheatear, skylarks, bee-eaters. Good, large populations of marmot are present near Novostreltsovska, which are monitored.
Function of corridor: The Kamishna corridor connects steppe territories in the north to steppe further south in Russia, it is a transboundary corridor. The River also forms a river/wetland corridor, with wet grassland along the stream.
Required measures for corridor development: Protect steppe, avoid conversion into farmland. The river is a reasonable corridor but partly the vegetation needs to recover. No canalization or drainage should be done. Water pollution from ploughed territories can form a threat.

Figure 16
Calcareous slopes along Kamishna River, on the Russian border.

Figure 17
Zeleko Reservoir and grassland slopes.

Zeleko Reservoir and Berezovka Balka (7)
General description: The reservoir is in the east of Belovodsk Raion. The balka runs north-west from here and ends near Streltsovskii steppe, which is just across the watershed. The western slopes are rather open calcareous grasslands.
Land Use: A lot of ploughing is done near the dam in the lower part of the valley. Probably the area is extensively grazed. At the lake fishing and some camping take place.
Fauna observations: Pallid harriers, larks, terns, ducks and other water birds. Several marmots were observed just west of the lake.
Function of corridor: The Berezovka Balka could connect the steppe from Kamishna valley with the Streltsovskii steppe (Zapovednik). Streltsovskii is one of the major steppe areas, and core area in the ecological network, and needs therefore to be connected within the ecological network.
Required measures for corridor development: Restore grasslands just north of Zeleko Reservoir through extensive grazing. Point of attention is the connection across the watershed towards Streltsovskii steppe.

Balka Rebushja (not visited) (8)
General description: The balka runs from Gorodnee to Baranikovka village, and links Derkul with Kamishna River. Due to a large fire which destroyed over 400 ha, the area could not be visited.
Land Use: Mostly vegetated with rough grassland, but burned now.
Fauna observations: -.
Function of corridor: The corridor is important for connecting steppe habitat of the Derkul and Kamishna system.
Required measures for corridor development: Recover the area from fire. Protection for rubbish dumping, excavations and overgrazing.

Derkul River, South of Belovodsk (9)
General description: The slopes west of the Derkul River South of Belovodsk are of steppe grassland type. Parts of the slopes are degraded by grazing, but otherwise well vegetated. The area links with the first area described.
Land Use: The slopes are mostly grazed. Also here is near villages more human impact, rubbish dumps and some quarries where limestone rock is excavated.
Fauna observations: Several birds were seen, several hoopoes, skylarks. A large population of marmot (roughly 300) is found near Pervomoisk.
Function of corridor: The corridor is both steppe and river corridor. It is important for connecting steppe habitat all throughout the Belovodsk Raion and with area 1 it is more or less the backbone of the ECONET (see Figure 7). Down in the valley is the river with rough grassland (abandoned fields) and reed land along the Stream Derkul.
Required measures for corridor development: Conversion of the few ploughed fields towards grassland. Protection for rubbish dumping, excavations and fires.

3.2 Field Assessment Antracite Raion

The Antracite Raion was visited on the 9th and 10th of August. In the eastern part we covered some 100 km, and in the north- and western part 90 km and 109 km resp. These were also the most promising parts with regard to the present steppe habitats.

Only some small protected areas are present within this Raion: There are no strictly protected areas (zapovedniki) in Antracite Raion.
Land use data is provided in Table . In Antracite Raion 59% is agricultural land (of which 11% lies fallow) and 18% is pasture, grazing land. Some 19% is forest, whereas 17% is 'open land without vegetation'.

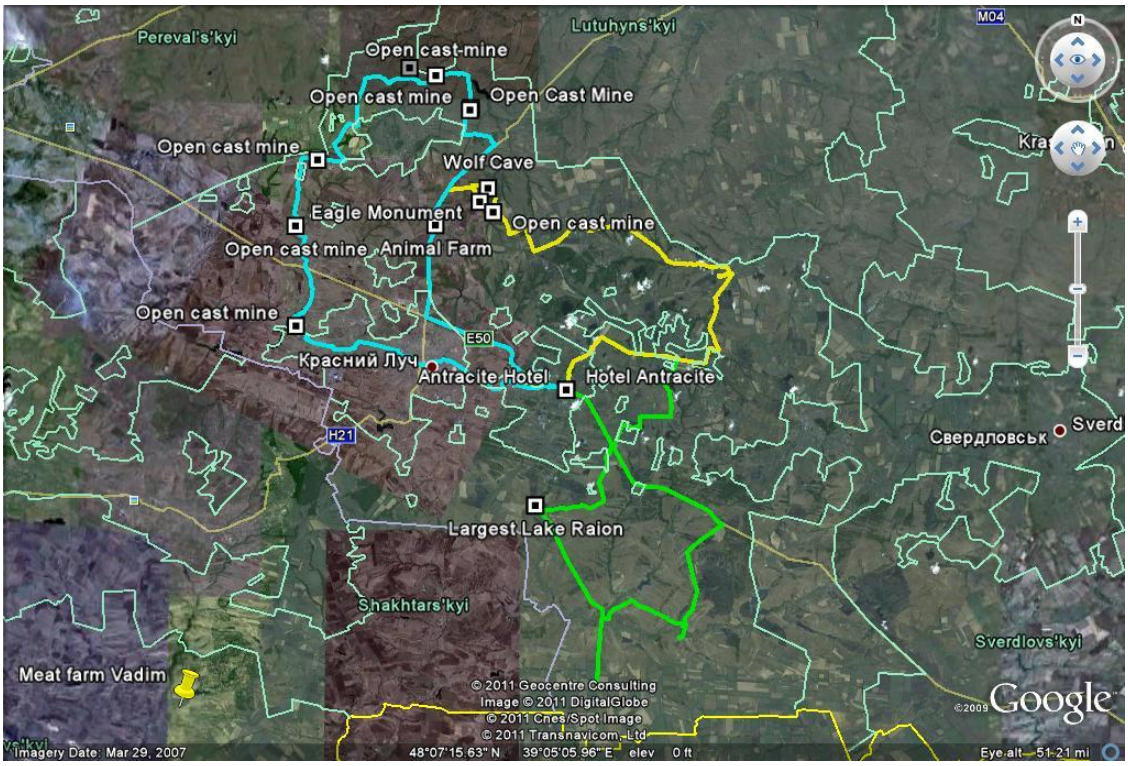


Figure 18

Map of Antracite Raion with route during field visit (recorded by GPS), August 2010.

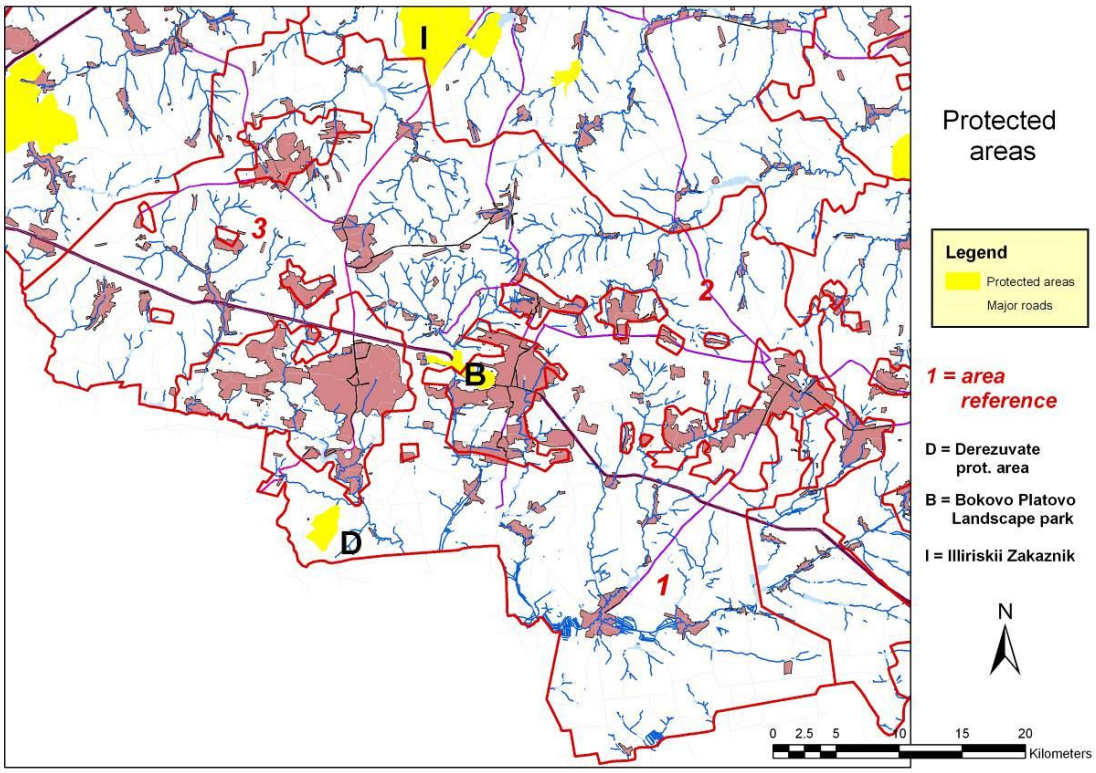


Figure 19

Protected areas in Antracite Raion and areas visited (1-3) discussed in report.

Southeast Antracite, border region (1)

General description: The area consists of rocky steppe, with alternating fields and industrial sites. The steppe is often degraded as a result of ploughing in the past, and has a thin vegetation cover. Spread out are small villages, usually well vegetated with tall trees.

Land Use: The steppe is probably lightly grazed, but production is low and the vegetation has low biomass. Mining sites and mine spills dominate the landscape locally. Forests are planted; generally they are some 50 years old.

Fauna observations: Several birds were seen, hoopoes, and skylarks.

Function of corridor: The major connection between the rocky steppes in this area is towards Russia in the South. However, extended farming areas are near the border, and few natural grasslands are remaining.

Required measures for corridor development: Conversion of the few ploughed fields towards grassland.

Figure 20

Rocky steppe near Bobrykove village, Russian border.

Figure 21

Livestock brought to Rocky steppe to graze, near Dubyvskii village.

Northeast Antracite (2)

General description: The area consists of rocky steppe, with alternating fields and some mining areas. The steppe has a thin vegetation cover. North of the area in the neighbouring Raion are extensive steppe areas, adjoining the steppe areas in Antracite.

Land Use: Most of the region consisted of steppe grassland. A lot of the steppe have been ploughed in the past, and are degraded. The steppe is lightly grazed, but production is low and vegetation has low biomass. Near the urban centres are some larger coal mines. Near villages is more farming, and some scattered rubbish causes pollution. In the area on the northern border recently extensive areas were afforested, some of the areas were seen burning during the fires in August 2010 (Figure 23).

Fauna observations: Several birds were seen, hen harriers, Ortolan buntings and skylarks.

Function of corridor: The area forms part of a large steppe complex across the border in Lutuginskii Raion. Down in the valley is the river with rough grassland (abandoned fields) and reed land along the Big Kamenka River.

Required measures for corridor development: A ban on conversion of steppe towards forests. Protection for rubbish dumping, excavations and fires.

Figure 22
Kamenka River valley near Rebrykove village.

Figure 23
Fires in newly planted forest in the steppe.

North-west Antracite (3)
General description: The area consists of rocky steppe, with forests and extensive mining areas. North of the area in the neighbouring Lutuginskii Raion are extensive steppe areas, adjoining the steppe areas in Antracite. The landscape is dominated by both small and large scale mining, legal and illegal.
Land Use: The illegal mining has disastrous proportions, and is at both small and industrial scale. The mine spoil heaps as well as illegal roads are seen everywhere.
Fauna observations: Several birds were seen, hen harrier and skylarks. According to reports from hunters there are many wild boars, foxes, some wolf and fish otter.
Function of corridor: The area forms part of a large steppe complex across the border of the Raion. Smaller farming areas are scattered between steppe grasslands.
Required measures for corridor development: Immediate action is required to stop illegal mining. The mining is widespread and causes a total destruction of the landscape and farming potential. Otherwise protection for rubbish dumping, forest planting and fires is required.

Figure 24
Open cast mine.

Figure 25
Open cast mine.

Figure 26
Open cast mine area.

Figure 27
Rocky steppe, near Trubnyi.

Figure 28
Open cast mine (pict. V. Kliuiev).

3.3 Modelling results

3.3.1 Local populations and habitats

In Paragraph 2.3 the species are listed which were analyzed. Birds: Isabelline wheatear, Ortolan bunting, Giant Eagle owl, Steppe Harrier. For mammal species: Souslik, Birch mouse, Marmot, Marbled Polecat and Wolf as well as one reptile, Orsini's viper and one insect, the Predatory bush cricket. For all these species the model was run to assess local populations.
The modelling result (map) shows the habitat, as well as their importance for the selected modelling species. For each area is defined: is this habitat suitable? If it is, is the area large enough for one pair, or for a key population or MVP. Based on this can be defined what real core areas can be with sustainable populations.

As example the results for the Northern Birch mouse (Cisista betulina). The habitat is defined, the species occurs in strict steppe habitat (Figure 29). The population assessment (Figure 30) shows that potentially larger populations may occur on the extensive calcareous slopes. North of Belovodsk (Novomilarevski) and west of Yovsug River are larger, so-called Minimum Viable Populations MVPs (see also Paragraph 2.2). The example shows the current situation for Belovodsk Raion. The same assessment was done for Antracite Raion.
It should be noted that the modelling results assume an 'average quality' of habitat. This is therefore the 'potential' suitability. The modelling results give an indication of the suitability of areas but reality will always differ from the modelling results.

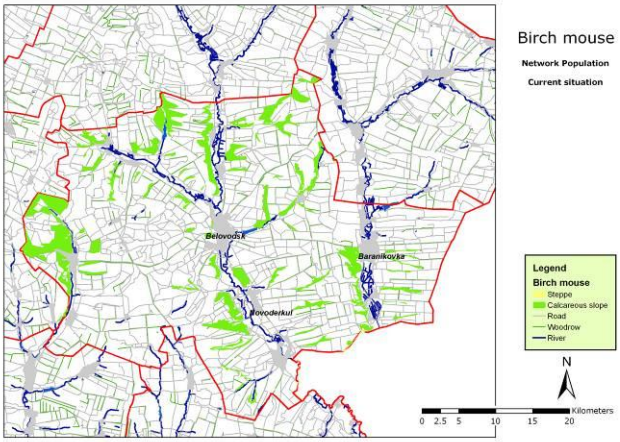


Figure 29
LARCH modeling result, habitat for the Birch mouse.

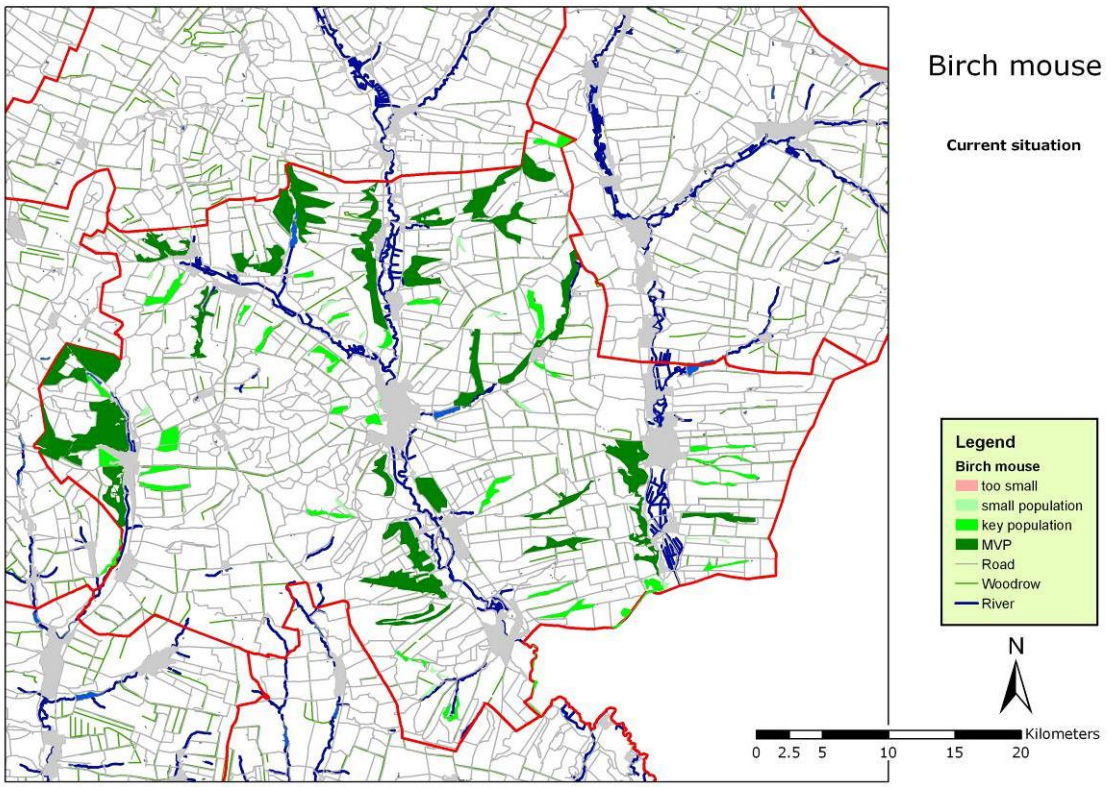


Figure 30
LARCH modelling results for Belovodsk Raion, population analysis for the Birch mouse.

Barriers like roads and built-up areas will affect animals' distribution, thus modelling results. Barrier sensitive species are: Marbled polecat, Marmot, Souslik, Birch mouse, Orsini's viper and Predatory bush cricket. The birds are obviously not affected by barriers such as roads or rivers, although some birds like the Ortolan bunting do avoid built-up areas, they have a strong preference for open, natural landscapes.

In the following step the sustainability of the network population is defined for the same species (Figure 31). Not all areas where we find potentially populations (the green areas in Figure 30) are sustainable: some are too small, to survive on their own. They do need a network of connected populations, if this does not exist; the population is not sustainable and is likely to go extinct (red coloured areas in Figure 31).

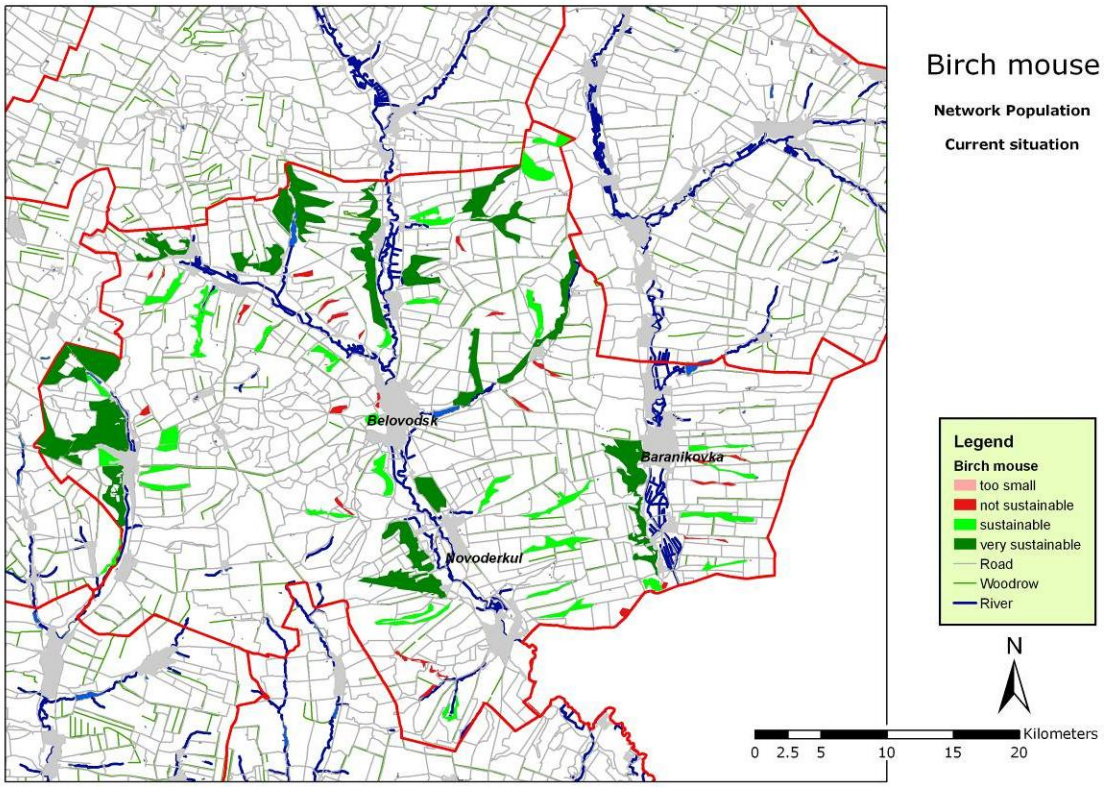


Figure 31
LARCH modelling results for Belovodsk Raion, population analysis for the Birch mouse.

In Annex I the results for the network assessment for all species are presented (figures on the left side of the page). The results are presented for all species for Belovodsk as well as a selected number of species for Antracite.
We see for the Eagle owl small populations, i.e. areas that are large enough for (some) pairs of owls. Some areas are too small, which is due to the fact that the carrying capacity is low or that the areas are really small. No real core areas are present, since the Eagle owl needs large territories.
The Marbled polecat has also mostly small populations. It has a wide range, lives in slightly higher densities than the Eagle owl, and larger areas are occupied. Especially the larger grassland and calcareous slopes are suitable for small populations. Some isolated balka's however are too small; they are too far from other areas and not connected to other small patches sufficiently large for the Marbled polecat.

The Isabelline wheatear has key populations and smaller local populations along the Derkul and Kamishna River, Glinyanaya reservoir and Yovsug River. Also the northern part of the protected area (N, see Figure 7) is in principle large enough for a key population. All other habitat holds small populations, which is also a result of the mobility of the species and the larger range.
The Ortolan bunting benefits from both dry steppe grasslands and wet grasslands along the rivers. Most abundant is the species in these combined habitat complexes, with larger key populations. Almost all habitat is part of local populations' habitat, only few areas are too small.
The Pallid harrier is rare. It occurs in low densities due to its large territories. The range is very large, and therefore most areas, including isolated patches, form part of its territory. It is all small populations that occur along river valleys, steppe, natural grassland and calcareous slopes.
The Marmot has all over the district small populations. One population is according to these results just large enough to be a more stable key population: the area along the Derkul just south of Belovodsk.
The Souslik forms one large MVP. It has a small range and dispersal distance, but occurs in high densities and most suitable habitats are therefore large enough for an MVP.
The predatory bush cricket shows clearly effects of fragmentation: larger roads can divide local small populations. As a result, there are only few key populations along the Derkul River and upstream from Yovsug River.
Also snakes are particularly vulnerable for fragmentation. We see that Orsini's viper has several key populations, at least in the largest habitat complexes. However, busy roads can fragment habitats.
The Wolf in itself has not enough habitat in this Raion, although it is likely to occur as vagrant. There will be very few permanent dens in the area according to the modelling results, due to the large habitat requirement for a pair of wolf. The Wolf also has a preference for more cover and protection; in denser forest areas the wolf is less hunted.
The Birch mouse occurs in high densities. Most areas therefore are large enough to hold MVPs; some are large enough for key populations.

In Antracite are many larger territories, however, the suitability is probably lower due to the lower productivity of the soil. Therefore larger territories are required for species to have still sustainable populations.
We see that Ortolan bunting and Marbled polecat have key populations in the area south of Antracite, near the Donetsk border. North of Antracite are small populations. Orsini's viper and Isabelline wheatear also have key populations in the area far north, where adjoining steppe territories are.

3.3.2 Network assessment and population viability

In the network sustainability assessment all populations of areas that are within the home range of a species are added. Based on the size of the areas and certain rules it is assessed whether a population can be sustainable or not.
Very viable are the Ortolan and Isabelline wheatear, mobile species with not such large area requirements.
The Birch mouse has some very viable populations, but there are also populations which are not viable (Figure 31), and the same counts for the Predatory bush cricket and Orsini's viper. The Marbled polecat is sustainable, but in the centre of Belovodsk Raion are however areas which are too small and isolated to be part of the larger network.
Not viable are the Marmot, Eagle owl, Pallid harrier and Wolf. Most of the areas are too small for these species.

3.4 Discussion

So, in three steps (habitat analysis, population analysis and network analysis), is assessed what the functional habitat is of a species, and whether it meets the criteria for a sustainable population.
The results for the Eagle owl are rather simplified. We have no accurate data on the density of Eagle owl. The data used for densities are based on Western Europe, but also articles for Eastern Russia. Further, the owl depends on rocky habitats for breeding. We assume rocky habitats not to be limiting for breeding; the modelling is based on feeding areas.
The Ortolan bunting benefits from its higher densities (higher carrying capacity) and wider range of habitat choice, so that most habitat is utilized.

4 Proposed ECONET

4.1 Analysis and strategy

The major ecosystems in Lugansk Oblast are steppe, rivers and wetlands, and forests. The steppe is of a different type (rocky steppe in the South, calcareous steppe in the North); the rivers are smaller in the South and run often in an east-westerly direction. Also otherwise Belovodsk and Antracite Raions are, as follows from the field assessment and modelling results, quite different and require different interventions. The strategies are discussed below.

4.1.1 Belovodsk Raion

In Belovodsk is degraded fragmented steppe habitat in between large extensive farming areas, and some valuable steppe territories. There are still some populations of key species like Marmot present, but often in small numbers. Modelling results show that some populations are too small to sustain in the long run, in particular less mobile species. Abandonment of ploughed lands has resulted in an increase of fallow land and grassland area.
There are transboundary steppe corridors identified towards the north and east, Rostov Oblast in Russia (Van der Sluis et al., unpubl.). Forests are mostly planted and fairly young. Rainfall was always limiting for tree growth, natural forests were mostly found along river valleys and in balka's. North of this region the steppe gradually changes into forest-steppe, and there are indications that forest expands from the many planted tree rows and tree lines in the Oblast. Some larger forest fragments are west of the town of Belovodsk. Rivers run mostly north-south, to link up with the major river that drains the Oblast, the Severski Donetsk.

The strategy we propose therefore is:
Improve the connectivity (cohesion) of the network, by linking fragmented areas and establishment of one larger steppe core area (protected area). Stimulate where possible productive use of steppe in the buffer zones and corridors. Link up steppe fragments in Belovodsk with major protected steppe areas in Russia, and with Streltsovskii steppe just north-east of Belovodsk Raion. Improve the major connections for other ecosystems, forests and rivers.

This translates as the following measures:
- Identify a major steppe core area in Belovodsk
- Develop corridors in particular for steppe ecosystems
- Develop one Forest corridor, to connect some of the fragments of forests
- River corridors follow main streams towards Russia or down towards Severski Donetsk
- Initiate activities for income generation to stimulate development of ECONET
- Include corridors in farming systems
- Ensure the connectivity with neighbouring Raions
- Realise international cross-border corridors towards Russia (Derkul and Kamishna river)

4.1.2 Antracite Raion

In Antracite are still substantial quantities of grassland (including prime rocky steppe and degraded steppe areas) in large blocks, however, the areas are under high pressure from environmental pollution and uncontrolled mining activities. The mining is an eye-sore and destroys natural habitats. This results in a large loss of resources for the local population that are left with a destroyed landscape and destroyed roads and environment. Modelling results show that there are still in potential some wildlife populations, in reality they are likely to be under threat as a result of industrial development. Some large core areas need to be protected and safeguarded, to ensure also for the future a sufficient large natural area to maintain wildlife populations. This core area should link with important steppe areas north and south of Antracite Raion. There is urban sprawl, large towns of Antracite and Krasnii Lutsj are in the centre of the Raion and fragment the landscape and physically separate the natural areas from north and south.

The strategy we propose is:
Safeguard remaining rocky steppe areas by proper habitat protection, strict control of land use and halting illegal land destruction. Establish core areas as the backbone for the ECONET, connect rocky steppe north and south of the urban areas.

This can be translated in the following measures:
- Tight control of mining activities, immediate measures to halt further expansion of illegal mines and restoration of abandoned sites
- Identify and protect two major steppe areas as state reserve within the Raion
- Realise a corridor north-south to connect the natural habitats
- Implement a ban on ploughing rocky steppe grassland or currently abandoned grassland
- Stop afforestation of steppe or degraded steppe
- Ensure the connectivity with neighbouring Raions and Oblasts, in particular the larger steppe areas just north of Antracite (Lutuginskii Raion and Perevalskii Raion and Donetsk Oblast)
- Realise international cross-border corridors towards Russia
- explore the link of steppe landscapes with cultural heritage, the steppe as described by famous Ukrainian authors as Pushkin

4.2 ECONET design

The ecological modelling shows the habitat of species and the wildlife populations. Based on the modelling the areas were identified where the ecological network (i.e. the natural habitat) would need to be strengthened, in particular the development of core areas/restoration areas and corridors. The areas outside the ecological main structure would allow for regular farming practices.

4.2.1 Belovodsk ECONET design

The ECONET design is presented below (Figure 32). The new core area is proposed in the north of the Raion, in fact the two botanical reserves Novomilarevski/Konovodskiii zakaznik (N in Figure 7). Land use currently is mixed grazing and arable farming. This should change into grazing area, with the consent of farmers that have lands here. New proposed steppe corridors will link this steppe core area with the Zakaznik north of the Raion and Streltsovskii steppe. Further south the corridors link with the steppe ECONET in Russia (Van der Sluis, unpublished).
The forest corridor connects a number of forest areas which are already not far apart. Wetland corridors obviously follow the river valleys. The two main rivers, Derkul and Kamishna, connect to the main rivers in

the South, the Severski Donetsk. Also the Yovsug River could be an important wetland corridor; however, most of the stream is outside the Raion boundaries.

Steppe corridors should (optimally) be 500 m wide, consisting of open grassy vegetation without trees, or if trees are present, only inside the balka. River corridors should be 700 m wide, a mosaic of wet grasslands, reed land, open water, oxbows and riverine forest. The forest corridor can be anything wider than 100 m. Roadside corridors are reserved roadside verges which are currently 30 m. wide. Within these roadside verges no building is permitted, and no ploughing of land is allowed. It is proposed that areas which are currently grassland are maintained; if both sides are forested one side should be cleared and maintained as grassland corridor.

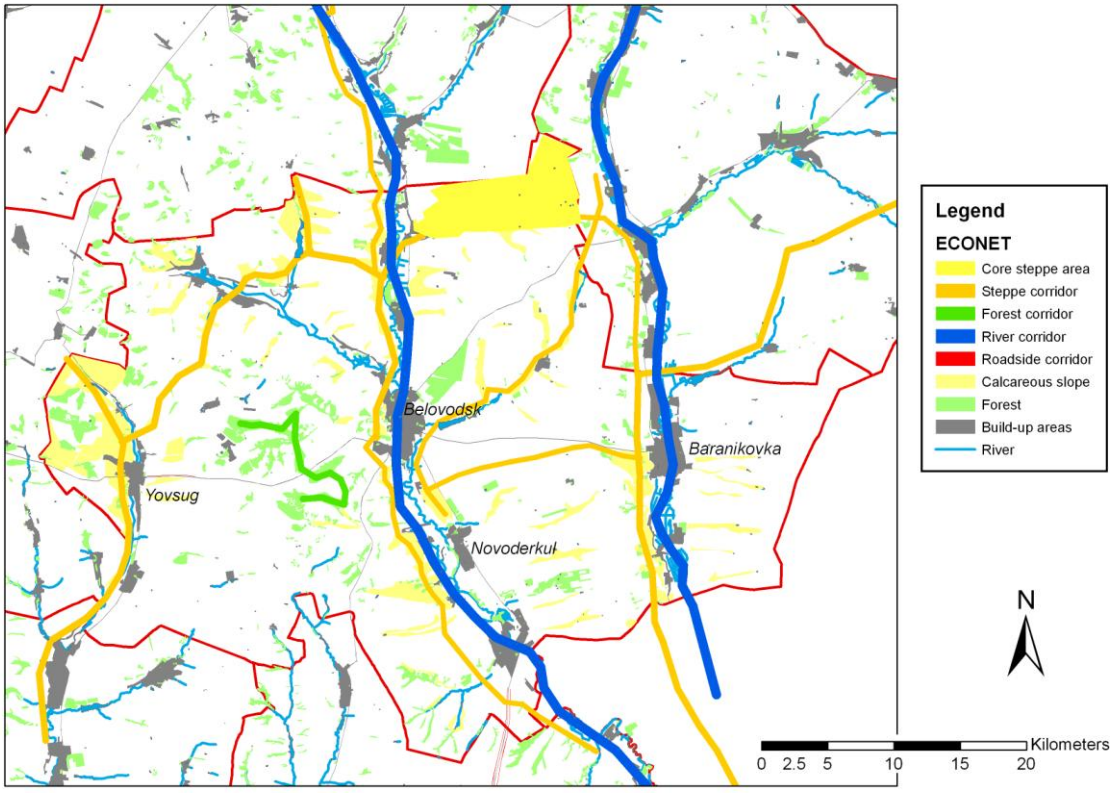


Figure 32

Proposal for ECONET in Belovodsk Raion, indicating the location of corridors and (new) core area.

The remaining grasslands in the Raion should be maintained, no ploughing is allowed. Optimal management for grassland and corridors is extensive grazing. Burning should be avoided or minimized.
The model was run with the ECONET as a 'scenario', i.e. the ECONET was considered implemented to assess whether the situation for the selected key species would improve under the new situation (see Van der Sluis et al., 2001, 2003; Bolck et al., 2004).

Table 5

Predicted change for Belovodsk after implementation of ECONET based on LARCH modelling; - = decrease, 0 = neutral, + = slight improvement, ++ = improvement, +++ = substantial improvement.

Species	Modelling result	
	Local Population	Network
Isabelline wheatear	+	0
Ortolan bunting	+	0
Eurasian Eagle-owl	+++	0
Pallid Harrier	++	0
Souslik	0	0
Northern Birch mouse	0	+
Steppe Marmot	++	++
Marbled Polecat	++	+
Grey Wolf	0	0
Orsini's viper	+	+++
Predatory bush cricket	++	+

In conclusion, we see that almost all species populations benefit from the implementation of the ECONET. In particular the medium ranged species, like Marmot and Polecat benefit from ECONET development. The Eurasian Eagle owl just surpasses a threshold, and shows a large increase from small localized populations to a large MVP.
At the network level we see that the changes are for several species small. In particular the species with very low densities and a large range do not seem to benefit much. This is due to the fact that surrounding territories are not included in the analysis. In reality, those species will have viable populations. The less mobile species like Marmot, Birch mouse and Viper show regional improvement in the viability of the ecological network.

4.2.2 Antracite ECONET design

In Antracite Two new core areas for steppe are proposed: one in the south, adjoining the Derezuvate protected area (which is forested). The proposed area is mostly grassland, and can also form a link with the larger steppe areas in Russia. In the north an area is proposed near Malenikolaevna, adjoining Illiriskii Zakaznik, in neighbouring Raion. Both areas consist mainly of rocky steppe and will therefore form a major steppe core area. The two areas in the south and north will also connect the steppe from east and west.

A steppe corridor is proposed to realize steppe areas in the north and south. It links also with the Bokovo Platovo Landscape park, a zakaznik. This area is mostly forested, and currently isolated, enclosed by urban areas.
No modelling was done of the scenario: currently most populations are viable, although fragmented. With the implementation the of ECONET the situation would improve, but less visible than in Belovodsk. As mentioned in the analysis (Paragraph 4.1.1), most species are viable according to the modelling, but due to environmental pressure the situation is less positive. The core areas are safeguards, to ensure that populations are maintained at sufficient levels to remain sustainable.

Also here the steppe corridor should (optimally) be 500 m wide, consisting of open grassy vegetation without trees. Where there is still grassland present, this should be maintained, no ploughing is allowed. Optimal management for grassland and corridors is extensive grazing. Burning should be avoided or minimized.

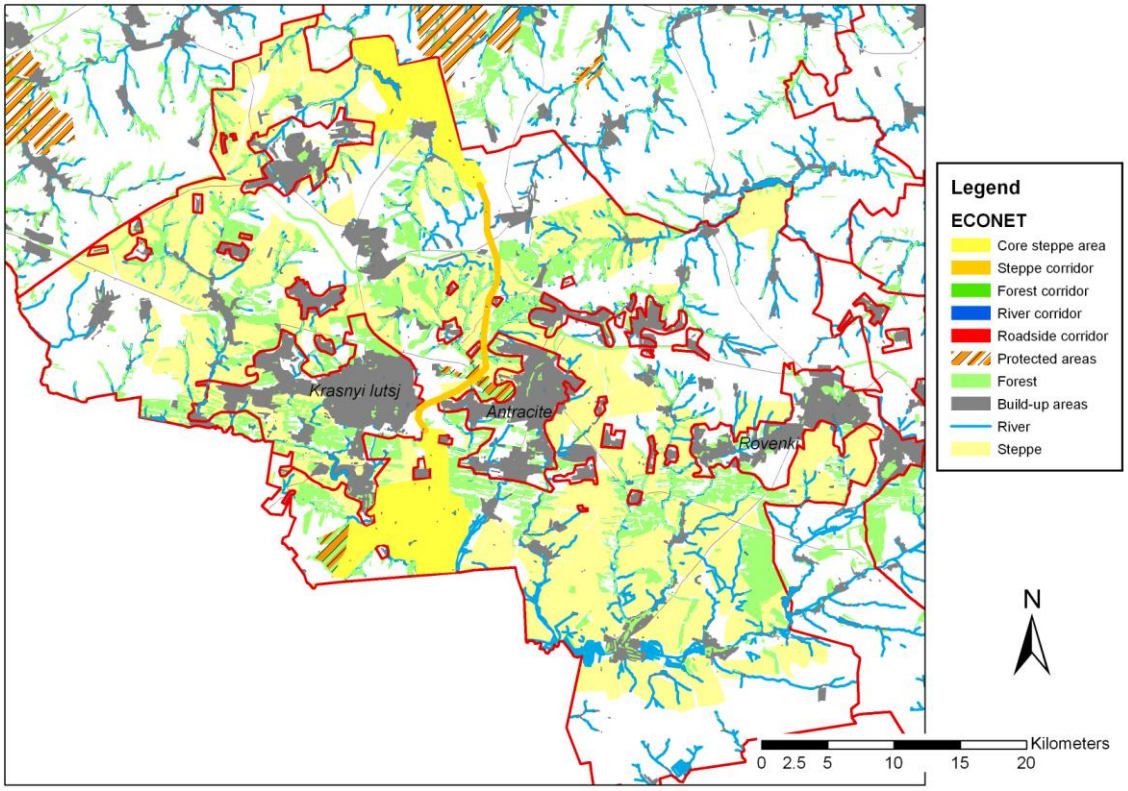


Figure 33

Proposal for ECONET in Antracite Raion, indicating the location of corridors and (new) core area.

5 Integration of farming and conservation

5.1 Introduction

For the conservation of biodiversity and for the maintenance of steppes extensive grazing is important. Ruminants from farms can be used for this objective and from a technical point of view the use of steppes can be implemented in livestock production on farms which are close to natural steppes (Van der Sluis et al., 2009). However the question is if, and how, the economic use and the conservation of biodiversity can be combined into one management system, given many practical preconditions. The objective of this chapter is to investigate the influence of different factors on the implementation of the use of steppes in livestock production on farms. Four farms using steppes in different ways were visited and investigated as examples with positive en negative points. The first farm in Belovodsk is a traditional farm and is keeping livestock since long time (as Kolkhoz). The second farm is a bankrupt state horse farm. The third farm in Antracite is a re-established abandoned farm focused now on beef cattle instead of dairy cows in the past. The fourth farm at Verknie Teplie will be established the coming season on land that has been abandoned several years ago.

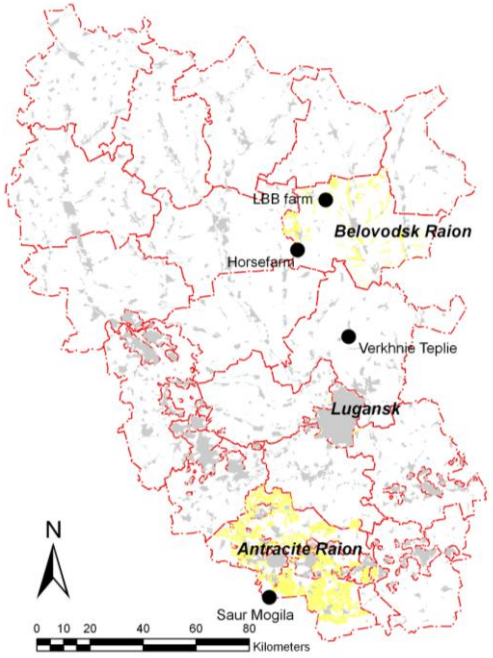


Figure 34
Location of visited farms.

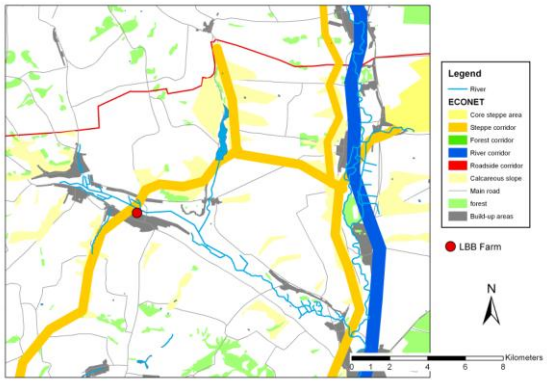


Figure 35
Location of LBB farm within the ECONET.

5.1.1 LBB farm (Belovodsk Raion)

Agrifirma LBB is situated at Litvinovka, north-west of Belovodsk, close to a planned ECONET steppe corridor (see Figure 35). Many small parcels (some hectares) of steppes and balki are found in this area, some of them they are not used, and others overused. So there are opportunities for using these lands by grazing animals.

The owner of the farm is a private company and the experienced personnel come from the neighbourhood. This farm has 185 milk cows and 230 young cattle (1 and 2 years old) of Ukrainian black and red breed. The milk production is on average 3.200 litres per year and the cows calve in March/April. The cows were at the time of visit (December 2010) in good condition and it looks like that on this farm a good balance between arable farming and animal production is found, though on the mentioned very low level of productivity.

Steppe character at present
The steppe is now totally degraded in terms of vegetation with most likely high soil fertility due to the large amounts of animal droppings that come back to the soil with nutrients that originate from the farm's arable land. The 185 dairy cows leave behind much more soil nutrients (with the brought in fodder) than they will take away from this small surface area (with the animal produce). It was noticed that leguminous plants and various non edible plants that characterize bad pasture management are abundant on this steppe pasture.

Steppe use
The farm has a steppe pasture of 15 ha with some 7 ha of balki, which are permanently grazed from April till October. The reasons for this summer system are that the herd has only dairy cattle with their calves. On the summer camp they can milk and feed the herd extra feed and forage (Lucerne, barley and Esparcet, *Onobrychis viciifolia* or Sainfoin). These logistic reasons are most important but also the traditional habitats and knowledge which has developed since this farm was a kolkhoz. The consequence of this summer system is that the steppe of 15 ha is degraded and a lot of other neighbouring steppes are not used for grazing or for collecting fodder for the winter as silage or hay.

Feeding system
In the winter the herd is fed maize silage of low quality, straw of Esparcet of very low quality (due to losses of leaves, and a too late harvesting stage), wheat straw and 4 kilograms of concentrates made from sorting waste of wheat and sunflowers. Hay as a rule is harvested in a late phase, because of lack of mowers and harvest equipment. Maize seems a too risky fodder crop for this area, since in dry years it forms no cobs at all, which results in a dramatic low fodder value.

Improved system
To avoid overgrazing of the 23 ha summer pastures a rotational grazing system should be in place with each day another part of the steppes. However for this large number of animals it is not likely that such a system is going to work. Due to the small surface area, it is realistic to say that the steppe has at present hardly any function in feeding the animals, but only providing some exercise. All fodder and concentrates (from waste) are by-products from the arable farm. A rotational grazing scheme can only be implemented if other pastures are integrated into the management scheme. This system would give space for biodiversity and for improved pasture productivity. If the resulting quality of fodder would not be sufficient, cultivation and conservation of fodder crops can be improved to provide the animals with sufficient proteins and energy. In such a case the milk production of the animals could be increased from the present 7.5 litres per day up to 20 litres per day (according the estimation of the farm manager). The production would increase from 592 tons to 1,500 tons with an increase of gross income of 450,000 Euro per year (according to the current milk price)! This improvement can be achieved with the present cows within a number of years. In order to achieve it, investments are required in essential equipment, among others round balers with package system for silage, or forage harvesters with crusher for making big silage heaps. The investments required would be less than 200,000 Euro, in case second hand equipment would be chosen (see Section 4.4.2). In case a higher milk production is realized an additional milk tank should be bought of 5,000 litres in order to store the milk. A few more necessary measures:
- More summer camps developed further away
- Separate the milking and young cattle and bring young cattle on underutilized steppes at a large distance
- Introduce herds of sheep or beef cattle and let them circulate on the steppes

- Use steppe management plans with the starting point of 1,000 kg dry matter of grass per hectare (currently no grazing occurs at all!)
- Make hay or silage making during flowering phase of herbs, when the feeding value is optimal
- Packed bales of silage can be made whenever the logistics to make big heaps is absent, or when the management wants to leave the option open to sell fodder
- Use all farm yard manure from the stable and summer camp on the arable land in order to improve yield levels
- A strategic stock of fodder must be created to be fed to the cows in dry years, in order to avoid the purchase of feed for very high market prices in those years

Figure 36
Heavily degraded LBB dairy farm steppe near Litvinovka.

Figure 37
Horse farm steppe, Belovodsk rayon, Ukrain.

5.1.2 'Horse farm' (Belovodsk Raion)

Description of horse farm
This state farm near Novoalexadrivka is located in the south-western corner of Belovodsk Raion, along the Yovsug River (some 20 km from the LBB dairy farm). It is a state farm with one official main task; the conservation of rare local horse breeds. Once it was established for the breeding and production of military horses. Nowadays they hardly get any money, so the enterprise is forced to generate their own income. They sell young horses and horses too old for breeding. However the number of horses is very small (around 30) and in recent years they could not make ends meet. This, together with well developed corruption, is the reason why the farm got indebted, and one of the companies who owned the debts was the LBB Company who is the owner of the dairy farm in Litvinovka.

The bank now is creating some degree of integration of both farms, which means that the horse farms provides hay for the dairy farm, by selling part of the hay that they make on the 120 ha of steppe land to the Litvinovka farm. Most of the horse farm land is now rented by the dairy farm, and the farm manager is highly dependent on the LBB Company. In the past the horse farm had large areas of steppe (3,000 ha) and now 300 ha are left.

Steppe character
At present around 120 ha are not grazed at all, they are just mown according to a rotational system, which is fine for the conservation of botanical and entomological biodiversity. The 120 ha hay land is relatively flat, and there is a risk that they will be ploughed like the rest of the horse farm's territories. The reason why they have remained seems the existence of the horse farm, now this farm is bankrupt there is no guarantee any longer.

This means that this relatively unspoiled piece of steppe is under direct threat. The only justification for their conservation will now be the cooperation with the dairy farm to provide fodder. Due to this rather coincidental factor the steppe may be conserved in this rayon, but it seems rather unlikely that similar events occur elsewhere. The hay land is located along a balka so it means in practice that the ecological corridor will be much narrower on other places along the same balka. The state of the vegetation confirms that it is not overused, but no botanical data were obtained.

Steppe use

As usual, the lands near the horse farm stables are used relatively intensively, and the 120 ha on a few km's distance extensively, because the farm does not own any means of transport themselves (neither for the animals, nor for hay). There are hardly any wild grazing animals so the biomass remaining in December is still significant. Although the steppe is still in connection with other steppes, poaching is endemic and seems the main reason for the absence of natural grazers, according to local informants.

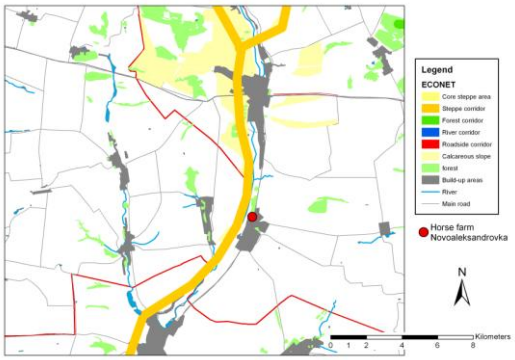


Figure 38

Location of Horse farm within the ECONET.

Feeding system

The horses do not need highly nutritional feed, so in principle the quality of the hay might be sufficient. If in the near future the hay land will provide fodder for the dairy cows of the LBB farm, the same remarks will apply as those on the LBB farm in Paragraph 5.1.1 with regard to improvement of the quality of hay and silage.

Improved system

In the future it should be decided whether the horse farm steppe can be integrated into the rotational grazing system of the LBB farm. If this is possible, it would enable implementation of a proper mowing/grazing system for the steppes in Litvinovka as well. If the horse farm steppes would be exclusively used as hay meadow, the nutrient status of the steppe can deteriorate. In such a case there might be a need to apply farm yard manure from the LBB dairy farm on those steppe pastures. Investments in trailers for the transport and loading of farm yard manure will be required. One heavy tractor with two 10 ton trailers and a telescopic loader would be sufficient (second hand of good quality will cost around 95,000 Euro together with two manure spreaders). The same equipment can be partly used for production and transport of silage.

Table 6

Equipment needed for the improvement of the integrated LBB/Horse farm, in order to increase milk production up to 15/20 litres a day. Current market prices of equipment are based on the European second hand market (2010).

Name	Specification	Market price
Tractor (production year 2000)	150HP (5,000 engine hours)	30,000
Telescopic loader (2005)	100 HP (5,000 engine hours)	25,000
Trailers	2x 10 tons	20,000
Manure spreaders (2) (1995)	10 tons	20,000
Forage harvester crusher (self propelled, production year 2005)	300 cm (4,000 engine hours)	50,000
Round baler/packing machine (production year 2005)	Making packed bales of up to 400 kg's	25,000
Milk tank	5,000 litres	15,000
	Total	185,000

An adapted management system (with components like those mentioned under 4.4.1), together with the proposed equipment could improve the quantity and quality of the fodder dramatically and will result in a gradual increase of the milk production up to previous levels.

5.1.3 Saur Mogila farm (Antracite Rayon)

About 400 beef cattle and calves graze 2,000 ha of rocky steppes on this farm. The area is large enough to feed the herd during the grazing season from April to November. The farmer is planning to provide supplementary feed during the dry season, because the animals are not growing enough. The farmer is aware of the fact that rotational grazing is the best guarantee for good re-growth of the steppe vegetation.

The farm started three years ago on the location of an old kolkhoz with dairy cattle, which was abandoned five years ago. The steppes of a natural reserve are used. The steppes were in Soviet times misused but after the collapse of the Soviet Union they were not grazed at all. Also 500 ha arable land is cultivated mainly for growing concentrates (oats, barley, sorghum and peas). In the future, when the right equipment is bought, farmyard manure will be used on arable land, instead of chemical fertilizers.

The grazing herd is rotating and grazing on the steppes with the help of shepherds on horses. The horses are necessary because some cows are aggressive, especially the Zeboe breed and the cows with suckling calves. At night the cows are held in an enclosure with electric fences to protect them against wolves. The shepherds sleep in mobile homes. In the winter the animals feed on cultivated fodder (Esparcet and Sudan grass), wheat straw, and concentrates (grain of oats, barley, sorghum and peas). The cows with suckling calves get 4 kg of concentrates and the younger animals get 1.5 kg. The animals perform well in this feeding system, especially by the use of steppe grass in spring and the use of concentrates.
The cattle are from Ukrainian Grey, Zebu en Red Steppe breeds. For breeding own bulls are used. This year 107 cows had suckling calves (115 heads). The calving season is in spring and the calves are suckling during 5 to 7 month. The bull calves are castrated at the age of 10 months and the young cattle are going to the slaughterhouse in autumn at the age of about 17 months. This meat has to compete with (cheap) beef meat out of Brazil: 70% of beef meat is imported in the Ukraine. Therefore they get the modest price of 1.40 Euro per kg of life weight.

Steppe character

Though there are in principle enough steppes available, near the farm, there are clear signs of mismanagement, most likely because these pastures are used as corridor to those pastures that are farther away. An abundance of thistles remain on these nearby pastures, and few valuable forage plants.

Figure 39

Farm manager with his cattle near the winter stables at Saur Mogila near Antracite (border region Lugansk and Donetsk oblast).

Figure 40

Rocky steppe near Saur Mogila with founding member of the cattle farm Mr. Grigory.

Steppe use

In principle, a rotational grazing system is practiced according to the farm leader, with summer camps in the remote areas. In itself this system is good and it can be continued.

Improved system

The high gift of concentrates from the own arable farm should be (as much as possible) replaced by a feeding system with high quality fodder, like silage and hay. Farm yard manure obtained in the winter stable can be applied to the arable land to replace fully the fertilizers bought, and this will result in higher yields. The produce of the 500 ha arable land can then be sold to the market. Since the obtained farm yard manure should be enough for the 500 ha of arable land, the farm could be easily managed according to international organic standards and the meat and arable produce could be marketed internationally, or locally marketed under a self invented trade mark.

The farm yard manure obtained at the summer camps could be applied at the local pastures to maintain soil fertility; otherwise the fertility will decline as well as the botanic values. By applying the farm yard manure on the arable land, around 15,000 Euro will be saved annually for purchase of chemical fertilizers. In order to load, transport and apply the 5,000 tons of farm yard manure, one tractor is needed (150HP), one excavator (or telescopic loader), and two manure spreaders and trailers (of 10 tons). This equipment, if bought second hand, will cost around 95,000 Euro. Since the equipment is multifunctional costs can be written off to various farm operations (like hay and silage making and transport). The market value of arable crops that could be sold from the arable land in case of proper fodder production at the steppes would be around 300,000 Euro (even without organic certificate). A modern combine (for instance New Holland 8060 or the NH TX series) would lose during harvest less than 0,5% of the harvest instead of the present 10-20% loss by Don 1,500 combines. It costs a mere 45,000 Euro including GPS control system.

For the production of high quality forage, like at the Belovodsk farm, a forage harvester/crusher is needed and two drawn round balers with packaging facility. Together they would cost around 100,000 Euro in case of a good second hand quality.

The underlying problem to implement proposed measures seems the absence of experienced and educated staff and the informal status of the farm. It was said that most of the land is illegally used, so under such conditions it is not very attractive to invest a lot of money.

5.1.4 Verknie Teplie (Stanychno Lugansk'yi Raion)

Description
Two families that know each other a few decades made plans to start a beef cattle farm using a long balki (10 km) with surrounding steppes, in Stanychno Lugansk'yi Raion, 20 km north of Lugansk near the village of Verknie Teplie. This balki can be a good corridor in the ECONET and is linked to a larger, south running corridor. During Soviet times 3,000 heads of dairy cattle were kept on the steppes, and the resulting severe erosion can still be seen everywhere. The initiators of this project are motivated to use these steppes properly. The arable land of this farm has low productivity, and it seems no coincidence that it had been abandoned in the past years. The soils contain sufficient humus but seem very poor in other nutrients than nitrogen. Soil analysis is required of all fields in order to make a plan to restore soil fertility of arable and grazing land.
Its founders are desperately looking for relevant information on various topics, since they have themselves no agricultural background.
December 2010 two juridical entities were registered, and the plan is to start breeding in spring 2011 with 300 beef cattle. The idea is to buy highly productive cattle, like Aberdeen Angus and Herefords, but these breeds will probably not fit with the low quality feed from the arable land (226 ha) and steppes (>154 ha and the 10 km balki). National breeds, like Ukrainian Grey and red steppe will fit better in these difficult circumstances of low quality feed, dry and hot summers and cold winters.

Steppe character
At present the number of animals held in this area is very small and thus the steppe pasture have had now 20 years of low or no use, which has led to a certain degree of recovery of the vegetation. Some of the former steppes need a restoration plan and other steppes need a grazing plan. Some of the steppes might even need a soil fertility restoration plan for a minimal production level for the farm. We observed during our visit that on the slope of the present balki there is still a relatively rich steppe vegetation and a lot of Stipa grass.
If necessary these steppes can be improved by sowing various steppe grasses, Yellow Lucerne and other species.

Steppe use
At present the steppes here are not used at all. After the establishment of the farm they will be rather intensively used and misuse will have to be avoided at all costs.

Future pasture use
The steppes can be grazed from April to November and there will be enough in the area (more than 3 ha per cow). Low grazing pressure is essential to recover formerly overgrazed steppe. Use of mobile electric fences is better than summer camps; fixed summer camps have the disadvantage of the animals passing each day the same part of the steppe, which has a negative impact on the steppe. When extra feeding is necessary, like in dry season or for cows with suckling calves, the feed can also be given where they are grazing. Another system is to keep the animals day and night in the summer camp and feed them there and collect also the manure.
In winter in the barn the feed can be used that is obtained from the arable land, like straw and concentrates. At the stable is already a sunflower seed processing unit. The protein and mineral-rich waste from the processing unit can be excellently used as concentrate. Of course, first of all it should be tried to produce optimal forage quality from the steppes (and arable land) by making high quality hay and silage using modern technology of

forage harvesters (for fresh feeding or silaging) and packed bales. Hay making out of a dry steppe swath is very difficult, because fragile nutritious leaves tend to fall off. The quality of hay can be improved by using modern drawn round baler presses with wide belts. Literature on proper pasture management has been provided to the initiators of this project.

Figure 41
Steppe corridor partly on territory of future beef cattle farm in Verkhnie Teplie.

Figure 42
Stipa grass growing in the present corridor of Verkhnie Teplie.

5.1.5 Concluding remarks

Grazing (beef) cattle and sheep are a good mean for the conservation of those steppes that need to be grazed, and has economic benefits as well, economic advantages can be combined with ecological benefits. However, there is shortage of beef cows (and calves) in the Ukraine, and this makes it difficult in the short term to start new beef farms. During Soviet times it was more common to keep dairy cows in the steppe areas, but this is more difficult than keeping beef cattle or sheep. They require more and better feed than beef cattle (Van der Sluis et al., 2009). It is not impossible that the present high milk price will also stimulate initiatives on dairy farming in steppe areas. A real problem will be the training of new pasture specialists, because there are hardly any specialists left that know the steppe plants and know how to manage the composition of the swath. It seems that all present steppe pastures were mismanaged in the past and show signs of various forms of degradation, of soil and of vegetation. Many valuable forage plants have apparently disappeared from the swath, especially valuable grasses and leguminous forage plants.
As can be expected in the steppe zone, the climate also plays an important role in the management of the steppes.
It should be kept in mind that one out of two years is a dry year, in which steppe swath yields may drop by 50% (see Table 6). This means that in those very dry years animals must be sold against dumping prices or expensive feed must be purchased. The only appropriate answer is to create and store strategic feed stocks of up to 50% of the yearly required quantity.

Table 7

Occurrence of dry and moist years in Lugansk oblast from 1999-2009.

Год (year)	суммарные осадки 10-50 mm (total precipitation from 10-50 mm)	Тип года (type of year)
1999	58	Dry-Сухо
2000	42	Dry- Сухо
2001	136	Good - Благоприятно
2003	79	-not sufficient - Недостаточно
2004	116	Good - Благоприятно
2005	75	Not sufficient - Недостаточно
2006	80	Not sufficient - недостаточно
2007	32(58)	Dry - Сухо
2008	59	Dry - Сухо
2009	7	Very dry - Очень сухо

For proper conservation system of steppes the farm manager should be aware of the fact that all pastures need rest once during five years, in order for the plants to produce seeds and soil recovery. In addition, the composition of the steppe swath is highly dynamic, which means that the quality of hay and silage will be different every year. It is clear that it is a big challenge to supplement the continuously changing feed value of the steppe fodder with cultivated fodder and concentrates from the arable land.
The storage of larger amounts of fodder as strategic stock will also require expenses, but they can be offset against the financial advantages of these stocks in dry years and the low initial cost price of this steppe fodder.

All advises formulated above are focused on one thing: to create and maintain good steppe vegetation. This should be the challenge for the farm managers but also for conservationists dealing with the protection of biodiversity. It is of utmost importance that the conservation community and the farmers are well aware of the joint interests of this cooperation. Despite contrary beliefs, proper steppe management is good for biodiversity and for swath productivity. Only in specific cases specific plants or animals might require measures that could be in conflict with production targets.

In the examples given general strategies have been given on how to improve the farm results under the given circumstances. In order to start with those measures, a modernization plan should be elaborated for each individual farm with specific phased measures on different areas, like swath composition, soil fertility, fodder quality, mechanization, staff training, animal health, rotational grazing, creation of fodder stocks and protection of rare on-farm species of plants and animals. Much attention should be paid to the implementation of these modernization plans, since skilled staff is rare in rural areas. It should be tried to make use of botanical knowledge of conservationists, which would also stimulate cooperation between the farming and conservation communities.

6 Communicating ECONET and Stakeholder Engagement

6.1 Introduction

This chapter focuses on how communication, a communication strategy and engaging with stakeholders can benefit the implementation of ECONET in Belovodsk and Antracite and eventually in Ukraine as a whole. In this chapter background information is presented on the used concepts.

There are many definitions on communication. The German organisation GTZ describes communication as dialogue, enabling people to understand the key factors of their physical, social, economic and political environment and their interdependence so that rising problems can be solved competently. Communication by definition incorporates feedback, whereas information does not. Hence, communication is the transmission 'belt' between information dissemination and action planning.
Wageningen UR's Centre for Development Innovation defines communication as: *the process of sending and receiving messages through channels in order to establish common meanings between a sender and a receiver.*
Effective communication only occurs if the receiver understands the exact information or idea that the sender intended to transmit. This means 'the truth' is not what the transmitter says but what the receiver understands. In other words, how does the receiver digest the information, how does the receiver give meaning to the words and in fact how does the receiver learn.
Rather than outlining all the available definitions we would like to outline in what way communication can support the implementation of ECONET in Belovodsk and Antracite and in Ukraine as a whole. Or, more importantly, how can we communicate the implementation of ECONET in such a way that stakeholders and the broader public understand the importance of developing ecological networks and on top of that are motivated to support the implementation! Some useful definitions are presented below:

What is a Communication Strategy?
Definitions refer to an approach to address a target group with the aim to increase knowledge, change attitude, and motivate to take action (including making sure that people have the right skills). Other definitions refer to a document that supports reaching your overall project objective by defining specific communication objectives and describing how to reach those communication objectives. It is an approach and it is good to document this approach in a document, and as such a communication strategy is the support along the road towards the vision which is transmitted.

What is a stakeholder?
All people who are affected by the implementation of ECONET, who have influence or power over it, or have an interest in its successful (or unsuccessful!) conclusion are stakeholders. It is essential to make a thorough analysis of all stakeholders and describe how they are affected or can affect the implementation of the plan for the ECONET. There are numerous documents and websites (e.g. http://portals.wur.nl/MSP) that provide a diversity of tools for stakeholder analysis. The tools that are essential in the planning process should be used and adapted together with the stakeholders! Stakeholder analysis might be started by the project team but needs to be finished with all stakeholders together! In the framework of this BOCI project ECONET-Lugansk, a communication workshop was held from 26-28 March 2010 in Belovodsk town. During that workshop the project team or Working Group on Communication started with a first very draft stakeholder analysis.

The table outlines the primary stakeholders according to the ECONET Working Group. This table focuses initially on Belovodsk Raion (Table 8).

Table 8

Stakeholders of ecological network development and their interests in Belovodsk.

Stakeholders	Interests	Conflicts with interest WG	Support to interest WG
Government, rayon administration, head of department of natural resources	Votes, public opinion	Need to improve grain yields in the oblast or forest areas	Official status of activity, authorization
Local councils	Favourable conditions for community	Conflict with the higher level administration, extra work for them	Start of local programs, communication with community
Farmers, owners and users of land	Income, livestock grazing, honey	Limits their regular activities	They are local leaders and have influence on people
Non agricultural business	Extra income, ecotourism	Limiting regular activity, preventing access to area	Influence of local leaders, funding
Scientific organizations, universities, schools	Education, to increase quality of education	Lack of time and lessons, unprepared staff	Expeditions, spreading of information
Media	To increase rating to get a source of interesting information	Lack of interest in ecological problems and quality of information	Publishing of our work, advertising
Environmental NGOs	Environmental protection	Competition with us, lack of ability to solve real problems	To involve in our activity
Other NGOs (hunters)	To keep original habitats and feeding base for animals, have access	Limiting of access to protected areas	Information and data about animals, monitoring; expand wildlife habitat
Local communities	To keep access to area, grazing, ecotourism	Manipulation through the negative stereotypes	Motivation through the positive stereotypes
Working Group ECONET	To create eco network, to improve qualification	-	-

During that workshop we also outlined what actually the interest of the Working Group is regarding the implementation of ECONET:

- technical interest in the realization of the ECONET
- to increase own knowledge and understanding
- generate income for experts involved in the process
- to convince people, and to be heard
- to realise and implement ECONET in Belovodsk and Antracite Raion

6.2 Multi-stakeholder processes

When you start engaging with stakeholders, you start up a stakeholder process. It is actually important that stakeholders engage in each planning process, because it is a process that results in a new form of partnership, which requires effective communication, patience and mutual trust. Good partnership is simply and definitely the most important ingredient for an effective and efficient planning process. Effective in the sense that it leads to an agreed result: a process that leads to impact and ensures that locally-held knowledge

finds its way to the right decision platform. Efficient in the sense that there is a minimum waste of resources, expenditure and without unnecessary effort.
An important element of engaging with stakeholders in the planning process is that it helps to identify and prepare for possible upcoming conflicts. Conflicts are not necessarily bad, it often stimulates creative thinking and looking at problems from different angles. It might not always be able to solve conflicts that come up during the process, but entering into a multi-stakeholder process will help to manage conflicts.
A multi-stakeholder process can best be explained as a (planning) process that leads to a result that has been prepared and understood by a multitude of stakeholders (e.g. a strategy for the implementation of ECONET) and supports partnership(s) and mutual trust. The result might not be agreed upon by all stakeholders, but important is that all stakeholders understand why decisions are taken and when. A multi-stakeholder process has a clear beginning and a clear end. Expectations are seriously considered and communicated. All stakeholders understand their role in the process and how they could contribute to the process. An important keyword for multi-stakeholder processes is learning. All stakeholders learn together throughout the process.
If it is clear who all stakeholders are and after starting an analysis on getting to know the stakeholders better (what are their interests, what linkages are there between different stakeholder groups etc.) you need to have a clear picture on who (which stakeholder) participates when and how. Participation is a very wide concept, which includes different levels of involvement: from just informing, to consulting, to ensuring active engagement in planning, implementation or decision making (or a combination of these last three). These different levels of participation need to be clear for all stakeholders and these levels might change during the planning process. The Working Group must ensure that they agree with stakeholders at what level they can participate.

6.3 Communication strategy for implementation of the ECONET

Developing a communication strategy includes a lot more than just developing a few brochures. Unfortunately in many programmes and projects communication often stops with the implementation of just these activities. It is even seen as a form of stakeholder involvement. In the ECONET project guidelines on communication were provided during the workshops as well as this report, on how to go a few steps further than just delivering leaflets, stickers, posters or brochures.

Developing a communication strategy requires a thorough situation analysis. The situation analysis, which includes stakeholder and problem analysis, is the starting point for a good design of the communication strategy: because you need to know first of all the issues at stake. In this case, which issues will support or block the implementation of ECONET? The situation analysis is the process of understanding the status, condition, trends and key issues affecting people and people's livelihoods, ecosystems or institutions in a given geographic context at any level (local, national, regional, international). Many lessons learned and applied techniques from Participatory Rapid Appraisal (PRA) are extremely useful to carry out a situation analysis.

What are the challenges regarding the implementation of ECONET? 'No implementation of ecological networks will lead to the loss of biodiversity in Ukraine' became the central problem in brainstorming the issues concerning Nature Conservation.
In the next step the problems were clustered: which problems go together, are related or overlap. In addition cause and effect relationships are outlined, this resulted in the creation of a problem tree. The central problem was made more specific to the pilot regions and then focused on all the root causes of why ECONET is not implemented in Antracite and Belovodsk.

Figure 43 outlines the problem tree that was developed during the workshop (in March 2010) in Belovodsk. Figure 44 shows the 'simple' translation of this problem tree into an objectives tree, i.e. problems are translated into objectives (as example: the problem 'Loss of biodiversity' is translated into the objective 'Loss of biodiversity reduced'). Based on the problem analysis tree and especially from the objectives tree specific communication objectives are formulated and this provides ideas for possible communication activities (see Figure 45).

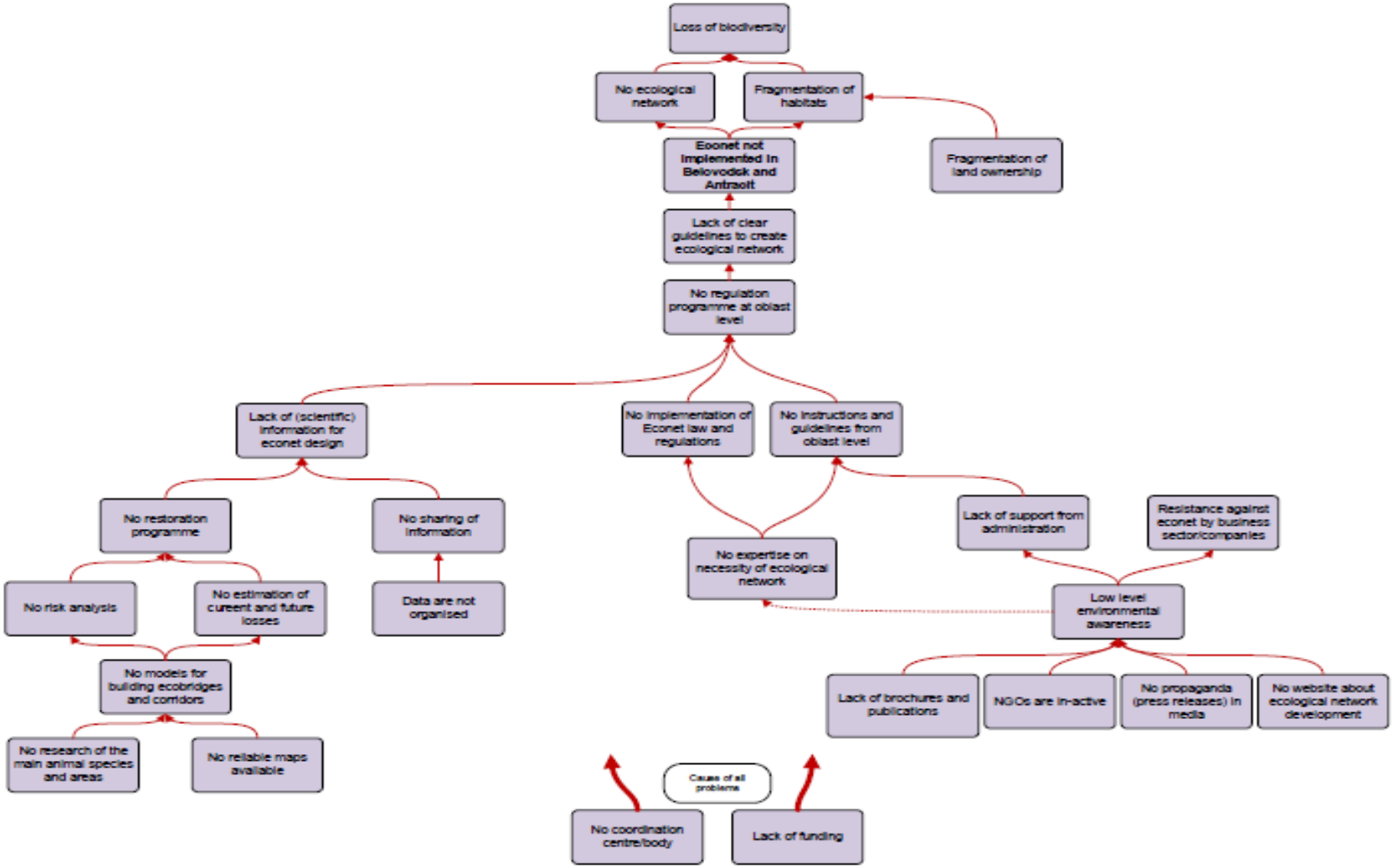


Figure 43

The problem tree related to ECONET development in Belovodsk and Antracite.

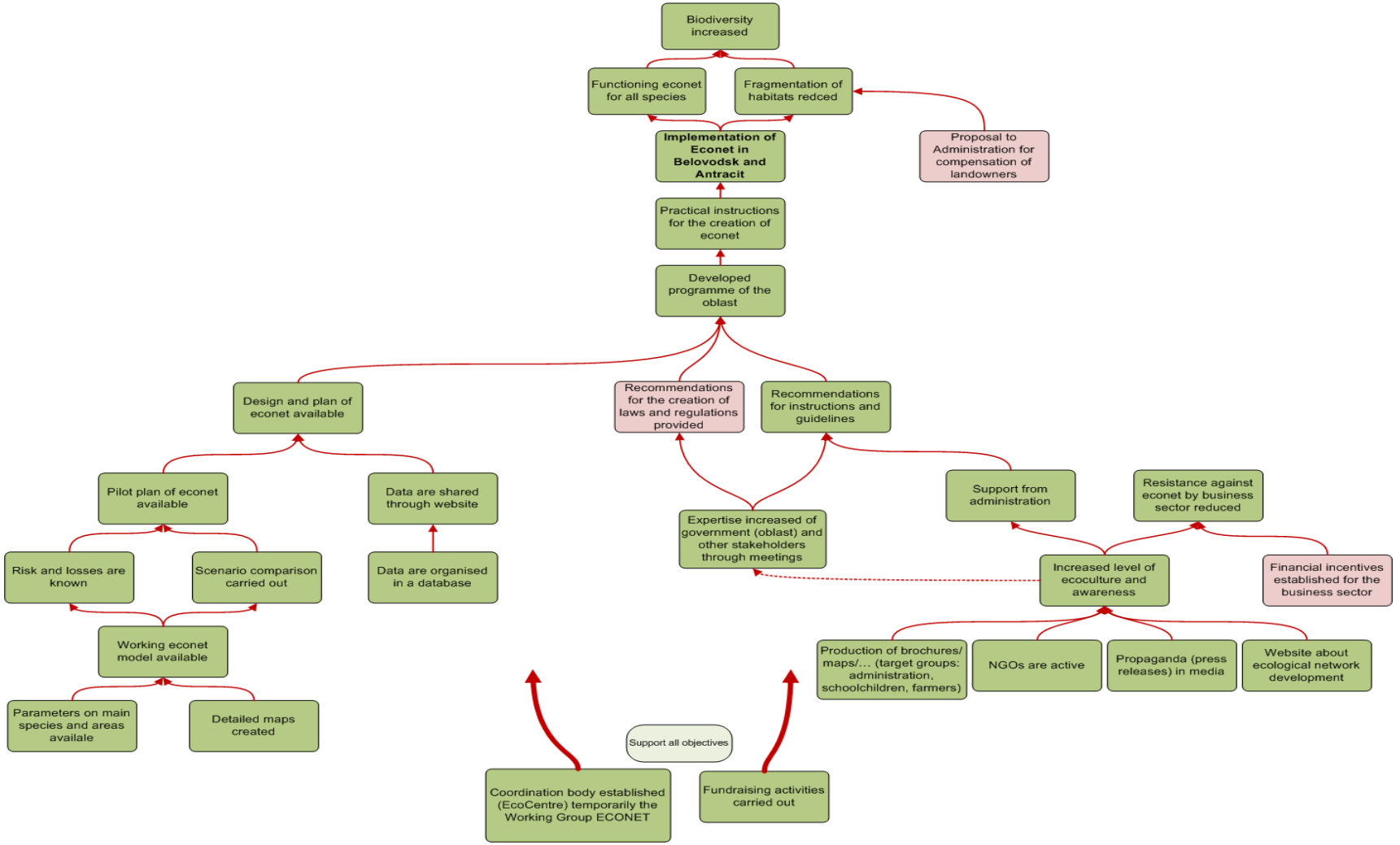


Figure 44

The objectives tree related to ECONET development in Antracite and Belovodsk.

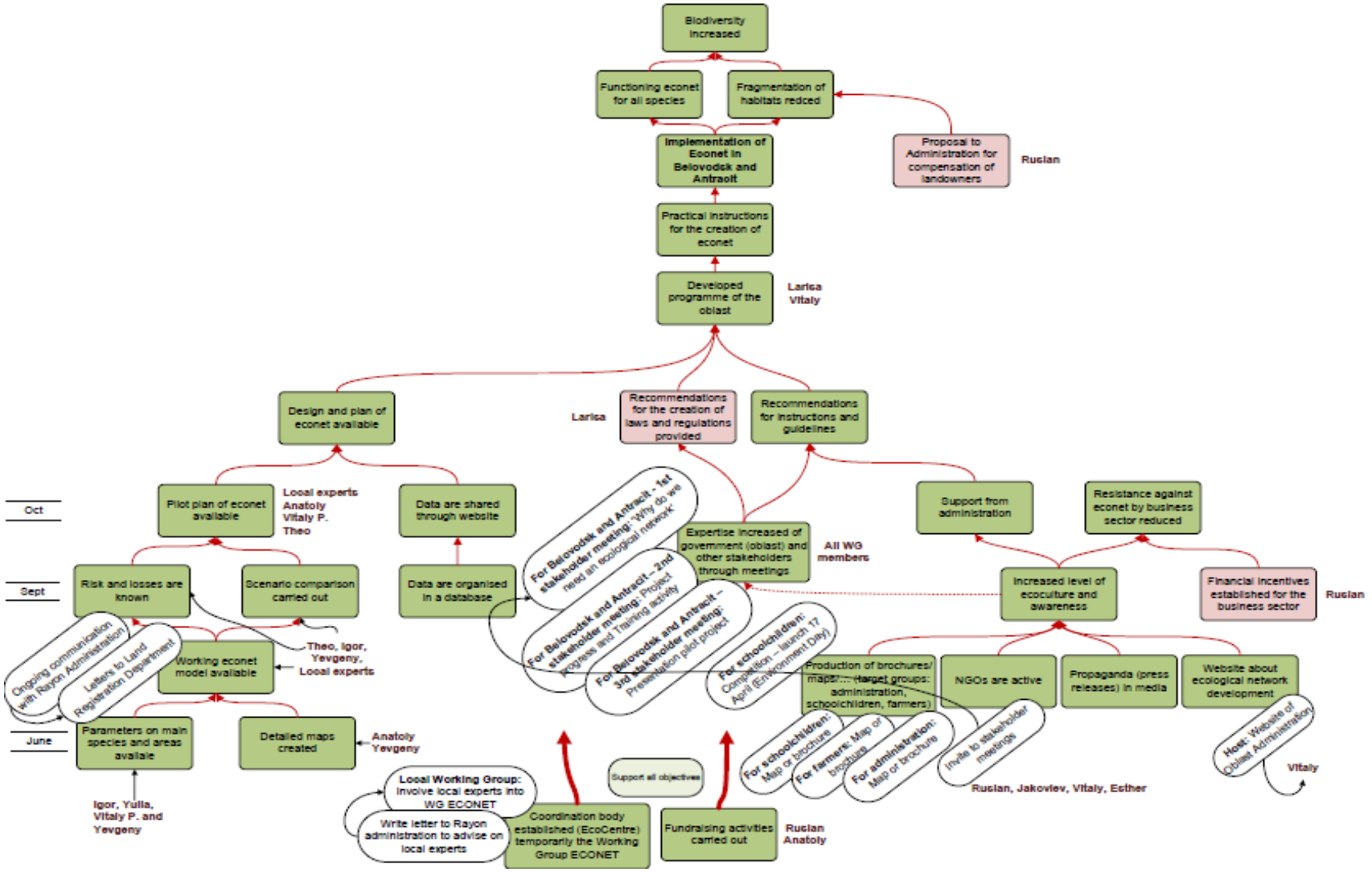


Figure 45

Objectives tree and related communication activities.

6.4 Setting communication objectives

The objectives tree (Figure 43) has been complemented with some preliminary ideas for communication activities. Also a draft timeline (next to the objectives tree) and the involvement of working group members in the different activities have been outlined.
Before thinking of communication activities, specific communication objectives should be formulated for all objectives. For instance, increased awareness and ecoculture, from the objectives tree could result in the following communication objective: By the end of January 2011 administration representatives of Belovodsk are aware of the need of ecological network development and the implementation of ECONET for sustainable development in Belovodsk. This could be followed by: By the end of April 2011 administration representatives of Belovodsk are motivated to implement ECONET in Belovodsk Raion. It is very supportive and beneficial to set specific communication objectives for each objective out of the objectives tree.
Based on these two objectives, it is important to ask:

- is the target group clear, is the objective therefore specific enough?
- is the objective clear enough, relevant and achievable?
- is the time frame clear?
- is the objective measureable (can you measure your objective, to evaluate whether you have been effective)?

It may be necessary to rephrase a bit to make sure that the right activities are prepared to reach the communication objective:
By the end of January 2011, 80% of the administration officials of Belovodsk are aware of the need of ecological network development and the implementation of ECONET for sustainable development in Belovodsk.

This communication is quite SMART (Specific, Measurable, Achievable, Relevant/realistic and Time bound).
What activities would we need to implement to reach this objective?

- Organize a workshop focused on administration officers
- Prepare a leaflet in support of the meeting
- Etcetera

A long list of activities can be developed and based on budget, resources and time those that are possible are selected. Later on we will look in a bit more detail to what could be helpful concerning carrying out such activities.

Another tool that looks already in a bit more detail to strategy development is the 'task analysis checklist'. This tool can serve two purposes: checking which tasks are currently carried out by key stakeholders (which helps to have a better overview of the current situation) and tasks which actually are necessary to reach the overall objective of implementing ECONET in Belovodsk and Antracite. Therefore two different tables are necessary: one that describes the current situation and one table that will outline more a future necessary stage.

During the workshop in March in Belovodsk only one of the two tables was prepared, i.e. the required tasks to developECONET in Belovodsk and Antracite. Also think of listing those tasks that enable and motivate towards ECONET implementation for the whole of Ukraine.

Comparing the table for the current situation with the table for the future task gives information on which specific communication objectives should be set. Especially because these tasks need cooperation and involvement of a lot of stakeholders to be effective, and effective cooperation between stakeholders requires a lot of effective communication.

Table 9

Task analysis matrix: Which tasks need to be carried out to ensure ecological network development?

What are necessary tasks for the development of ECONET? / Who should be involved (Stakeholders)?	Design of ECONET	To contact heads of administration	Lobby for support (e.g. Head of department of land resources - Mr. Melehin)	To create local working group	To collect and systemize all needed information	Organize and run expeditions	Advertizing and propaganda	Seminars and training programs	Developing a monitoring system	Development of local regulations	Identify benefits for business	Fund raising
Government, rayon administration, head of department of eco resources,		v	v	v	v		v		v	v	v	v
Local councils				?						v	v	
Farmers, owners and users of land				?								v
Non-agricultural business				?								v
Scientific foundations, universities, schools				?	v	v		v	v			
Media				?			v					
Environmental NGOs				?			v	v	v			v
Other NGOs (hunters)				?					v			
Local communities				?								
Working Group ECONET	v	v	v	v		v	v	v		v		

6.5 Message design

In Paragraph 6.3 was mentioned already that a message has *not* been communicated unless the sender has received it. Mathematically speaking one could formulate: 'message effectiveness is a function of the reward the message offers and the effort required interpreting it'. Hence, the effectiveness of a communication strategy largely depends on the ability of its messages to catch the attention and understanding of the target audience.

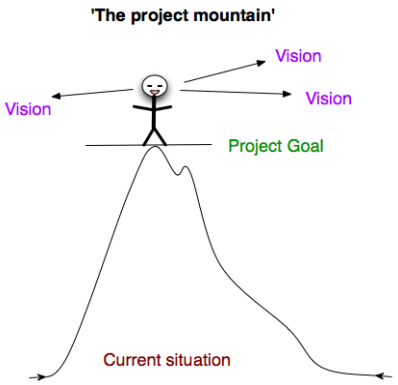
For the message to be successful, it should follow the '***KISS AIDA'*** principle that is often used in social marketing: Keep It Short and Simple (KISS) in order to catch the audience's Attention, raise its Interest and instigate Desire that will lead to Action (AIDA) in relation to, in this case, ecological network development or ECONET implementation. These points of orientation are derived from well-established findings from development communication and rural sociology: Any change process follows a pattern from awareness via interest and from trial to adoption or rejection. In addition, the information should also be accessible, accurate, verifiable, complete, timely, and relevant.

A shared vision is important to develop the right communication objectives: *Your vision is my vision; your dream is my dream.*

One should realize that all target groups always want to know what your 'hidden agenda' is. All stakeholders need to be aware of that ultimate goal you are working towards: A Ukraine that is economically developing, but without harming or losing the natural resources. Why? Because destroying the ecological structure (habitats, ecosystems, landscapes) of Ukraine will lead to an economical decrease.

If there are multi-stakeholder workshops planned, it is important to spend sufficient time on formulating a joint vision or dream. Without vision no cooperation (the Chinese formulated it as follows: *'Vision without action is a daydream. Action without vision is a nightmare'*).

A communication strategy aims to help people to that top or to motivate people to move along to the top by providing information, knowledge, tools and methods so that people can enhance their skills to go up, new insights so that people move up rather than downhill.
Imagine a vision as climbing a mountain. Different stakeholders will have different ways to go to the top, as well as that they will use different tools and methods to do so, but at the top we hope that all stakeholders see the same (a healthy Ukraine, socially, ecologically and of course also economically).
With this project we contribute to that dream or vision. For the project the top of the mountain is the establishment of ECONET in Antracite and Belovodsk Raions. It is a realistic goal that we can reach and we hope that it results on the longer term in an ecological network for the whole of Ukraine and eventually to the dream or vision that we just described: A healthy ecological, social and economical Ukraine….
Of course a shared vision can realistically not be achieved by only one project, programme or initiative!



Selection of tools and methods
To reach a certain objective, it must be very clear what the current situation and the vision is you are working towards. Communication can support how we get to the vision and is an important part of planning and strategy development.

Table 10
What is most effective to reach the objective, how to communicate the message effectively and reach the target group…?

Objective	Message	Target group or stakeholder group	Method, tool or media type
By the end of January 2011, 80% of the administration officials of Belovodsk are aware of the need of ecological network development and the implementation of ECONET for sustainable development in Belovodsk.	Networking is important for economic development, but it does also require developing ecological networks.	Administration officials.	*For example:* A meeting or workshop between the project team and administration officials. A brochure that clearly outlines the benefits of an ecological network as a background document after these benefits have been discussed ion a workshop.
By the end of 2011, 80% of the tourists visiting Belovodsk are aware of the implications of fragmentation of natural areas.	Size matters!	Tourists.	*For example:* Poster. …
Etc.	Etc.	Etc.	Etc.

It is essential to remember: A clear vision is essential! Why do you do what you do, what is behind your communication efforts (essential for yourself as well as for your stakeholders). Further: A thorough situation analysis is essential. Each time should be checked: what target group should be addressed, with what message, using which media, methods and tools to be able to effectively reach the objective!

6.6 Multi-stakeholder meetings

During the workshop in March multi-stakeholder workshops and brochures were chosen as effective media and methods to explain stakeholders: 'Why do we need an ecological network?'
A potential list of stakeholders for Antracite and Belovodsk includes:

- Administration (four representatives)
- Local council (three representatives)
- Farmer/landowner (two representatives)
- Director school/deep. of Education (one representative)
- Agric Business (one representative)
- Non-agric business, ecotourism (one representative)
- Local representative Zapovednik (one representative)
- Media (one representative)
- Environmental NGO (one representative)
- Hunting Committee (one representative)
- Local community (one representative)

This means that the target group is very mixed, which makes it more difficult reaching specific objectives.
A multi-stakeholder workshop has been selected as an important method to reach the objective increased awareness in Antracite and Belovodsk on the importance of establishing ECONET (problem and objectives tree). A more specifically described objective would be: 'At the end of the meeting all participants understand why we develop an ecological network in Antracite/Belovodsk.'
A second objective formulated was: 'At the end of the meeting all representatives of each stakeholder group are interested and willing to cooperate with the Working Group ECONET'.

Especially to be able to reach that second objective it is advisable to develop specific objectives for the meeting per target group.
Ideally the programme for the stakeholder meeting in Belovodsk and Antracite looks as follows:
Draft programme (meeting facilitated and organized by the Working Group ECONET)
09.30 - 10.00 Departure by bus to [venue]
10:00 - 10.15 Introduction of meeting participants
10:15 - 10.45 Introduction of ECONET
10.45 - 11.15 Discussion
11.15 - 12.00 Discussion in specific groups
12.00 - 12.45 Plenary discussion: sharing results of discussion in groups
13.00 - 13.30 Lunch
13.30 - 14.00 Departure by bus from [venue]

Still the following has to be described:
What is the key message to the target group?
How are you going to transfer your message?

And, can these key messages be transferred during a multi-stakeholder workshop?

During the project several stakeholder meetings have been organized in Antracite and in Belovodsk.

6.7 Brochures

Good communication with stakeholders, as explained above, is crucial to reach the long term objective.
For Lugansk Oblast the following groups were identified as most important 'targets' for communication:
- the 'general public'
- land users (farmers mainly)
- future residents, the children

This resulted in brochures being developed for those groups:
1. For schoolchildren - the aim is to make school children more aware of the importance to connect natural areas of Antracite and Belovodsk in a playful way
2. For the general public - to outline in easy terms the importance of developing an ecological network and inform them about the benefits for Antracite, Belovodsk and Ukraine in general
3. For farmers - to outline the importance of developing an ecological network and inform them about the benefits for Antracite and Belovodsk and more specifically to inform about the benefits for the development of their farm, and how they possibly can adjust their management. This brochure is based on the study that focused on business opportunities for farmers due to the implementation of ECONET (Chapter 5).

In Annex II the three brochures are included that have been developed for awareness raising: one for the general public, one for farmers and one for children.

7 Conclusions and recommendations

7.1 Conclusions ECONET design

In this project two strategies were designed for actual implementations of ECONET within the context of regional development. A general assessment of the territories were done for two Raions, and a model was used to design the current ecological network. Based on the outcome of the field assessment and the modelling, two strategies were proposed for the Raions. These strategies differ, since in Belovodsk Raions a lot of land has been ploughed and only limited natural steppe are left. There are some protected areas which can be upgraded to realize more steppe land. For Antracite there is more (degraded) grassland due to the shallow rocky soils, unsuitable for large scale farming as it is practiced in the North. Here industrial use and large scale mining offers some people alternative opportunities, which results in land degradation. Protection of two larger areas will strengthen wildlife populations as a whole and ensure its sustainability. A corridor through the urbanized area of Antracite will link the territory with neighbouring Raions and countries and connect also the isolated landscape park.
Practical suggestions were provided for farmers to integrate the ECONECT within farm plans, focussing on opportunities, availability of land, and interest of farmers to participate. Finally, the communication is discussed in this report along the lines as developed at the beginning of the project.

7.2 Recommendations

Realisation of ECONET
Development of an ecological network preferable should be based on the national legislation on ECONET. Leading in the implementation process of the network should be the Environmental committee of Lugansk Oblast Administration, however in cooperation and intensive consultation with the Organisation of Protected areas or Zapovedniki, which currently has a very limited role in the development of the ecological network. Proper legislation must be in place for protection of core areas, protected areas, reserves. For protection of corridors additional legislative tools may be required. However, opportunities exist already to realise corridors at a low cost through existing structures and legislation. Along major roads are zones of 30 m wide. These often consist of wood rows, which function as corridor but also as grassland corridor, ploughing is not allowed in this zone. These roadside corridors should be a functional part of the ECONET, they either should be planned as grassland/steppe corridor or forest corridor, and managed accordingly. Strict control of land use is required here, to stop land use which conflicts with its function as corridor (building activities, pollution, ploughing, burning etcetera).

Land use in corridors
Aim for these corridors is to function as conduit for species. It depends on the requirements of the species how this functions. Most species will require a fairly natural environment. Some species may require cover from the vegetation, forests or forest-shelterbelts. Most land use can be permitted in corridors, however, the use of chemicals and fertilizers should be restricted, intensive land use and over exploitation should be avoided. Ploughing and urban development should be prohibited. Corridors should not be dissected by infrastructure such as roads, railways and urban areas.
Overgrazing is conflicting with the function of corridors; it causes erosion and will lead to loss of value for the land. Overgrazing should be addressed by limitation of grazing animals. Quotas for stocking levels should be considered. Grazing levels can vary from year to year based on available standing biomass, which depends on

rainfall and current grazing pressure. Areas adjoining corridors and core areas should be considered sensitive areas.
Hunting and fishing should be avoided in core areas of ECONET, but can be permitted in the buffer zones and corridors, provided that this takes place at some distance from core areas.

Financing mechanisms for ECONET
An important source of income for farmers is probably the sustainable production of fodder from degraded and under-utilized lands. In particular regional certified products can in the long run gain higher income for farmers. Sometimes it may be possible to access funds from donor agencies. Probably not for regular management, but for specific research or development of e.g. tourism facilities or business plans.
For wetland corridors biomass production from the reed lands can provide additional income. Also crop residues (straw) which are currently burnt, can be used for fuel. Specific bio-fuel crops such as Switchgrass and Miscanthus are in particular suitable for degraded land, except for producing biomass and a function for maintaining biodiversity, these grasses can restore degraded soils. The energy from these biofuels can be used for local energy and heating systems as well as for export.

Stakeholder communication on ECONET
As discussed in the report, it is important to engage stakeholders in the planning process. This requires effective communication, patience and mutual trust between stakeholders. Good partnership is definitely most important for an effective and efficient planning process.
In this project the communication has just started. The involvement of land users in the planning process is apparently not engrained in the governance system. However, it is strongly recommended to pay more attention to the communication process, since this is key in reaching long-term conservation objectives.

7.3 Further research

- Further research is required to study the relationship between soil production, vegetation composition, nutritional value and meat production. Currently there is insufficient understanding of these relationships, in particular for natural and semi-natural steppe grasslands.

- The underlying species data for the model LARCH is based on best available knowledge and literature on those species. The results are indicative, for the species discussed and should be seen as 'ecological profiles', indicative for specific species groups. However, further data collection and research on the species would be advisable.

- The vegetation maps and land use data is very incomplete for Lugansk Oblast. For proper land use planning it would be essential to improve the digital land use data and make it also available in digital format. Proper digital maps based on satellite images can support conservation planning.

- Excellent opportunities exist for biofuel production, in particular the use of reed land and reed biomass, and growing Switchgrass on degraded soils which are at present unproductive and prone to erosion. Further study is required of the exact location of these degraded soils, to potential in Lugansk Oblast, and whether they can contribute also to support of biodiversity.

- The detailed ECONET approach can be used as guidance for other regions. The examples provided here on integration of ECONET at farm level can promote the concept in different areas.

- There is a need for a review of the National Ecological Network of Ukraine, since it is too general and not practical enough to be implemented.

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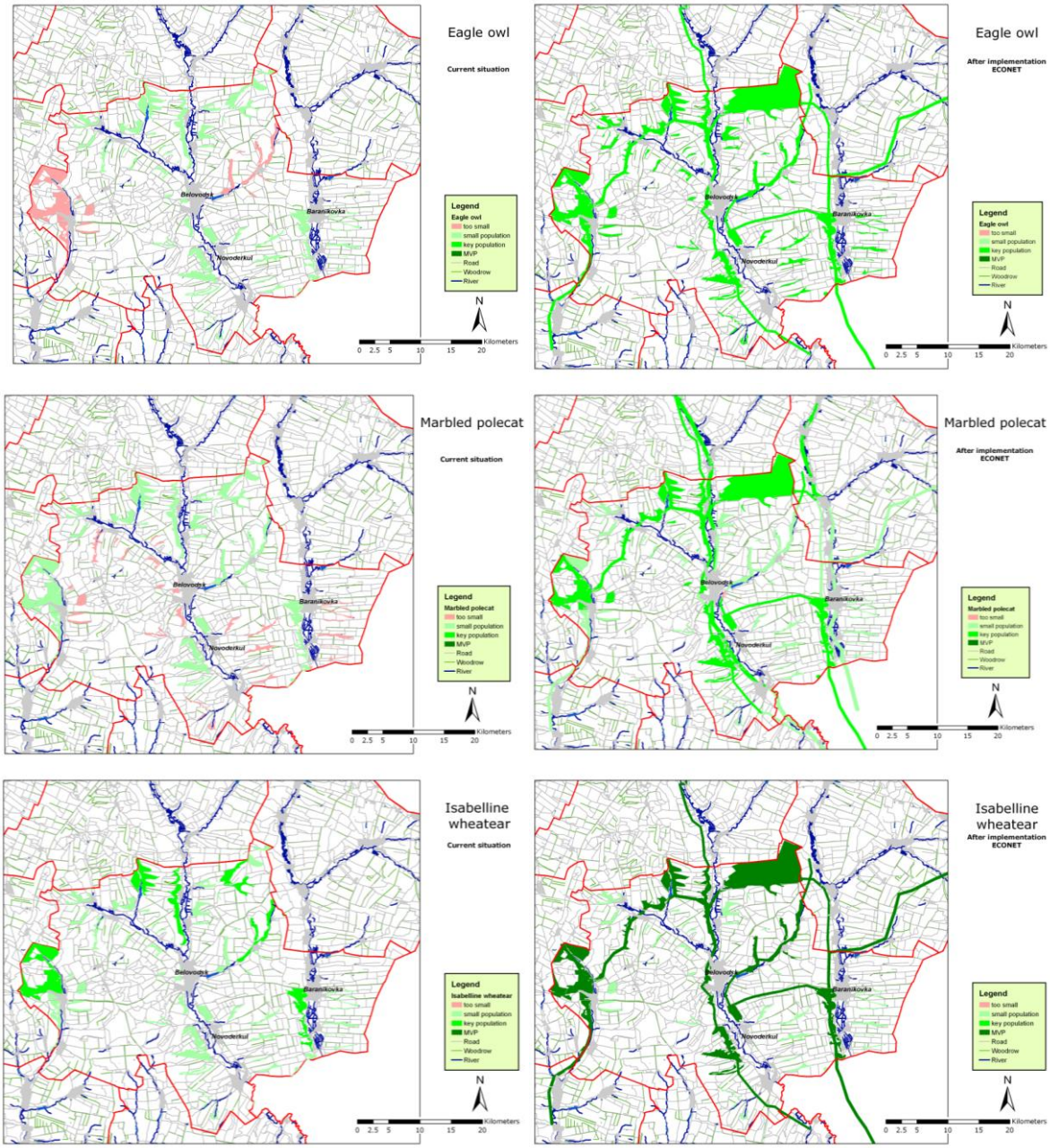
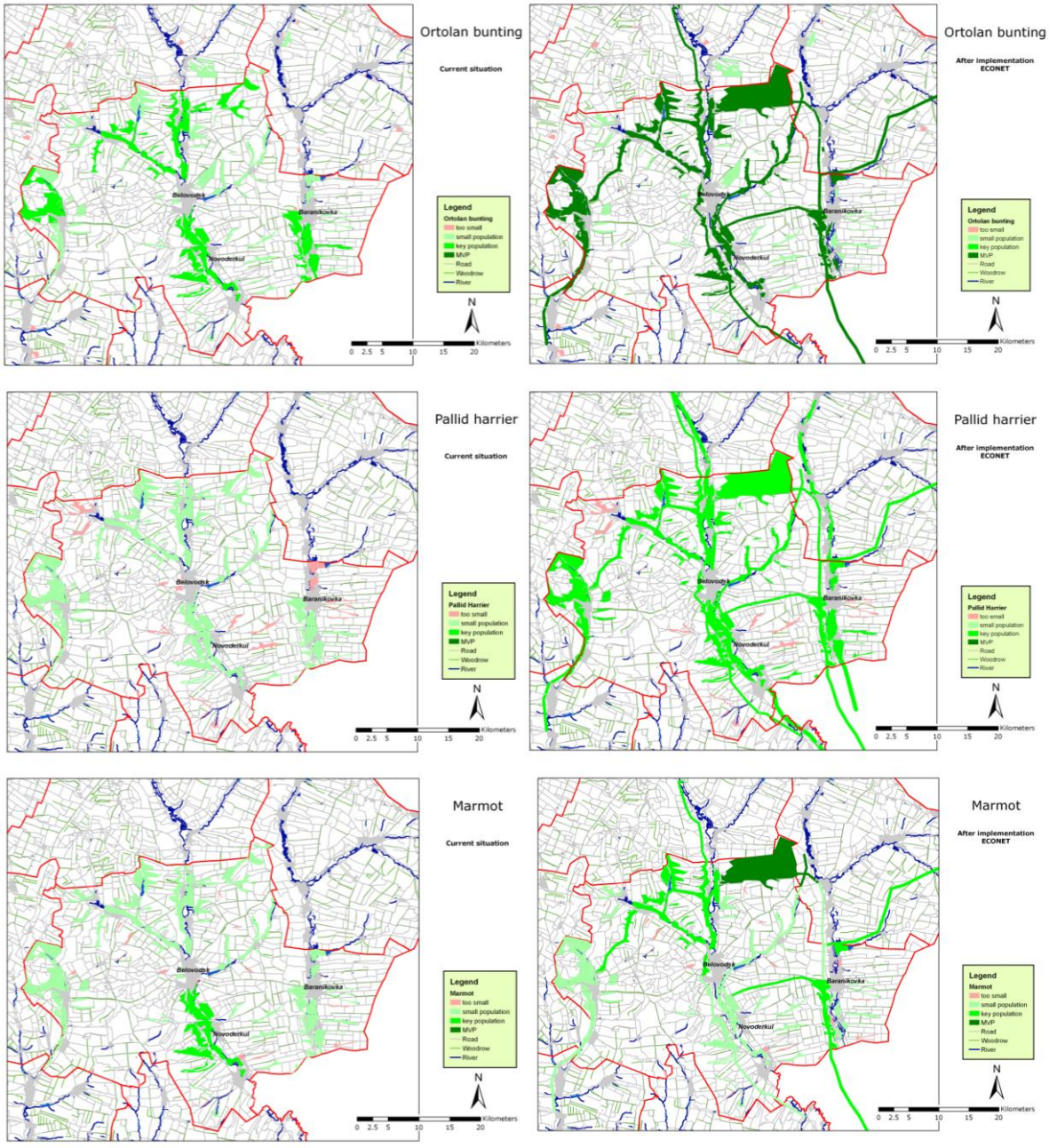
Annex I Modelling results LARCH

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Ortolan bunting
After implementation ECONET
Legend
Ortolan bunting
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Pallid harrier
Current situation
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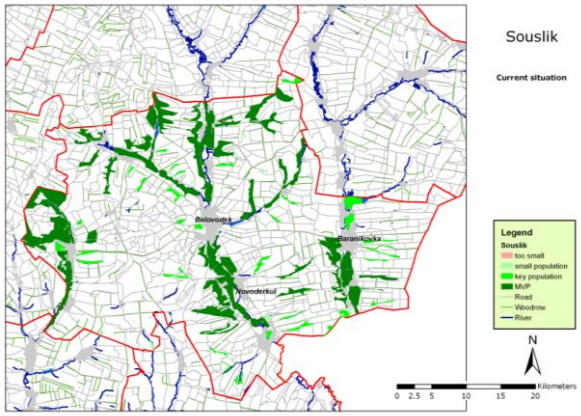
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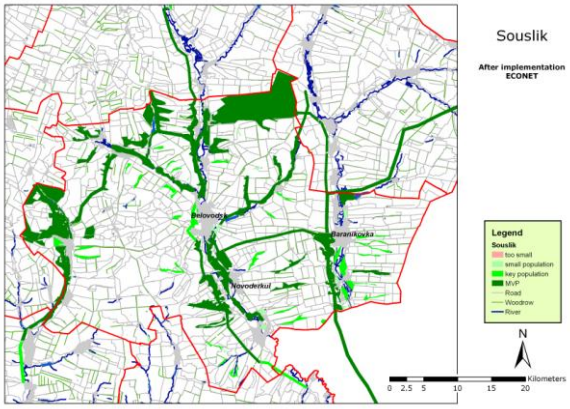
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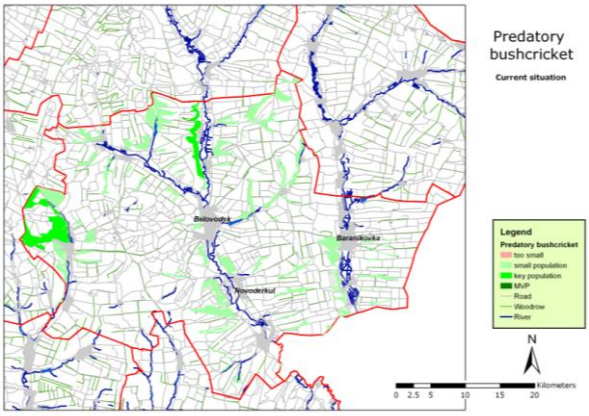
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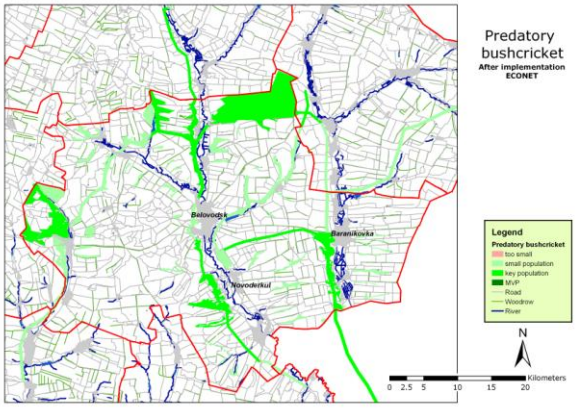
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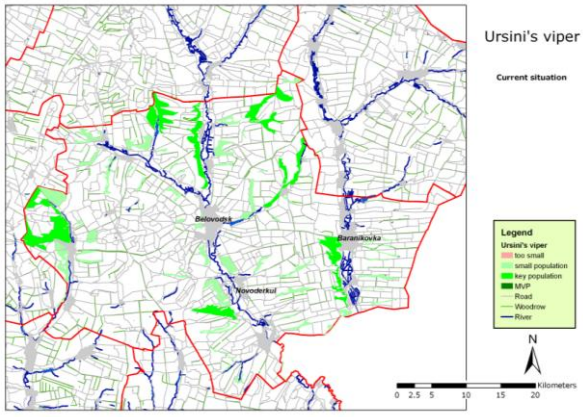
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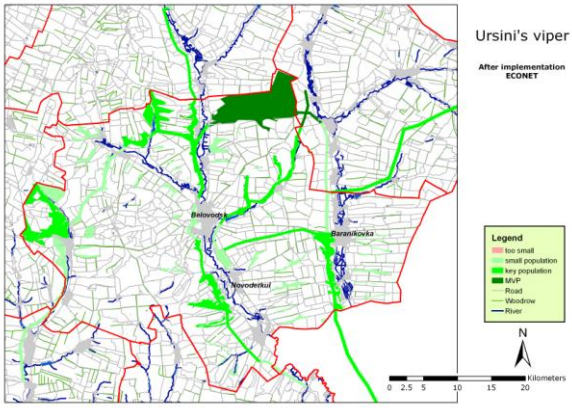
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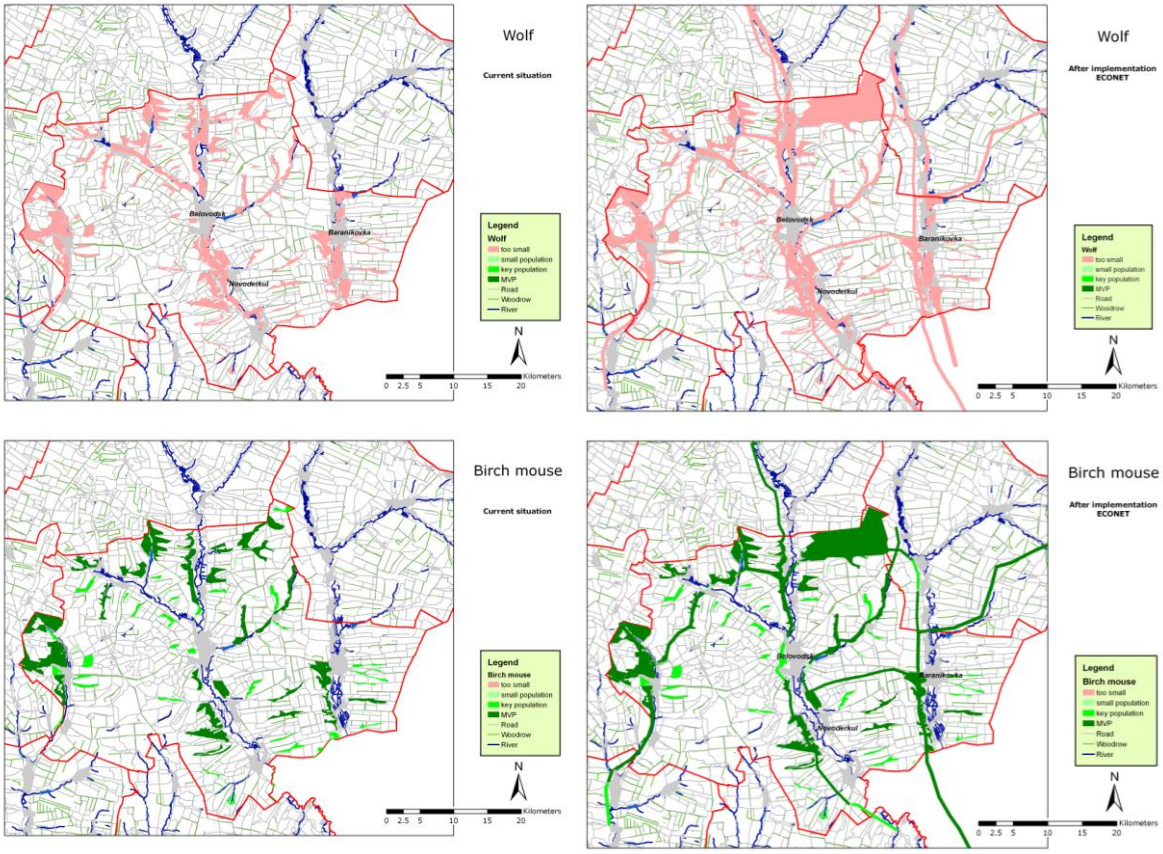
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Birch mouse
Current situation
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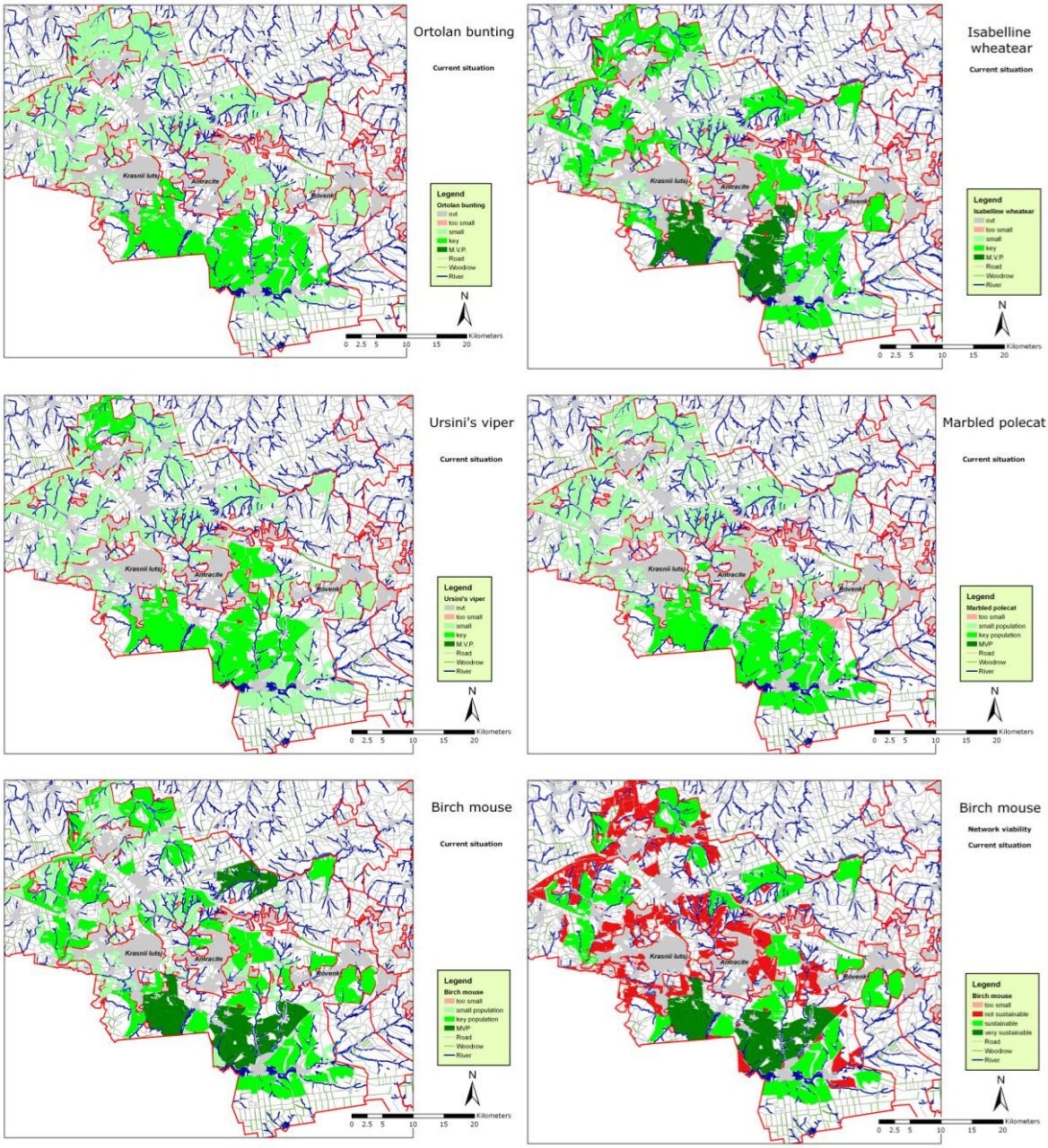

Annex II Brochures on ECONET


Территоря района это дом для растений и животных. Это очень подобно нашему дому. Здесь тоже доме есть и кухня, где можно поесть и ванная комната, где можно привести себявпорядок.Естькомнатыдляигрипрогулок.
Вот так выглядит наш дом
Очень плохо, что не все комнаты этого дома соединены между собой. На карте мы видим значки-указатели. Они показывают места где проход для животных закрыт и они не могут попасть в нужные им комнаты. А наша с Вами задача соединить экологическую сеть (желтым цветом показаны экологические коридоры) в единую систему. По которой животные смогут ходить друг к другу в гости и заниматься домашними делами.
ЭКОЛОГИЧЕСКАЯ СЕТЬ
БЕЛОВОДСКОГО РАЙОНА
Ключевые территории
Ландшафтный коридор
Водный коридор
Ключевые территории
Придорожный коридор
Ключевые территории
Степной коридор
Лесной коридор
Восстанавливаемый участок
Вот так выглядит дом животных
Курячівка
Гармашівка
Кононівка
Лимарівка
Шуліківка
Литвинівка
Садки
Західне
Новолимарівка
Гончарове
Біловодськ
Т-13-14
Парневе
Сенькове
Новоолександрівка
Степове
Новодеркул
Данилівка
Первомайськ
Городище
Плугатар
Новоспасівка
Раздолля
Р-09
Мусіївка
Кирносове
Зеленівка
Узлісся
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ДЛЯ ЧЕГО НУЖНЫ ЭКОЛОГИЧЕСКИЕ СЕТИ

Экологическая сеть - это система, которая объединяет природные территории для сохранения и восстановления окружающей среды, сохраняя животных и растений и места их обитаня. Благодаря оставшимся и неповрежденным участкам природы, животным и растениям удается сохранить свое разнообразие.

Наш край очень красив и разнообразен.

Давайте заботится о нем!

ИНТЕРЕСНОЕ О ЖИВОТНЫХ

Самый большой хищник Луганской области волк. Волки не любят одиночества, более того, они развили сложную технику групповой охоты, что свидетельствует об их уме и способности к обучению.

Речной бобр очень дружелюбное животное. Помогая друг другу, бобры делают из поваленных ими стволов и веток сооружение, кажущееся, на первый взгляд, беспорядочным. На самом деле это очень прочная конструкция, которая может устоять даже в половодье.

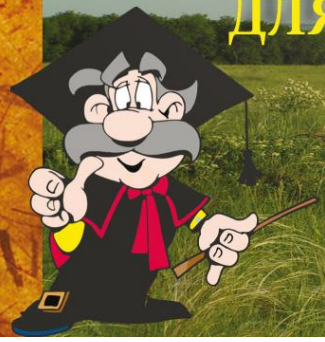
Кроты вовсе не слепые. На самом деле, у кротов достаточно острое, хотя и ограниченное, зрение. А увиденный кротом свет, служит знаком опасности.

Дятел может одновременно ударить клювом 20 раз в секунду

Чтобы сделать килограмм меда, пчелка должна облететь 2 млн. цветков.

Государственное управление охраны окружающей природной среды в Луганской области
Беловодская районная государственная администрация

ЭКОЛОГИЧЕСКАЯ СЕТЬ ДЛЯ ШКОЛЬНИКОВ



WAGENINGEN UR
For quality of life

ЧТО ТАКОЕ ЭКОЛОГИЧЕСКАЯ СЕТЬ?

Экологическая сеть – целостная территориальная система, которая создается путем объединения объектов природно-заповедного фонда и других особо ценных территорий для сохранения и восстановления качества окружающей среды, повышения природно-ресурсного потенциала территории, сохранения ландшафтного и биологического разнообразия, мест обитаний ценных видов животных и растений, генетического фонда, путей миграции животных.

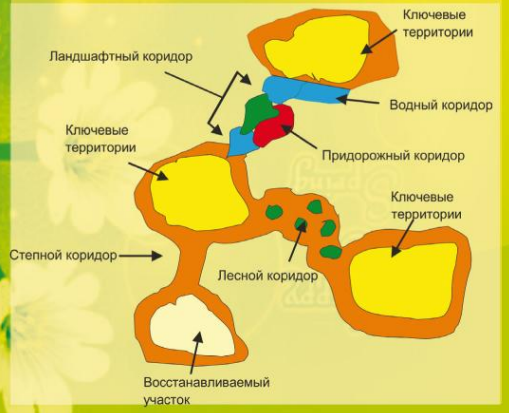
ПРЕИМУЩЕСТВА СОЗДАНИЯ ЭКОЛОГИЧЕСКОЙ СЕТИ

- Повышение продуктивности сельскохозяйственных угодий
- Снижение ветровой и водной эрозии земельного фонда
- Восстановление деградированных земель
- Использование деградированных земель с одновременным восстановлением их качества
- Снижение затрат на борьбу с вредителями
- Формирование более благоприятного микроклимата на полях
- Формирование запасов пресной воды / влагозадержание

СТРУКТУРА ЭКОЛОГИЧЕСКОЙ СЕТИ

Структурные элементы экологической сети – территории, которые выполняют в ее составе разные функции и обеспечивают оптимальное функционирование экосети в целом. Структурные элементы экосети это:

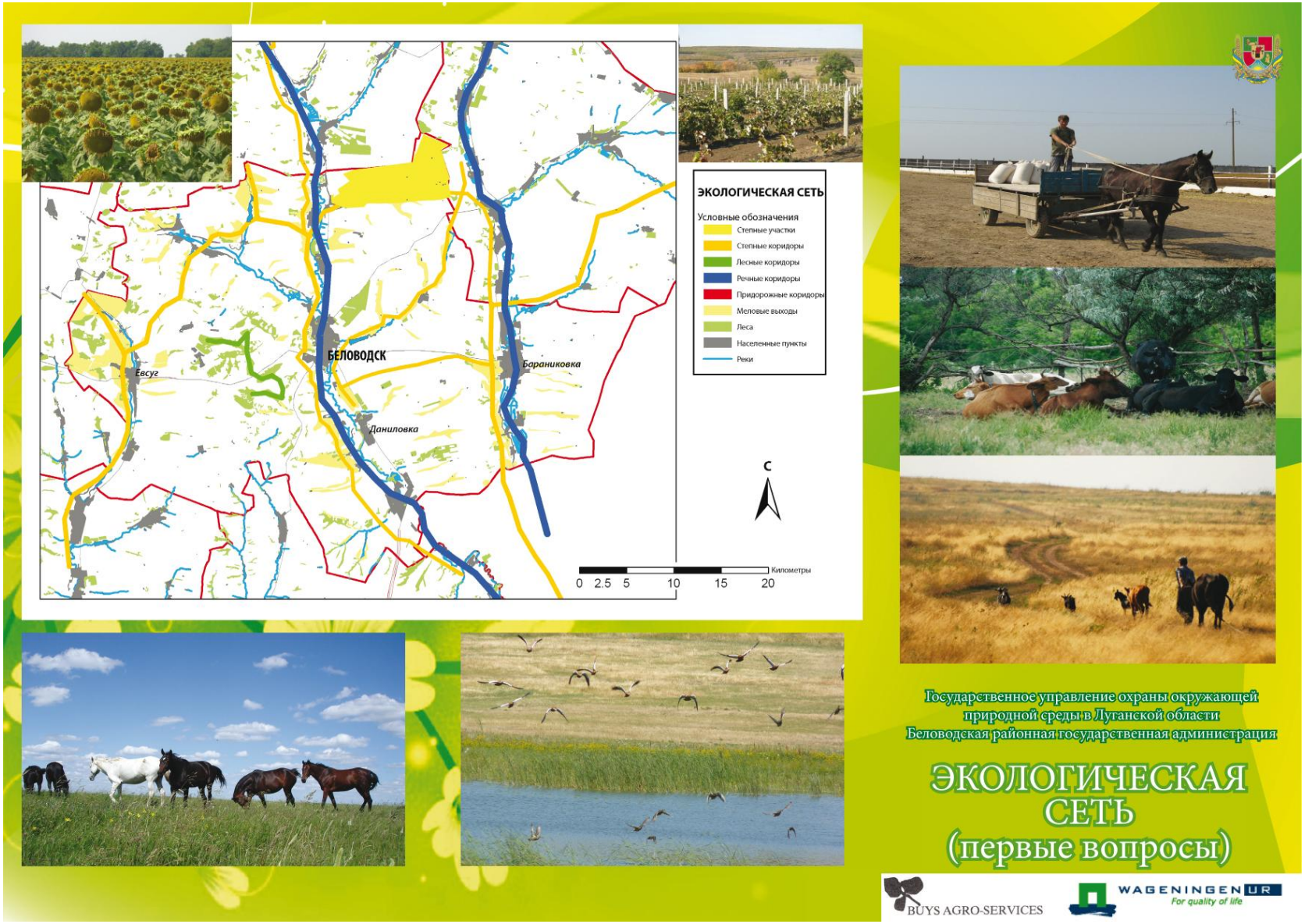
- ключевые (ядра),
- соединительные (экокоридоры),
- буферные и восстанавливаемые территории.

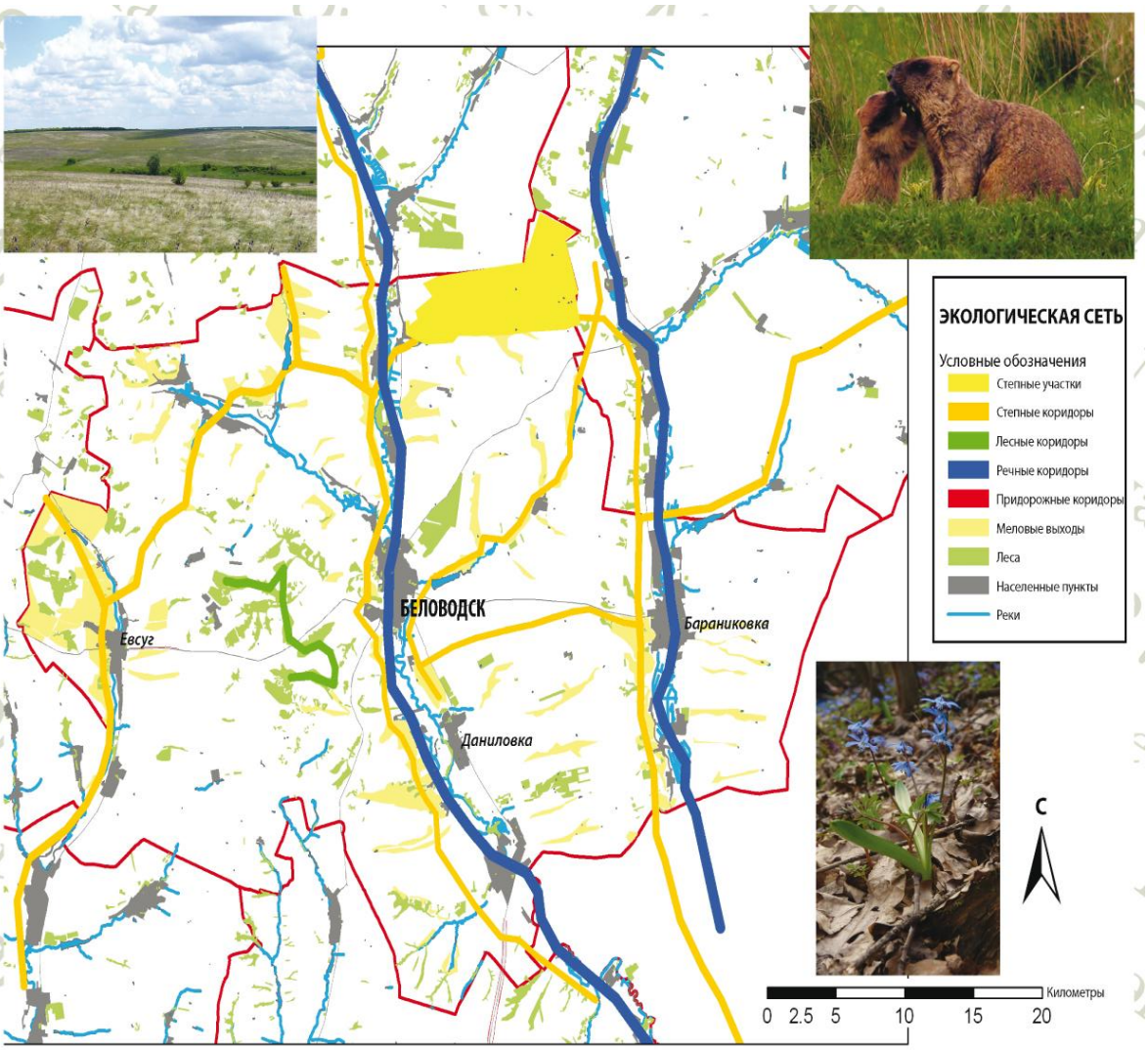


ЧТО ДЕЛАТЬ?

Наиболее распространенный подход к производству молока в степной зоне Луганской области предполагает использование степных пастбищ для выпаса скота и пахотную землю для производства корма. Общая площадь степных пастбищ невелика и пастбища страдают от перевыпаса и деградации растительности. В зимний период коровы получают сено и силос невысокого качества, солому, а также небольшое количество концентратов.

Для улучшения качества пастбищ следует применять ротационный выпас и присоединить дополнительные пастбища в графике выпаса. Частично пастбищную землю следует использовать для производства силоса и 10-20% пастбищ должно отдыхать. Также необходимо внедрить новое оборудование для производства силоса высокого качества. При комбинировании всех этих мер было бы возможно увеличить надой молока от 7,5 литров в день от коровы до 15-20 литров, и постепенно восстановить степи с дикорастущими травами и бобовыми растениями, что в свою очередь увеличит показатели продуктивности сельскохозяйственных животных.


ЭКОЛОГИЧЕСКАЯ СЕТЬ
Условные обозначения
Степные участки
Степные коридоры
Лесные коридоры
Речные коридоры
Придорожные коридоры
Меловые выходы
Леса
Населенные пункты
Реки
БЕЛОВОДСК
Евсуг
Даниловка
Бараниковка
С
0 2.5 5 10 15 20
Километры
Государственное управление охраны окружающей природной среды в Луганской области
Беловодская районная государственная администрация
ЭКОЛОГИЧЕСКАЯ СЕТЬ
(первые вопросы)
BUYS AGRO-SERVICES
WAGENINGEN UR
For quality of life



Природа. Мы наслаждаемся ею, мы используем ее, но нам также нужно защитить ее. Защита природы - это законодательная норма или обязанность каждого гражданина? Почему это важно, почему важно поддерживать государство в этих усилиях?

Государственное управление охраны окружающей природной среды в Луганской области
Беловодская районная государственная администрация

ЭКОЛОГИЧЕСКАЯ СЕТЬ
ЧТО? ЗАЧЕМ? ПОЧЕМУ?

WAGENINGEN UR
For quality of life

ЧТО ТАКОЕ ЭКОЛОГИЧЕСКАЯ СЕТЬ?

Экологическая сеть – целостная территориальная система, которая создается путем объединения бъектов природно-заповедного фонда и других особо ценных территорий для сохранения и восстановления качества окружающей среды, повышения природно-ресурсного потенциала территории, сохранения ландшафтного и биологического разнообразия, мест обитаний ценных видов животных и растений, генетического фонда, путей миграции животных.

ПРЕИМУЩЕСТВА СОЗДАНИЯ ЭКОЛОГИЧЕСКОЙ СЕТИ

- Повышение продуктивности сельскохозяйственных угодий
- Снижение ветровой и водной эрозии земельного фонда
- Восстановление качества деградированных земель
- Повышение качества жизни населения
- Повышение запасов питьевой воды и улучшение ее качества
- Улучшение качества жизни (места для отдыха, более комфортные условия для проживания, повышение стоимости недвижимости и пр.)
- Чистые продукты питания

СТАТУС СТРУКТУРНЫХ ЭЛЕМЕНТОВ ЭКОЛОГИЧЕСКОЙ СЕТИ

Структурный элемент	Юридический статус
Ключевая территория (ядро)	Природоохранные обьекты – соответствующий природоохранный статус. Территории, не имеющие природоохранного статуса – сохраняют существующий юридический статус с внесением дополнений, касающихся рекомендуемого режима землепользования территории.
Соединительная территория (экокоридор)	Статус водоохраной зоны. Статус территории, на которой располагается инженерная инфраструктура. Статус территории, на которых расположены межевые знаки.
Буферная территория	Статус водоохраной зоны. Статус лесополосы. Существующий юридический статус с внесением дополнений, касающихся рекомендуемого режима землепользования территории.
Восстанавливаемая территория	Изменение статуса в соответствии с целью восстановления территории – природоохранный статус или сохранение статуса сельхозземель с их переводом в категорию «пастбища, сенокосы».

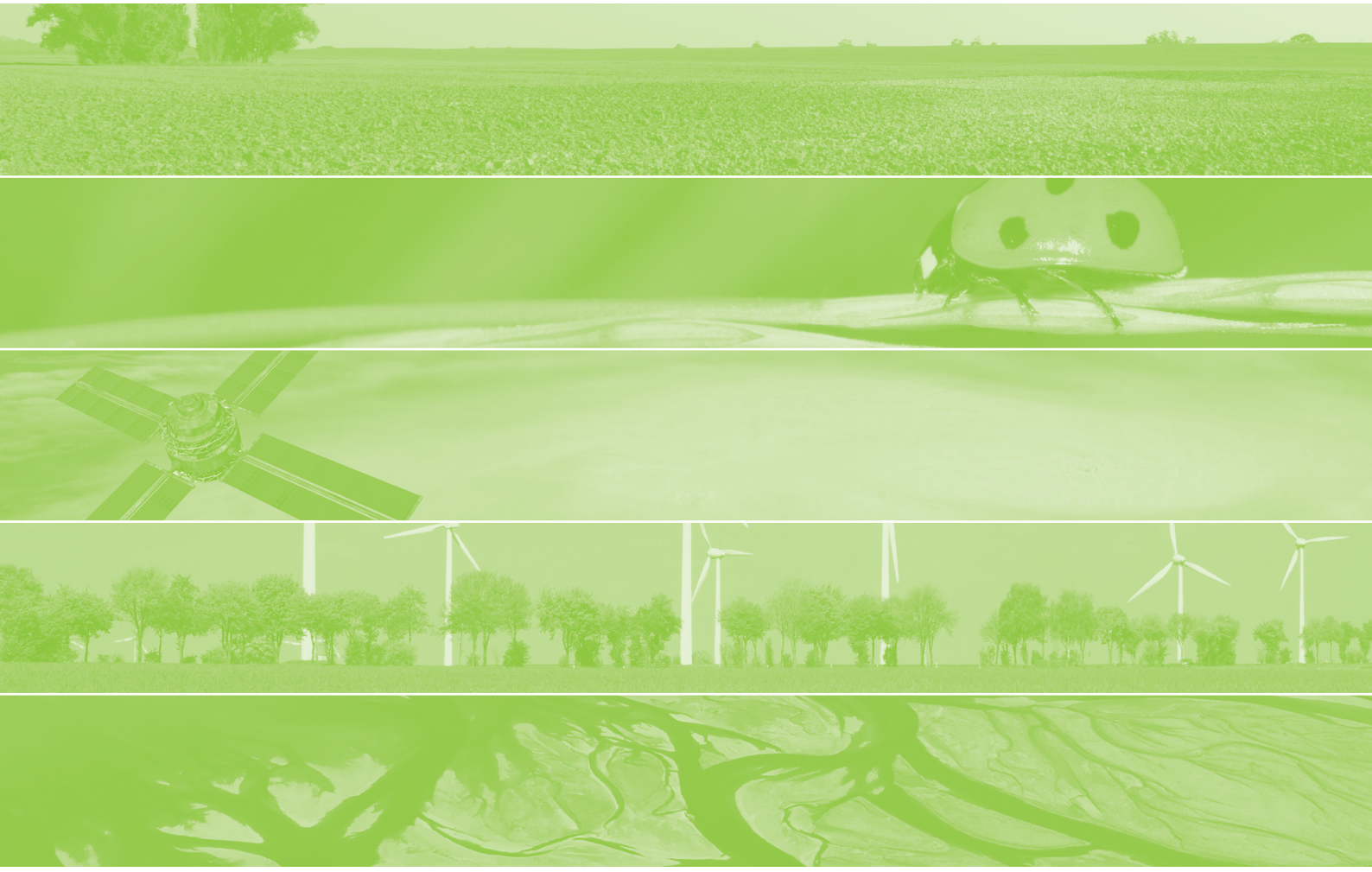
БИОЛОГИЧЕСКОЕ РАЗНООБРАЗИЕ

Что такое биологическое разнообразие?

Биологическое разнообразие лежит в основе жизни на Земле и отражает все разнообразие биоты – от генетического строения растений и животных до культурного многообразия.

Угрозы для биологического разнообразия

Сокращение мест, исторически пригодных для существования животных и растений, непосредственное уничтожение объектов природу, общая техногенная нагрузка на природу и чрезмерное рекреационное давление на окружающую среду определяют общее обеднение видового и популяционного состава природы области. Это требует принятия неотложных мероприятий, направленных прежде всего на обеспечение охраны мест существования и произростания объектов растительного и животного мира, существенного повышения эффективности контроля за их использованием.



Alterra is part of the international expertise organisation Wageningen UR (University & Research centre). Our mission is 'To explore the potential of nature to improve the quality of life'. Within Wageningen UR, nine research institutes – both specialised and applied – have joined forces with Wageningen University and Van Hall Larenstein University of Applied Sciences to help answer the most important questions in the domain of healthy food and living environment. With approximately 40 locations (in the Netherlands, Brazil and China), 6,500 members of staff and 10,000 students, Wageningen UR is one of the leading organisations in its domain worldwide. The integral approach to problems and the cooperation between the exact sciences and the technological and social disciplines are at the heart of the Wageningen Approach.

Alterra is the research institute for our green living environment. We offer a combination of practical and scientific research in a multitude of disciplines related to the green world around us and the sustainable use of our living environment, such as flora and fauna, soil, water, the environment, geo-information and remote sensing, landscape and spatial planning, man and society.

More information: www.alterra.wur.nl/uk