

## Proposed priorities for Cohesion Policy in Hungary – Biodiversity

### Programme 1

**Name of the programme:** Changing existing infrastructure to reconstruct natural habitats and natural water regimes

(In this case infrastructure can be: dams, sluices, canals, drainage canals, pump stations and roads)

#### **Problem statement:**

The aim of these man-made installations which change the water balance is to make a particular place suitable for a chosen human activity. Consequently, because of the hydrological regime the original ecological system changes (water cover, water table, surface run-off, micro and meso-climate) and this process also results in the partial or total decline or change in the biodiversity. These changes also have effects on the extended environment and affect its ecological state and its biodiversity.

The construction and reconstruction of the infrastructure demands one-time resource use, their maintenance and running need it regularly, and the environment shoulders the burden of it. In most cases these investments are from public funds and their running is also done by public service from public finance but it serves for private use. As the decline of biodiversity is a negative externality, the public pays twice during the process.

#### **The aim of the programme:**

To increase biodiversity and to contribute to the aim of halting biodiversity loss by 2020

#### **Objectives:**

- Rehabilitation of wetlands
- To multiply the number and to expand the area of wetlands
- To improve the ecological system's coherence
- To improve the multi-functional and environmentally-friendly use of land e.g.: reintroduce traditional land use practices of flood plains
- To promote changes concerning land use patterns of low fertile arable lands (in Hungary: lands with low golden crown value)
- To improve the habitat mosaic patterns of the land
- To promote the fulfilment of climate-adaptation tasks
- To improve the water balance
- Flexible treatment of the consequences of unpredictable water run-off due to climate change e.g.: floods and drought

#### **Eligible project activities to be supported within the programme**

- Revitalization of small watercourses, restoration of natural meanders
- Expanding controlled flood-plains – to ensure natural water regimes
- Moving drainage canals in order to protect natural habitats which are regularly covered by water

- Finding means of multi-functional land use for land with excess surface waters
- Implementing water management methods which help to change land use patterns (preparation of the transformation of arable land with low fertility to grass-, forest-, wetland and semi-natural fish-ponds)
- Creation of wetlands with the intention of water retention

### **Sustainability criteria for taking part in the programme**

- Projects which are included in the programme have to decrease the burden on the environment as a consequence of resource use
- The energy consumption of different activities has to be decreased by at least 30%, including the energy consumption demand of different cultivation types, which occur during the improvement, and also the energy demand of the maintenance and running of the reconstructed infrastructure.
- The maintenance cost of the new infrastructure has to be lower than that of the current ones.
- Reconstruction has to be based on self-regulatory capacity of ecosystems, to avoid regular human intervention. Only periodical interventions are allowed.
- Local materials have to be used (local in this context means the closest available) in order to decrease the need for transportation
- Construction has to be adjusted to the environment.
- Construction has to be designed for the whole life cycle concerning energy and material consumption and waste management.
- The use of toxic substances has to be excluded totally.
- The development has to improve the water balance, 10% of the concerned land has to be regularly water covered, 30% has to be wetland, such as swamps, forest wetland, mud flats, bog, wet meadow, etc.
- The diversity of the habitat has to be increased and in the area where the construction takes place a minimum of two new habitats have to be created.
- The diversity of the species has to be improved by at least 50% compared to the current range.
- The development is not allowed to be carried out on those areas where a habitat can be found which belongs to the Habitats Directive, except if it is not endangered because of the construction.
- The development must not decrease employment, and those ones are favoured which increase labour intensity.
- Before and after the programme, obligatory monitoring activities must be undertaken for 10 years. The expenses for this are to be included in the financial support.
- As far as the indicators are concerned an annual report about the results has to be handed in for 10 years following the construction.
- Those who are participating and affected by the work have to be involved in the preparation of the plans, and transparency has to be ensured.

### **Compulsory monitoring during the programme**

Before the programme is launched a survey has to be carried out about the habitat and the diversity of species in the area. The results must be recorded as the initial state.

- Indicator species are needed, the type of the habitats has to be taken into consideration and when indicators appear they have to be monitored.
- An annual survey is needed of the biodiversity.
- Land use which is involved in the construction has to be surveyed and recorded.

- As the project is finished the new land use circumstances have to be recorded.
- The energy needs of the existing land use have to be examined, including the different types of land use and the energy demand of the already-existing infrastructure.
- After the development the evolution of total energy demand needs to be monitored.

### The indicators of the programme and the required targets

- The total direct and indirect energy consumption of the land use.  
Target: 30% energy input decrease in the total energy consumption.
- The proportion of land constantly under water which is directly involved in the construction - 10%
- The proportion of wetlands which are directly involved in the construction - 30%
- Species' diversity growth - 50%
- Emergence of flagship indicator species on certain areas - minimum 3 species per year

**Required finance:** 55 billion HUF ≈ 190 million EUR

#### Justification of costs and savings:

- We calculate the mitigation of seasonal inland water problems on 20 000 ha by creating 2 000 ha permanent inland water, 6 000 ha wetland, and 12 000 maintained cropland. The cost of levelling soil is 1.5 million HUF/ha. For 20 000 ha, this makes 30 billion HUF altogether.
- Changing, reconstructing and creating additional infrastructures, such as dams, sluices, canals, drainage canals, pump stations and roads would cost approx. 25 billion HUF. These facilities are partly needed to maintain constant water cover, or in other cases to change the water regime to rehabilitate the natural environmental conditions.
- The total energy input into the systems can be decreased by 30% because of the 30% wetland which is a self regulatory ecosystem.

## Programme 2

**The name of the programme:** Redesigning and changing public lighting and other light sources to benefit the environment

#### **Problem statement:**

Public lighting is related to several environmental problems. The phenomenon of light pollution is the most well-known one. Entomologists claim that light sources primarily attract insects according to the different spectrums of light emissions. Insects flying towards light usually die for various reasons. Since light attracts insects from an area of several kilometers, particular species which live near lighted places are likely to disappear. Other species which are attracted by the insects such as, birds, reptiles, amphibians and small mammals can also fall victim to public lighting which makes the situation even worse. This causes whole food chains to evolve, resulting in the emergence of predators, scavengers, etc. Since lighting operates simultaneously with traffic infrastructure many animals die because of traffic collisions.

It also has to be noted that energy-saving light bulbs may have adverse impact on biodiversity. The attraction of the light sources depends on the ultraviolet radiation of the light spectrum but even blue light has a significant attractive effect. Bulbs emitting common yellow light are less attractive and the red spectrum is hardly noticed by insects. Recently the replacement of the bulbs used so far has started and the newest generation lighting is LED-based. LED light has low ultraviolet radiation but its blue spectrum is high, and as a result it also attracts insects. This is a representative example of when efficiency is increased without taking biodiversity into account, so it does not improve the latter's situation.

However, the three problems can be handled simultaneously if the light fittings are designed properly. The use of LED bulbs can decrease energy consumption, and the installation of light fittings with light directing plates can focus the light which can also reduce light pollution and lessen the attraction of insects. A yellow or slight red lamp-cover can significantly decrease the attraction of insects, although it also makes the light weaker.

### **The aim of the programme:**

To increase biodiversity and to contribute to the aim of halting biodiversity loss by 2020.

### **Objectives:**

- To decrease energy consumption
- To decrease light pollution
- To decrease the attraction of insects, and to hinder the evolution of secondary food chains and to decrease road deaths of insect-eating animals
- To create a biodiversity-friendly lighting culture and its prototypes

### **Sustainability criteria to take part in the programme**

- Fall in energy consumption compared to the previous situation by a minimum of 50%
- Decline in the maintenance and running costs by a minimum of 20%
- Installation of biodiversity-friendly light fittings - within one project minimum 5000 fittings installed. This should only happen in those places where it is justified e.g.: holiday resorts, suburbs, city peripheries, settlements near water, other sites in city peripheries e.g.: petrol stations.
- All three objectives have to be fulfilled at the same time.
- Can be implemented only if it replaces/improves former facilities which were not environmentally-friendly.

### **Eligible project activities to be supported within the programme**

- Manufacturing of biodiversity-friendly light fittings which decrease light pollution
- Installation and purchasing of biodiversity-friendly light fittings
- Exchanging of bulbs
- Compulsory monitoring

### **Compulsory monitoring during the programme**

- Recording of the initial situation of the biodiversity in the particular environment by the designation of flagship indicator species; Following the results over 10 years in the attracting environment, emergence of indicator species or growth in their population.

### The indicators of the programme and the required targets

- Fall in energy consumption compared to the previous situation by a minimum of 50%
- Decline in the maintenance and running costs by a minimum of 20%
- Emergence of 5 designated flagship indicator species out of 10 over 10 years
- 10% growth in the population of current indicator species over 10 years
- approx. 200 000-240 000 light fittings installed, approx. 500 000 GWh savings per year

**Required finance:** 12 billion HUF ≈ 41.5 million EUR

#### Justification of costs and savings:

- 3 W LED = 30-35 W incandescent
- The LED bulbs require much less wattage than the CFL or incandescent light bulbs, which is why LED bulbs are more energy-efficient and long lasting than the other types of bulb. We have to calculate the different brightness of LED. LED light is more focused, but there is no additional reflection. Achieving the same brightness, LED saves approx. 75% of energy. We also have to calculate that LEDs are designed for long-lasting operation (LED bulbs last up to 10 times longer than compact fluorescents, and far longer than typical incandescents – up to 80 000 hours), but their brightness will be lost during operation. We calculated 12 000 hours of operation, and with the same brightness after changing bulbs.
- 50% energy saving is a very careful estimate, but it can be met in any case.
- 20% savings in operational costs came from the fact, that, to have a 12 000-hour operational time we must change incandescent bulbs 7-8 times, while LEDs need changing on 2 occasions only.
- Concerning the total cost including the price of the lamp and the consumption:
- A 35 watt halogen lamp for 12 000 hours operation including 8 changes of bulbs costs 21 900 HUF, while a 3 watt LED including two changes of bulbs costs 3900 HUF.
- For public lighting we need 20 watts (6 bulbs x 3 watt). The price: 60 500 HUF including the light fitting. For a stronger lighting we need 60-150 watt, so the price can go up to 100 000-120 000 HUF.
- There is another option to reshape the light fitting while reusing or recycling the original fitting. For the mitigation of light pollution and insect attraction different lighting properties can be chosen: new LED bulbs are available in 'cool' white light, which is ideal for task lighting, and 'warm' light commonly used for accent or small area lighting.
- **A 50% financing intensity of total costs would mean 50 000 HUF support per light fitting, and would mean the installation of 240 000 fittings.**

### Programme 3

**The name of the programme:** Fostering the development of Green Infrastructure- GI - in rural areas

## Problem statement

Ecosystems work properly only in 10% of Hungary and in the rest 90% they are deteriorated to various extents. According to conservative calculations natural vegetation heritage can be found only in 2-3% of the country. It can be said that the diversity of habitats in Hungary is favourable thanks to the various types which exist, although most of them can be characterised as suffering from fragmentation and are endangered by the decreasing size. In particular, forest wetland, native alluvial forest, loess and sand forest and loess grassland associations are in an unfavorable situation. Degradation and fragmentation is also endangering the diversity of species. In Hungary the relatively high diversity of species comes from the fact that various elements of flora and fauna are accumulated in the Carpathian basin. This fortunate state is endangered by the isolation of habitats, because of the hindrance of the natural exchange of genes.

In view of the changes in the climate and the positive temperature anomaly experienced in Hungary, improvement of the coherence of natural habitats is crucial, and barriers and distances have to be overcome. The most obvious way is the rehabilitation of the habitats and ensuring their proper coherence.

The current land use is extremely unfavourable as far as climate change adaptation is concerned. Concerning land use, competitive agriculture prefers more extended and more intensive arable lands. All of these are highly unfavourable from the aspect of the climate because of the poorly-structured land cover. The developed structure has not only increased soil degradation but contributed to the isolation of natural habitats. Their coherence is also hindered by the increasing traffic infrastructure, especially by the rapid growth in the motorway network.

## The aim of the programme:

The EU Biodiversity Strategy in spring 2011 announced the development of a Green Infrastructure 'daughter' initiative (by 2012), as a key element to ensure the restoration of ecosystems and their services to mitigate climate change and adapt to its impacts. The programme aims to contribute to the implementation of the GI initiative.

## Objectives:

- To support adaptation to the consequences of climate change
- To increase natural habitats' coherence
- To improve the conditions of the natural exchange of genes
- To increase the stepping stone elements of the natural green corridor system
- To decrease soil degradation, deflation and erosion by ensuring constant land cover

## Sustainability criteria to take part in the programme

- Constant improvement in the permanent land cover
- Creation of green infrastructure formations which are self-regulated, fit the landscape and do not need maintenance in the long run
- Use of indigenous species during the reconstruction
- A halt to other activities which endanger the successfulness of the reconstruction
- The involvement of the concerned public and interested parties in the programme planning and preparation - transparency has to be ensured



### Eligible project activities to be supported within the programme

- Changing land use patterns of low fertility lands towards constant surface cover with grass and forests
- Creation of habitat types/plant associations adequate to the ecological conditions
- Rehabilitation of habitat-fragments, to reconnect and expand fragments
- Creation of landscape-adequate green corridors near roads with the aim of soil protection from deflation and improvement of the local climate
- Removal of barriers and other isolation factors which prevent connectivity

### Compulsory monitoring during the programme:

- Recording of the initial state of the biodiversity in the particular environment by the designation of flagship indicator species
- To follow the results over 10 years in the attracting area - emergence of indicator species or growth in their populations.

### The indicators of the programme and the required targets

- Constant improvement in the surface cover
- Emergence of half of the 30 indicator species over 10 years in those areas which are involved in the programme
- 10% increase in the number of the already existing species' population over 10 years

**Required finance:** 20 billion HUF  $\approx$  70 million EUR

### Justification of calculation:

- 1 hectare of GI element costs 500 000 HUF on average;
- 4000 ha GI elements would be satisfactory to achieve a visible and measurable improvement of biodiversity and connectivity.
- One project can target a 300-500 ha mosaic area in cooperation with stakeholders; 10-15 projects would be feasible in the various parts of the country.

## Programme 4

**Name of the programme:** Promoting Green Infrastructure-GI - in cities

### **Problem statement:**

On one hand cities are isolated islands which hinder the exchange of genes, on the other hand they offer a great variety of diverse conditions because of their mosaics. The closed built-up areas in the cities cut gene exchanging corridors, e.g.: watercourses flow across cities but the gallery forests do not 'accompany' them. The peaks of mountains and hills can form intact stepping stones but the ridges and the slopes are built-up. Some of the species have managed to adapt to city conditions very effectively but populations of several other species are unstable because of the small range of natural and semi-natural mosaics. Occasionally in some of the fragments species can appear in larger numbers but then they disappear as quickly as they emerged. In other cases the mosaics of closed natural habitats

can create refuges and because of the accumulation of the species they can be characterized by high diversity. The existence of these refuges is very fragile because of the ever-present environmental stress, and they are constantly exposed to invasion because of the high number of alien species living in cities. The environmental stress originates from air pollution, light pollution, traffic and frequent disturbance (visitors). One critical condition of the toleration of the stress is the local microclimate. Since climate change is manifested more extremely in cities ie. there are higher temperatures, the tolerance of species which live in natural fragments is endangered. People in cities also have to tolerate higher exposure to environmental stress like various other species, and the climate in the cities is also a basic condition for their stress tolerance. Because of this, the normalization of the city climate is crucial not just for humans but also for biodiversity.

### **The aim of the programme:**

To improve the conditions for adaptation to climate change in cities

### **Objectives:**

- To promote better adaptation to climate change by rehabilitating and expanding green areas in the cities
- To increase the coherence of natural habitats by the creation of other green areas
- To improve the conditions of natural gene exchange, and to mitigate the isolating effect of cities
- To conserve refuge-like stepping stone elements of the natural green corridor system through buffer zones and by keeping away invasive species
- To increase biologically active surfaces in the cities
- To extend green areas in order to decrease stress factors
- To mitigate stress generating activities

### **Sustainability criteria to take part in the programme**

- A 5% increase in the number of biologically active surfaces in the areas must be included in the project
- Creation of subsistent green areas which do not need maintenance
- Stress tolerant, indigenous species must be planted
- Local protection for natural fragments must be declared
- Management plans must be designed
- Monitoring activity is compulsory
- Those who are affected by and interested in the project must be included
- Announcement of the results to the community – transparency must be ensured
- Volunteers must be involved in the programme and to the results must be sustained by land stewardship groups

### **Eligible project activities to be supported within the programme**

- Creation of biologically active surfaces: green roofs, vegetated green walls, parks, wetlands, arboretums, botanical garden, closed bushes and avenues, installations providing water retention by using natural materials, school gardens, etc.
- The rehabilitation and reconstruction of refuge-like stepping stone areas and the creation of buffer zones
- The connection and expansion of habitat fragments



- Necessary interventions in the connectivity of regional ecological corridors
- Creation of stress-mitigating green corridors along roads
- The removal or moving of facilities which create barriers and cause isolation in order to ensure connectivity
- Compulsory monitoring

Compulsory monitoring during the programme:

- To record the initial state on a map, to survey the condition of natural and artificial green surface elements
- To record the results over 10 years - the emergence of indicator species, or growth in their population size

**The indicators of the programme and the required targets**

- Changes in the extension of habitat fragments under rehabilitation and reconstruction compared to their original state – 10% growth is the minimum
- The extension of biologically active areas in the percentage of the whole territory – 1% of the total area
- Emergence of half of the 30 indicator species over 10 years in those areas which are involved in the programme
- 10% increase in the population of the already existing species over 10 years
- The number of volunteers involved in the programme has to be minimum 0.1% of city's residents

**Required finance:** 150 billion HUF ≈ 520 million EUR

Justification:

*To create biologically active surfaces: green roofs, vegetated green walls:*

- 1 square metre costs 20 000 HUF on average including installation/insulation/plants
- 500 000 square metres costs 10 billion HUF

*To create parks, wetlands, arboretums, botanical garden, school gardens, etc*

- 1 ha costs 30 million HUF on average including change of soil, moving waste, rehabilitation of brown areas, pull down facilities, plant, plantation, etc.
- 1000 ha costs 30 billion HUF

*Installations providing water retention by using natural materials, rehabilitating small creeks, ponds, etc.*

- targeting 20 ha ponds, 30 000 metres of water courses
- 1 ha pond: 50 million; 1 metre water course: 1 million → 31 billion HUF
- costs include constructing and pulling down facilities, creating artificial water beds, dredging and moving sediments, levelling surface, rehabilitating meanders, etc.

*The rehabilitation and reconstruction of refuge-like stepping stone areas and the creation of buffer zones and connecting and expanding habitat fragments*

- target 300 ha
- costs 30 million/ha = 9 billion HUF



*To create stress-mitigating green corridors along roads, closed bushes and avenues*

- target 700 km long 2 metres wide
- 50 000 HUF/ square metre; cost includes moving concrete, changing soil, plants and planting
- 1 400 000 square metres = 70 billion HUF

*Compulsory monitoring included in all activities as 0.1%*

## Summary of the programme and overall indicators of the whole programme

Priority/ biodiversity	Types of indicators	Indicators	Milestone for 2016	Milestone for 2018	Milestone for 2022	
Changing existing infrastructure to reconstruct natural habitats and natural water regimes	<b>Output indicators</b>	Number of successful cases and the extension of area	2-3 cases	6-8 cases	12-15 cases	
			5-10 000 ha	30-35 000 ha	50-60 000 ha	
	<b>Result indicators</b>	Decreased energy input	5-10% in the total concerned area	20% in the total concerned area	30% energy input decrease in the total energy input in the concerned area	
			Enhanced biodiversity in the concerned habitats	2% in total	5-7%	10% of the concerned area is constant water body
				5-10% in total	20% in total	30% of the concerned area is wetland
				10%	20%	Species' diversity growth - 50%
				-	8-10	Emergence of flagship indicator species on concerned areas - 20-25
Redesign and change of public lighting and other light sources to benefit the environment	<b>Output indicators</b>	Number of changed light fittings	50 000	100-120	approx. 200 - 240000 light fittings,	

	<b>Result indicators</b>	Decreased energy input			minimum 50% of the previous consumption	
			100 000	200-250 000	approx. 500 000 GWh savings per year	
		Enhanced biodiversity	-		2	Emergence of 5 designated flagship indicator species out of 10 over 10 years
					5%	10% growth in the population of current indicator species over 10 years
To foster the development of Green Infrastructure-GI - in rural areas	<b>Output indicators</b>	The total area concerned by the GI development within the programme	10 000 ha	20 000 ha	100 000 ha	
	<b>Result indicators</b>	Enhanced biodiversity	-	7-8	Emergence of 15 - half of the 30 designated flagship indicator species over 10 years in those areas which are involved in the programme	

		Better connectivity, decreasing segregation – population growth	-	5%	10% increase in the number of the already existing species' population over 10 years
To promote Green Infrastructure-GI - in the cities	<b>Output indicators</b>	number of people benefiting from the programme	200 000	500 000	1 000 000 people have benefited from the scheme
	<b>Result indicators</b>	Enhanced stress toleration by more resilient habitat fragments	2-3%	5%	10% change in the extension of habitat fragments under rehabilitation and reconstruction compared to their original state
		better tolerance of climate change effects	0.2	0.5	1% extension of biologically active areas in the percentage of the whole territory
		Enhanced biodiversity	-	7-8	Emergence of 15 - half of the 30 designated flagship indicator - indicator species over 10 years in those areas which are involved in the programme

	Better connectivity, decreasing segregation – population growth	-	5%	10% increase in the number of the already existing species' population over 10 years
	enhanced environmental consciousness	Number of the volunteers involved in the programme has to be minimum 0.1% of residents	Number of the volunteers involved in the programme has to be minimum 0.1% of residents	Number of the volunteers involved in the programme has to be minimum 0.1% of residents

Prepared by: Dr. Iván Gyulai