

Development of Green Infrastructures in Latvia through initiative "Place a Stone in a Stream"

Andris Urtans,
Nature Conservation Agency, Latvia
Andris.urtans@daba.gov.lv
Roosta, 07.03.2012

General Information about waters in Latvia

- Area of Latvia 64 00 sq.km
- 12.4 thousand watercourses and 2000 lakes
- Water (lakes & rivers) covers about 2,4% of Latvia
- Total length of rivers about 37 500km
- 777 streams longer than 10 km
- About 30% of total stream length are meliorated (Deepened, straightened etc)
- 17 rivers longer than 100 km
- 2 rivers longer than 300 km
- Population about 2 mio,
- Beavers 100.000



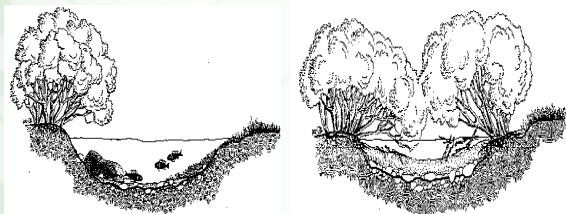
River network in Latvia



Defining Green Infrastructure Concept for Waterways

- "Life support" functions provided by the rivers with an emphasis on river/ coastal buffer zone interconnectivity to support long-term sustainability of connected ecosystems and adapt or mitigate Climate Change induced changes

River as an open System. Differences of historically extensive management and Non-intervention approach



Visualisation of Non-intervention approach in rivers. Eutrophication, Sedimentation, Tunnelling, Beaver



Results of Non-intervention approach in rivers & coastal zones

- Overgrowth of former coastal meadows and extensive agricultural areas with pioneer bush and short life *Alnus incana* stands decreased general coastal diversity and buffer zone efficiency.
- Increase of forest felling in the catchment added with beaver activities resulted in coastal erosion and siltation resulting in disappearance of most biodiverse gravel- stone stretches defined as EU Habitat No.3260

Initiative "Place a Stone in a Stream"



Our Rivers becomes silent

(photo B.L. Madsen presentation)



Listen :
Living river feature –
You can hear it !!!

The Aim of the Initiative :

- Support and increase Biodiversity in rivers,
- Improve river functionality and selfpurification capacities,
- Improve functionality of river Coastal zone and shape river landscape,
- Adapt possible Climate Change impacts on to the river ecosystem,
- Raise citizen awareness and motivation through practical involvement.

Stone Phenomenon

- Stones as a diverse microhabitats
- Stone surface covered with "biofilm" acting as wastewater treatment unit
- Stones as an mechanical aeration units (especially during summer periods with low natural oxygen saturation)
- Possible innovative Climate Change adaptation tool.



Stone surface

- Covered by erosional sediment stone surfaces becomes inactive,
- 5 – 10 sq.m riffle area fully transforms organic load generated by one person



Foto: L.Engel

Different scale activities: a single fallen tree can become an obstacle



Different scales of Activities: clogged, overgrown river stretches



Another scale. Reopening migration for fish, invertebrates and canoeists. Salacgriva fishermen Club in Vitrupe, 2010.g.october



Low cost, locally motivating, visible result



Involvement of Local people and their knowledge



State - Volunteers Partnership



Sun, good company and visible result seen by physicists, Estonian environmentalists, NGOs, Head of Municipality



The block contains four photographs arranged in a 2x2 grid. The top-left photo shows a group of people standing in a river, some holding long poles. The top-right photo shows people wading in a river, possibly planting or measuring. The bottom-left photo shows people working on the riverbank. The bottom-right photo shows people working in a shallow part of the river.

Vidzeme Planning Region Administration and representatives from Mass media in River Vaive 2011



A large group of people, including officials and media representatives, are posing for a group photo on a riverbank. Some are standing, some are kneeling or sitting in the shallow water.

Education and Voluntary River Quality Assessment scheme promoting involvement in practical activities



The block contains four photographs. The top-left photo shows people sitting on the ground near a river, possibly receiving education. The top-right photo shows people standing near a river, engaged in an activity. The bottom-left photo shows people gathered around a table outdoors. The bottom-right photo shows people sitting at a table, possibly in a classroom or meeting.

Leaflet produced on processes in rivers and how to install stones



The block features a leaflet with a diagram of a river cross-section and numbered steps. The diagram shows a river with stones and numbered sections 1 through 5. Below the diagram is a list of steps in Latvian.

1. Izvērtējiet griezumu: rādītā, kurā ir vislielākā erozijas draudze.
2. Aizsargājiet griezumu: izvērtējiet, kādi ir griezuma apstākļi, kā to ietekmē pie šķērsošanas, kādi ir griezuma apstākļi, kādi ir griezuma apstākļi.
3. Izvērtējiet griezumu: rādītā, kurā ir vislielākā erozijas draudze.
4. Aizsargājiet griezumu: izvērtējiet, kādi ir griezuma apstākļi, kā to ietekmē pie šķērsošanas, kādi ir griezuma apstākļi.
5. Izvērtējiet griezumu: rādītā, kurā ir vislielākā erozijas draudze.

Many enjoy visibility of result. Initiative is supported by the UNESCO Latvian National Commission



The block contains two photographs. The left photo shows a river flowing through a lush green landscape. The right photo shows a group of people sitting on a large log in a river, possibly engaged in a recreational activity.

Managing Green infrastructures in larger scale. River Venta Waterfall about 1920 and in 2011



The block contains two side-by-side photographs. The left photo shows the River Venta Waterfall in 1920, appearing as a wide, shallow stream. The right photo shows the River Venta Waterfall in 2011, appearing as a more defined waterfall with a large pool of water.

Step by step river regains its former features



Specific job with specific results



Renovation of former valuable river stretches



Sediment saturated pebbles before and after treating



New 2,6 hectares of spawning areas for those not so successful to get upstream. Hot Attraction "The flying Fish of Kuldiga city"



Results

- Reopening of silted stones and their clusters or installation of new stones provides multi level impacts on water chemistry, biological diversity and general quality.
- According to literature 5 – 10 sq.m riffle area transforms organic matter generated by one person, i.e. acts as local wastewater treatment unit.
- More diverse riverside landscape.
- Innovative low cost and locally viable Climate Change adaptation tool.

**Future Goal:
Introduce Initiative in all rivers of Latvia**

Expanding our Message. President of the Republic of Latvia Dr. V. Zatlers is introduced to the Initiative "Place a Stone in the Stream" 30.05.2010.



Developments in Estonian nature conservation

Hanno Zingel
Estonian Ministry of Environment
March 7, 2012

1910 – the classical nature conservation started in Estonia

* Vaika bird sanctuary was established on August 14, 1910 on the initiative of the local lighthouse keeper Artur Toom

* Vilsandi bird sanctuary is the first nature conservation area in the Baltic states



Areas/objects under protection in Estonia

Today, 490,000 ha of Estonian land, ca 18% of the territory, and 717,800 ha of the sea, is under protection



- 5 national parks
- 132 nature conservation areas
- 148 landscape conservation areas
- 118 areas with old protection rules
- 343 limited conservation areas
- 1038 species protection sites
- 544 protected parks and forest stands
- 1203 protected single objects of nature

569 protected species (categories I to III)

MINISTRY OF THE ENVIRONMENT

Nature Conservation regulation in Estonia

Nature Conservation Act (2004)



Protection rules for each protected area (adopted by Governmental Degree)

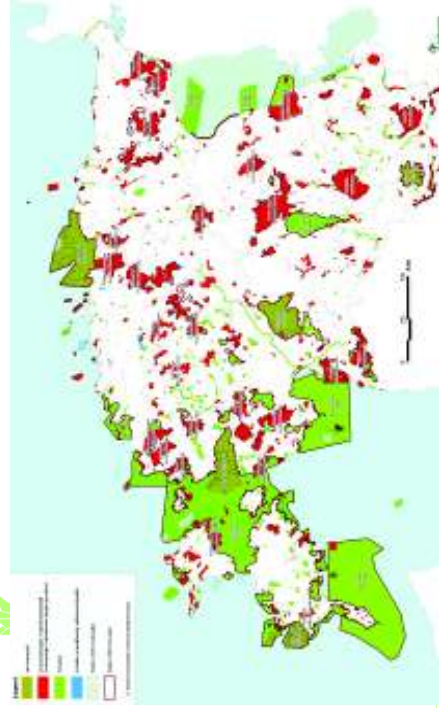
Management plans for each protected area adopted by Environmental Board

* Species action plans (ministerial degree)

* New: action plans for habitat types: first for semi-natural habitats)

MINISTRY OF THE ENVIRONMENT

Protected areas in Estonia



Compensations at national level

- * Reduced land tax (50 % or 100%)
- * Acquisition of land by state
- * Nature management support: restoration and management of semi-natural habitats 2001-2006, since 2007 mostly from EAFRD



MINISTRY OF THE ENVIRONMENT

EU support



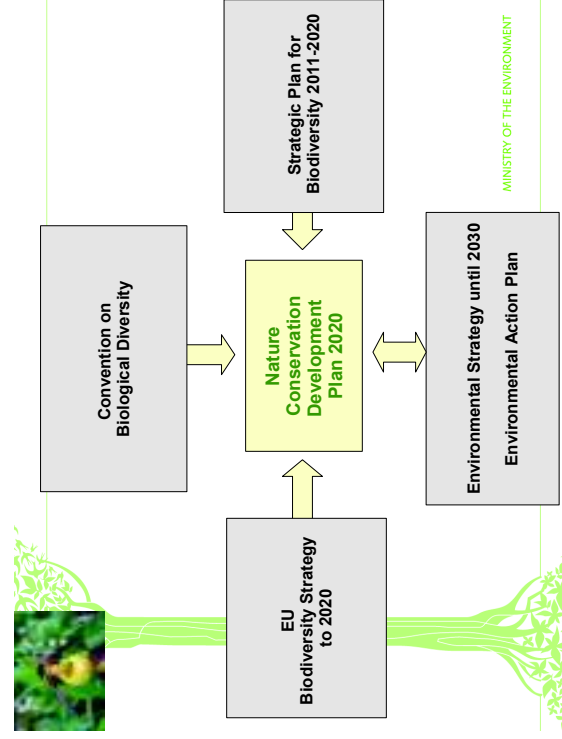
- EAFRD, ERDF, Life+
- Natura 2000 support to private forest owners, in 46,000 ha
- Natura 2000 support to agricultural land users, 22,000 ha
- Support for maintenance of **semi-natural habitats** (in N2000), in 25,000 ha

MINISTRY OF THE ENVIRONMENT

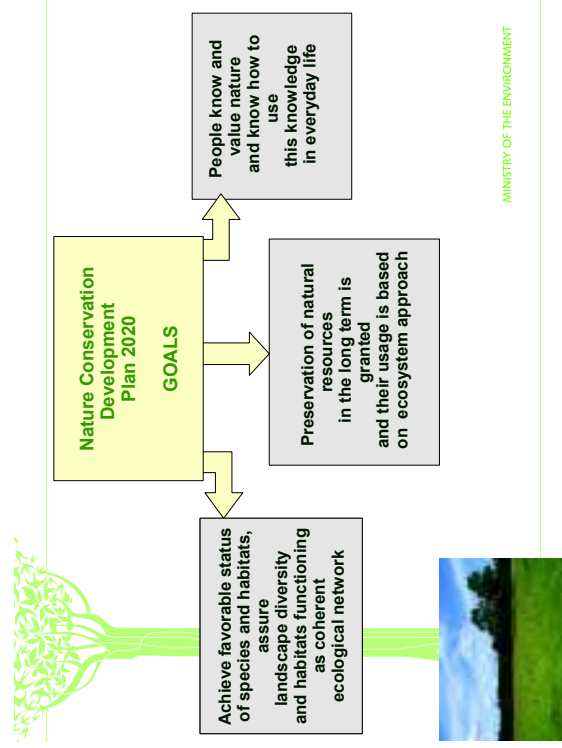
Compiling Nature Conservation Development Plan

- * Planned adoption first half of 2012
 - * Incorporating CBD and EU biodiversity 2020 strategic goals:
- Main target: Halting the loss of BD and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global BD loss**
- Target 2: By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems**

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Goal 1: species, habitats, landscapes, coherence ...

- Favorable status of species and habitats
- Landscape protection
- Conservation management and Natura 2000
- Gathering, keeping and disseminating nature info
- International cooperation on biodiversity protection
- Compensations for restrictions and supporting nature conservation works



Goal 2: Preservation of natural resources ...

- Use of non-renewable and renewable resources
- Impacts of transportation; impacts of climate change
- Biosafety and GMOs
- Impacts of renewable energy
- Taking into account ecosystem services in resource use

Goal 3: People know and value nature...

- Nature education
- Awareness rising
- Nature conservation science
- Nature tourism



in Natura

Nature conservation Development Plan and green infrastructure

- Taking measures for **core areas** of green infrastructure – protected areas and Natura 2000 network (compilation and implementation of management plans, restoration activities etc)
- Promoting the integration of nature conservation into sectors
- Promotion of biodiversity values outside protected areas
- Assessing and taking into account the ecosystem services
- Assessing and promoting coherence of green infrastructure (e.g. if sufficient for species movements)
- Promoting better contribution and cooperation by agri and forestry sectors (def high nature value areas, continuing/widening biodiversity related support schemes etc)

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Thank you for your attention!



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The Green Belt

The longest green network through Europe?

Jörg Schmiedel, BUND / FoE Germany
 Seminar "Protected areas as part of Green Infrastructure"
 7 March, 2012

www.europeangreenbelt.org
www.balticgreenbelt.net
www.balticgreenbelt.de






How it all began ...



Opening of inner-German border
 9 November 1989

Green corridor
 1960s - 1989




How it all began ...

- The fall of the iron curtain
- Valuable natural areas ...
- ... and engaged people to safeguard them

→ THE GREEN BELT






How it grew to what it is...

- Activities and activists throughout Europe
- A common vision
- Regional meetings

→ EUROPEAN GREEN BELT






The European Green Belt

- More than 12.000 km of natural areas, connected all through the continent
- 24 countries, uncountable habitats
- Also some cultural values






The European Green Belt

- Special value for tourism (not only nature tourism)

→ Infrastructure for people

→ The Green Belt's assets generate income



The Baltic Green Belt




- From Russia to Germany along the coast
- Underwater habitats
- Valuable and diverse, with special importance for migrating species






Connectivity




- There is probably no organism that wanders along the whole extent
- The Green Belt still hosts important stepping stones for migrating birds
- Serves very important connectivity functions on regional scale




Connectivity: Balkan Lynx recovery program




- The Balkan Lynx survived thanks to the iron curtain
- Less than 100 individuals
- The Green Belt connects its habitats and prevents genetic isolation




Reserve functions




- Retreat for many rare species
- Special value, because it incorporates many of Europe's habitats
- Even some endemics





Green Belt activities





- Conservation
- Communication
- Lobbying
- Work for a contiguous belt







Is it a success?




Yes!



But ...

Why does it work?

Logo: european greenbelt BUND

- A consistent concept
- Uniqueness
- Committed partners
- Focus not only on nature conservation
- Intensive communication

... but of course there are still a lot of things that could be better



Tänan väga!

Logo: european greenbelt BUND

Any questions?

Jörg Schmiedel
BUND Mecklenburg-Vorpommern
Wismarsche Str. 3
D-18057 Rostock
Tel. +49-381-2015755
joerg.schmiedel@bund.net
www.balticgreenbelt.de



PRACTICAL SOLUTIONS DESIGNATING GREEN INFRASTRUCTURE

Prof. Kalev Sepp
Estonian University of Life Sciences

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WHY A GREEN INFRASTRUCTURE?

- Loss of landscape **connectivity**: a new serious threat to further survival of many wildlife species
- Changes in nature conservation approaches: Species protection >>> Habitat conservation >>> **Managing the connectivity** (agricultural landscape, forest, etc)
- Multi-functionality of the Green Infrastructure: climate change, ecosystem services etc
- **Greening** urban planning, road constructions etc

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WHY A GREEN INFRASTRUCTURE?



In Urban areas Green infrastructure reduces....

- Flooding
- Erosion
- Stormwater runoff volume
- Stormwater pollutant loadings
- CSOs
- Gray infrastructure operation, maintenance, energy and treatment costs

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WHY? BACKGROUND - POLITICAL

- By adopting the **Pan-European Biological and Landscape Diversity Strategy** in 1995, the development of ecological networks (the Pan-European Ecological Network) became the priority nature conservation strategy in Europe
- The **Sixth Ministerial Conference "Environment for Europe"** in Belgrade in 2007 represented a watershed for the development of a Pan-European Ecological Network - **Green infrastructure since then**
- Developing **ecological connectivity** is one of the recommendations of the **CBD Conference** of the Parties in Nagoya in October 2010.

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WHAT IS GREEN INFRASTRUCTURE?

- **Green Infrastructure** is a strategically planned and delivered network of **high-quality green spaces** and other **environmental features**. It should be designed and managed as a multifunctional resource capable of delivering a wide range of **environmental and quality** of life benefit local communities
- **Green Infrastructure** includes **forests, rivers, coastal zones, parks, eco-corridors** and other natural or semi-natural **features** which constitute key elements for the provision of ecosystem services

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WHAT IS GREEN INFRASTRUCTURE?

Green Infrastructure is about **maintaining, strengthening** and **restoring** ecosystems – investments that often provide multiple benefits.

It should explicitly serve the following purposes:

- (1) Strengthening the **functionality** of ecosystems for continued delivery of goods and services.
This includes increasing the resilience and restoration of ecosystems and the maintenance of water and carbon cycles;
- (2) Combating biodiversity loss by increasing spatial and functional **connectivity** between existing natural areas and improving landscape permeability.

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GREEN INFRASTRUCTURE COMPONENTS

- a) **Healthy ecosystems** inside and outside a coherent network of protected areas (Natura 2000) with their buffer zones; such as floodplain areas, wetlands, extensive grasslands, coastal areas, natural forests etc.;
- b) **Multifunctional zones** where the way land is used helps maintaining or **restoring** healthy ecosystems;
- c) Natural **landscape features** such as small water courses, forest patches, hedgerows which can act as eco-corridors or stepping stones for wildlife;



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GREEN INFRASTRUCTURE COMPONENTS

- e) **Artificial features** such as eco-ducts or eco-bridges, or permeable soil covers that are designed to assist species movement across insurmountable barriers (such as motorways or paved areas);
- g) Areas where measures are implemented to improve the general ecological quality and **permeability** of the landscape;
- h) **Urban elements** such as biodiversity-rich parks, permeable soil's cover, green walls and green roofs, hosting biodiversity and allowing for ecosystems to function and deliver their services. This should also connect urban, peri-urban and rural areas.



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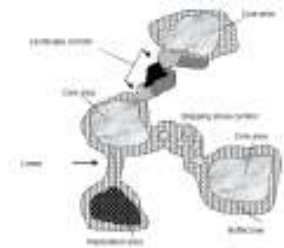
Is the Green Infrastructure a new concept?
What we can learn from our previous experiences?

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BACKGROUND: THE ECOLOGICAL NETWORKS CONCEPT

- Ecological networks' main goal is to conserve biodiversity by **maintaining** and **strengthening** the **integrity** of ecological and environmental processes;
- Ecological networks are based around the idea of **core areas**, **ecological corridors**, **buffer zones** and restoration areas
- They are designed and managed in such a way as to preserve biological diversity and to **maintain or restore** **ecosystem services** through the interconnectivity of its physical elements within the landscape



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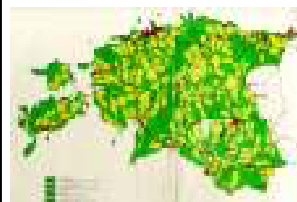
BACKGROUND: HISTORY

- The concept of ecological networks is not new; the model has developed over the **past 35-40 years**
- Beginning in the 1970s and 1980s in countries where **a strong land use planning tradition** had created the institutional environment for allocating functions at the landscape scale in the context of increasingly fragmented European landscapes
- The **concept** is the translation of ecological knowledge on fragmentation processes in the landscapes of Europe and its consequences for populations of natural species

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SPATIAL PLANNING, 1983, NETWORK OF COMPENSATING AREAS AT SCALE 1: 200 000



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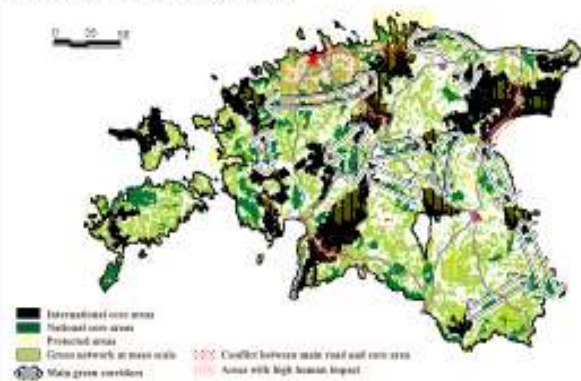
GREEN NETWORK IN ESTONIA

- Since the mid of 1990s we have a legislative and political support for ecological network applications (Act on Building and Planning, 1995, Act on Planning, 2002)
 - State level
 - County level
 - Municipality level
- The long-term National spatial strategy "Estonia – Vision 2010" included the "Green Network" chapter and also Vision 2030 will include themes related to Green Infrastructure.

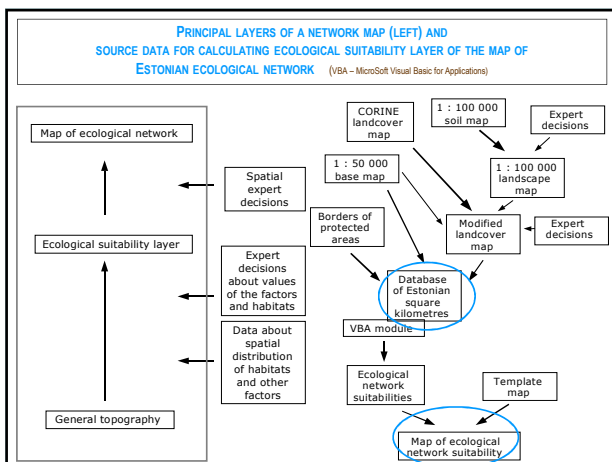
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ESTONIAN "GREEN NETWORK" ACCORDING TO "ESTONIA - VISION 2010 (JAGOMÄGI, SEPP 1999)



PRINCIPAL LAYERS OF A NETWORK MAP (LEFT) AND SOURCE DATA FOR CALCULATING ECOLOGICAL SUITABILITY LAYER OF THE MAP OF ESTONIAN ECOLOGICAL NETWORK (VBA – Microsoft Visual Basic for Applications)



ECOLOGICAL NETWORK VALUES OF HABITATS (LANDCOVER CLASSES) IN ESTONIA

• Constructions	0.01	• Coastal lagoons	1.9
• Peat extraction sites	0.05	• Coniferous forests on mineral soil	2.0
• Suburban areas	0.1	• Salt marshes	2.2
• Fields	0.2	• Bogs	2.4
• Complex cultivation	0.3	• Moist grasslands	2.6
• Plantations	0.4	• Broad-leaved and mixed forests on mineral soil	3.0
• Wooded agricultural land	0.6	• Wooded fens and bogs	3.4
• Scrubs	0.9	• Riparian zones	3.5
• Sparse vegetation	1.0	• Littoral marshes	3.6
• Inland water bodies	1.2	• Fens	4.0
• Coniferous forest on peat	1.3	• Coastal dunes	4.5
• Heath	1.4	• Inland dunes	5.0
• Other grasslands	1.5	• Boreal coastal meadows	6.0
• Broad leaved and mixed forests on peat	1.8		

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ECOLOGICAL NETWORK VALUES OF THE DENSITY OF LINEAR FEATURES

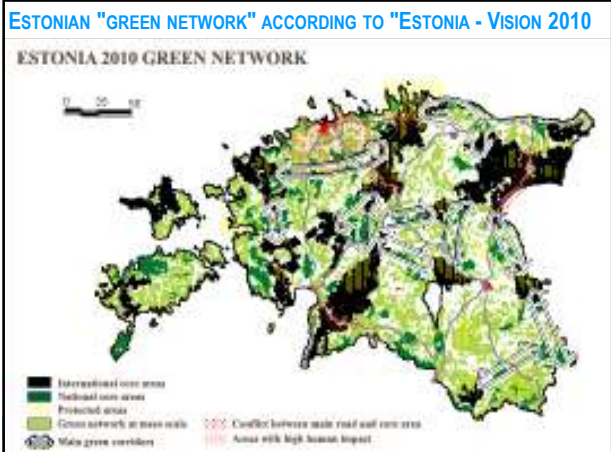
• Seacoast	1.6
• Landcover borders	1.5
• Coastline of larger [$>1\text{km}^2$] inland water bodies (incl. rivers wider than 100m)	1.4
• Contour lines [recalculated to $\Delta h=20\text{m}$]	1.3
• Watercourses	1.2
• Roads	0.5

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SUITABILITY AREAS FOR THE ECOLOGICAL NETWORK IN ESTONIA





LEGISLATION AND ADMINISTRATION

- The Governmental decree for second phase of county planning (1999-2004) "Defining environmental conditions for the development of land-use and settlement structure"
 - Green Network
 - Valuable cultural and historical landscapes
- Responsible unit: Department of Strategy and Planning, MoE, since 2004 in MoI
- We have a detailed methodology for defining green network at county level (Jagomägi, Sepp 2002)

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PURPOSES OF DESIGNING OF GREEN NETWORK

- The objective of planning the green network on the county level is not to define a large-scale 'green surface' and leave it out of use, but, first and foremost, to guarantee the naturally, environmentally, socio-economically grounded space structure, based on the location of different infrastructures and needs analysis of society
- To complete functionality of the network of protected areas, connecting them into a complete system with natural areas

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THE FOLLOWING MAIN PURPOSES WERE STATED

- To shape the spatial structure of natural areas in the most reasonable way considering the ecological, environmental protection, economic and social aspects
- To complete functionally the network of protected areas, connecting them into a complete system with natural areas;
- To protect valuable natural habitats and preserve the migration routes of wild animals, and valuable landscapes
- To soften, compensate, and forestall the anthropogenic impact on nature, to contribute to sustainable development strategy;
- To offer the possibility of nature-friendly management, living styles and recreation by ensuring spatial accessibility to natural areas

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THE FOLLOWING MAIN PURPOSES WERE STATED

- To promote nature conservation outside protected areas;
- To minimise future conflicts of interest incorporating different sectors (forestry, agriculture, transport, recreation) through spatial planning
- To guide settlement and land use structure
- To preserve the natural self-regulation ability of the environment
- To support international and transboundary co-operation

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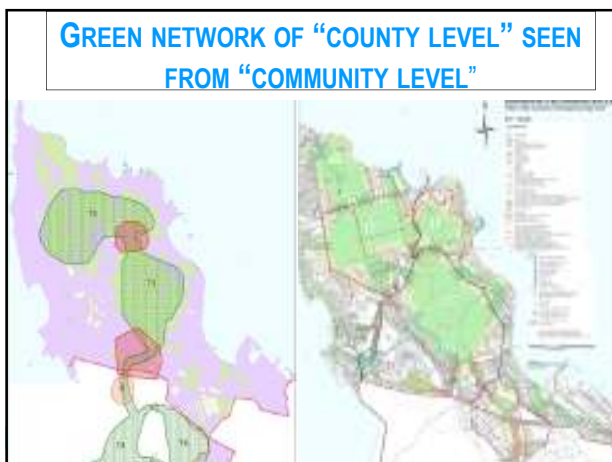
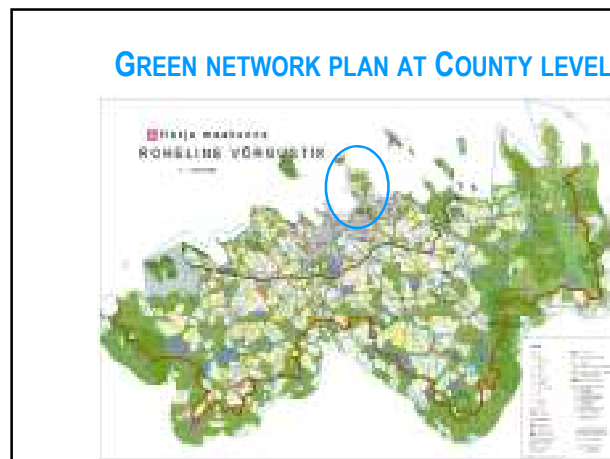
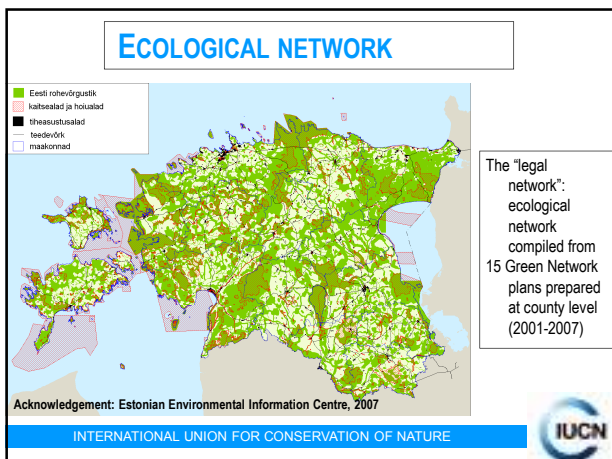
METHODOLOGY

Criteria for designation structural elements

- Nature conservation and environmental protection values, threats, conflicts
- Morphometrical parameters of the elements
 - core areas – territorial extent
 - corridors – wideness
- Ecological, environmental, socio-economic landscape peculiarities
- Distribution of species and their habitats

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SPATIAL PLANNING AT NATIONAL AND COUNTY LEVEL

- Necessary land use conditions and limitations were set on core areas and corridors (restrictions, codes of practice, environmental measures, regimes etc.)
- It is important to determine and reach agreement on the list of land use conditions which apply

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RESULTS

- All 15 counties in Estonia have defined and approved green networks at **county level**
- Local authorities have started to define and several (ca 90) have approved the green network at **commune level** (including towns Tallinn, Tartu, Pärnu – thematic planning)
- By 2011, the Green Network had been addressed in 87 comprehensive plans; ca 40% of municipalities

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LESSONS LEARNT

- A **wide interpretation** of the concept of Ecological Networks has advantages:
 - to guarantee the naturally and environmentally grounded space structure, which should guarantee sustainable development in the whole country (Ecosystem services, maintaining ecological functions at the landscape scale)
- **Different sectors/stakeholders** (forestry, agriculture, transport, recreation) and interest groups, including local inhabitants are involved through spatial planning
- **Implementation mechanisms** should be developed and defined in the frame of the spatial planning
- **Green and Grey Infrastructure** need to be planned together – with equal priority

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LESSONS LEARNT

- The practice shows that the actual implementation of the requirements has been very different among the cases. Many implemented measures are weak. *Mapism!*
- We should enhance existing methodologies (municipality level) in defining green (ecological) networks
- We need criteria for evaluating functioning of Ecological network. Monitoring!
- There is a need for practical advice on implementation and for involving stakeholders, supported by direct, open and flexible communication

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PRACTICAL SOLUTIONS

- Spatial planning
- Scales - Hierarchy
- Management measures
 - agricultural landscapes
 - forest management
 - protected areas,
 - Green solutions for urban environment
 - quarries,
 - roads, rivers



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PRACTICAL SOLUTIONS

INTERCONNECTED NETWORK OF ECOLOGICAL INFRASTRUCTURE



REGIONAL EI

- Strategic River Corridors
- Regional Parks

TERRITORIAL EI

- Strategic River Corridors and Tributaries
- Landscape-scale Forest in Wetlands



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PRACTICAL SOLUTIONS

INTERCONNECTED NETWORK OF ECOLOGICAL INFRASTRUCTURE



CITY EI

- Main Watercourses
- Regional Cycle Network
- Greenways
- Country Parks
- Local Amenity Schemes
- Airport Wetland Site

URBAN EI

- Watercourses
- Public Parks
- Pedestrian Paths and Rights of Way
- Commercial Areas
- Road and Rail Corridors/Vegetation

RURAL EI

- Economic Corridors
- Woodlands
- Sustainable Drainage Systems
- Trees, Hedgerows and Parks
- Allotments
- Green Stacks
- Commons and Churchyards



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GREEN INFRASTRUCTURE


- Linking ecological networks to **spatial planning** at **different geographical scales** can therefore be seen as a key to effective delivery in the future
- This is not only because of the obvious functional relationship between ecological networks and other forms of land use and infrastructure but also because delivering the concept through **the vehicle of spatial planning** is one of the main mechanisms for **sectoral integration**

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GREEN INFRASTRUCTURE


- Green Infrastructure planning should be collaborative and interdisciplinary, combining a wide **range of skills** and **funding**
- **Green** and **Grey** Infrastructure need to be planned together – with equal priority
- Coordinated and **integrated spatial planning** is **essential** to the success of GI

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GREEN INFRASTRUCTURE

- Successful delivery of GI needs **cross-sectoral integration** into all relevant land-use policies is essential for sustainable development
- GI is in the interest of a number of EU Commission Directorates



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ONGOING&FUTURE ACTIONS

- EC Communication (Green Paper), 2012 **GI Strategy**
- Improvement of the implementation of existing **legislation**, assess new legislation possibilities, integrate approach into **funding schemes** (e.g. Regional Policy for sustainable growth in Europe 2020 COM)
- **Guidance** for Green Infrastructure implementation and financing, based on experiences ("tool box")
- Step up **research** to better understand how it works
- **Communication** to targeted stakeholders and the general public (training, citizen participation, innovative financing and capacity building)
- Promoting **integrated spatial planning** as a required tool to implement Green Infrastructure

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ESTONIA 2030 – GREEN INFRASTRUCTURE

(SEPP, JAGOMÄGI 2011)



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Eesti Maaülikool
Estonian University of Life Sciences

Thank You!!



Green Infrastructure

Karin Zaunberger
European Commission
DG ENV Biodiversity Unit



Green Infrastructure

- what it is
- ecological context
- what it can provide
- policy context



what it is

Spatial planning

- Multiple services on the same piece of land

N2K ecological network

- One main pillar of Green Infrastructure

Ecosystem-based approaches to climate change adaptation and mitigation

- Working with nature; "EbA" ecosystem-based adaptation



'Green infrastructure' is - inter alia - an interconnected network of natural areas, including agricultural land, greenways, wetlands, floodplains, urban green spaces - parks, green walls, green roofs, - forest reserves, native plant communities and marine areas that naturally regulate storm flows, temperatures, flood risk and water, air and ecosystem quality as well as Working with Nature -

Developing and using ecosystem-based approaches to climate change adaptation and mitigation



Green Infrastructure



components (i)

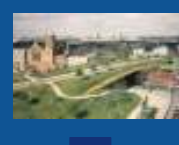
- Healthy ecosystems** inside and outside a coherent network of protected areas with their buffer zones; such as floodplain areas, wetlands, extensive grasslands, coastal areas, natural forests etc...;
- Multifunctional zones** where the way land is used helps maintaining or **restoring** healthy ecosystems;
- Natural **landscape features** such as small water courses, forest patches, hedgerows which can act as eco-corridors or stepping stones for wildlife;



Green Infrastructure

Components (ii)

- Artificial features** such as eco-ducts or eco-bridges, or permeable soil covers that are designed to assist species movement across insurmountable barriers (such as motorways or paved areas);
- Areas where measures are implemented to improve the general ecological quality and **permeability** of the landscape;
- Urban green spaces** such as biodiversity-rich parks, permeable soil's cover, green walls and green roofs, hosting biodiversity and allowing for ecosystems to function and deliver their services. This should also connect urban, peri-urban and rural areas.

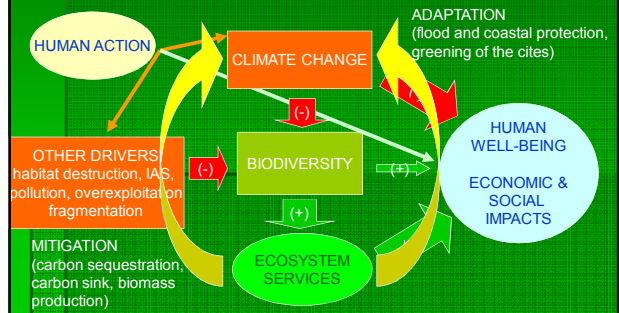




ecological context

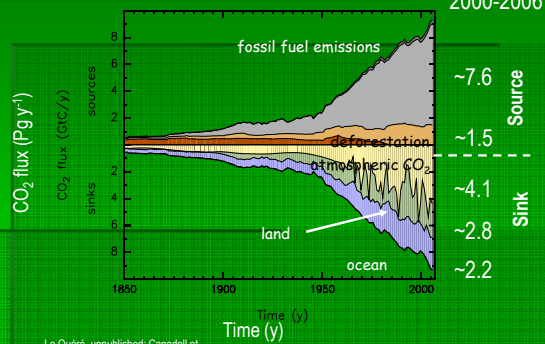
"we cannot solve biodiversity loss without addressing climate change, but it is equally impossible to solve climate change without addressing biodiversity loss"

Biodiversity decline and climate change: two sides of the same coin

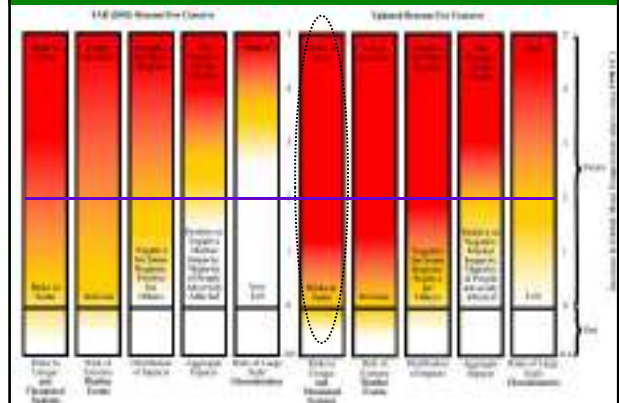


MORE BIODIVERSITY - LESS CLIMATE CHANGE

Flux of anthropogenic CO₂



MORE CLIMATE CHANGE - LESS BIODIVERSITY

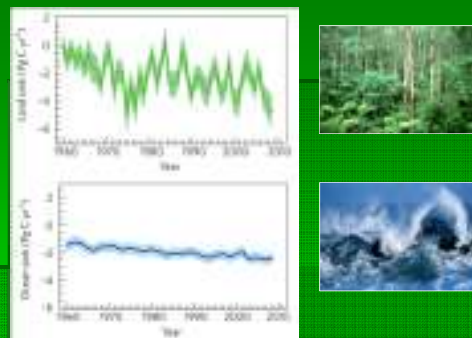


MORE CLIMATE CHANGE - LESS BIODIVERSITY



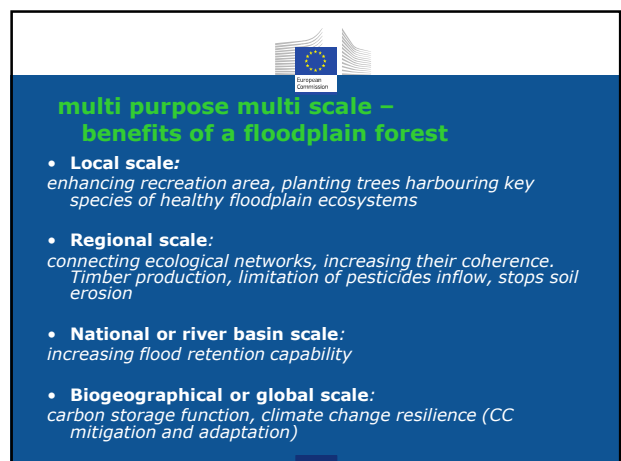
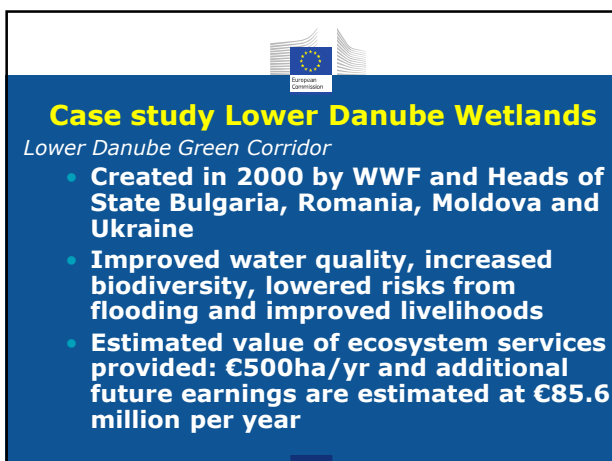
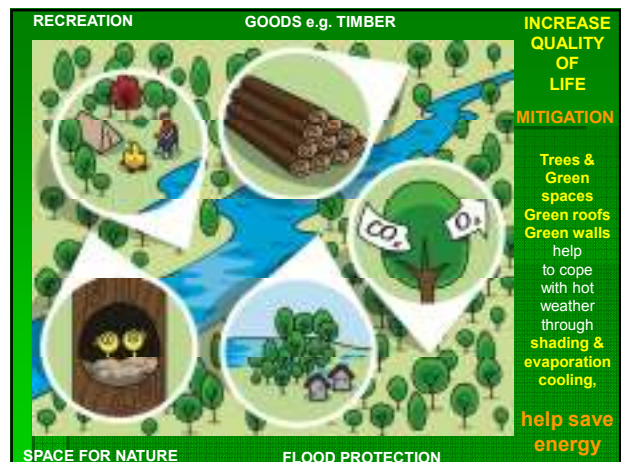
Reference: Hoegh-Guldberg et al. 2007

LESS BIODIVERSITY MORE CLIMATE CHANGE



The decline in natural carbon sinks has likely caused an increase in the airborne fraction of CO₂ by 5% over the last 50 years.

Le Quéré et al. 2009, Nature Geoscience





investing in ecosystem-based approaches - green infrastructure

- provides business and job opportunities
- contributes to green economy and sustainable development
- contributes to maintaining and restoring healthy ecosystems
- promotes creativity
 - discover “undiscovered solutions”
- valorises traditional knowledge
- helps building trust and partnerships



The present poly-crisis needs *solidarity* and swift implementation of integrated measures, such as

Ecosystem-based approaches to climate change adaptation and mitigation, which

- are cost-efficient and ready for use
- **bring multiple benefits**
- complement technological approaches
- should be an integral part of the overall adaptation and mitigation effort.

Promoting Green Infrastructure - “working with nature” - is an investment (rather than a cost); this should be recognised on international, EU and national levels; particular asset in times of financial crisis



wider policy context

- “EU2020”: smart, **sustainable**, inclusive growth – resource efficiency
- Policy reform – CFP, CAP and Cohesion Policy 2013
- Towards new financial perspectives 2014-2020 (cf LIFE)
- Financial crisis



International

- **CBD COP 10, Strategic Plan Aichi Targets, CBD COPX 33 on Biodiversity and Climate Change**

EU

- **Biodiversity Strategy to 2020**
- **Green Paper on Green Infrastructure; fall 2012**
- **Adaptation Strategy; 2013**



EU Post-2010 biodiversity policy framework

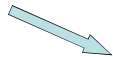
EU post-2010 biodiversity vision & headline target

Adoption (26/03/10)

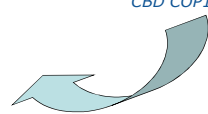


EU 2020 biodiversity strategy

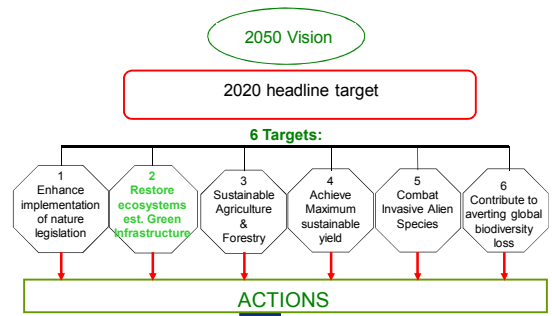
Adoption (03/05/2011)



New global strategic plan 2011-2020 (vision, mission, 20 targets)
CBD COP10 (29/10/10)



Structure of the Strategy



Target 2 of the EU 2020 biodiversity strategy:

By 2020, ecosystem services are maintained and enhanced through the establishment of Green Infrastructure and the restoration of at least 15% of degraded ecosystems

	EC	MS	Being done or in the pipeline (EC)
5	Assistance	Map & assess state of ecosystems & their services by 2014; assess economic value of ES; promote integration into accounting & reporting at EU & national level by 2020	EU level ecosystem services mapping, TEEB, economic valuation of ES, working group
6a	Assistance	Strategic framework to prioritisation of ecosystem restoration at sub-national, national and EU level by 2014	
6b	Green Infrastructure Strategy by 2012		Workshops, working group, studies
7a	Tools and methodology to biodiversity proof EU investments by 2014	cooperation	Study contract (IEEP); EIA review; EIA & SEA guidance; MFF
7b	No net loss of ecosystems & ES by 2015		Expert group

06/11 ENV Council conclusions
... "UNDERScores the importance of green infrastructure also as a contribution to further integrating biodiversity considerations into other EU policies; and WELCOMES the Commission's commitment to develop a Green Infrastructure Strategy by 2012"

11/11 CoR discussion
underlining 2010 position of importance of Green Infrastructure

12/11 ENV Council conclusions
" CALLS UPON the Commission to consider, within the scope of the Green Infrastructure (GI) Strategy under preparation, among others, the following issues: (a) possible scope and key components of GI; (b) possible framework for GI implementation based on existing experience, particularly in spatial planning, including coastal; (c) methodological issues related to GI, including with regard to spatial connectivity between protected areas and basic requirements for the delivery of the necessary ecosystem services; d) options to integrate GI in existing policy instruments and importance of GI in terms of climate change adaptation; e) identifying opportunities for financing GI; f) communication and promotion of GI targeting different stakeholders and sectors, and in particular local authorities;"

05/12 EP statement

what else has been done

Workshops
Green Infrastructure Conference
Expert Working Group

- http://circa.europa.eu/Public/irc/env/green_infra_wg/home

Several dedicated studies

Milestones on Green Infrastructure Green Paper (state of play 02/12)

02/12- Study results on case examples and typology, on EU-wide cost-benefit analysis Green Infrastructure, on NWRM, and on climate change and Natura 2000, and on the potential of ecosystem-based approaches to climate change adaptation and mitigation available

02/12 Science for Environmental Policy: special issue on Green Infrastructure

05/12 Green Week session on Green Infrastructure & water (stakeholder discussion)

09/12 Adoption of Green Paper on Green Infrastructure

10/12 Brochure on GI ready (Explain GI COM to general public)

EU biodiversity strategy

<http://ec.europa.eu/environment/nature/biodiversity/comm2006/2020.htm>

Green Infrastructure on ENV homepage

http://ec.europa.eu/environment/nature/ecosystems/index_en.htm

A single entry to information on EU biodiversity: [BISE](#)



How to integrate Green Infrastructure into spatial planning ?

Lauri Klein,
Biological Diversity Advisor
Estonian Environment Information Centre
Lauri.Klein@keskkonnainfo.ee
www.keskkonnainfo.ee

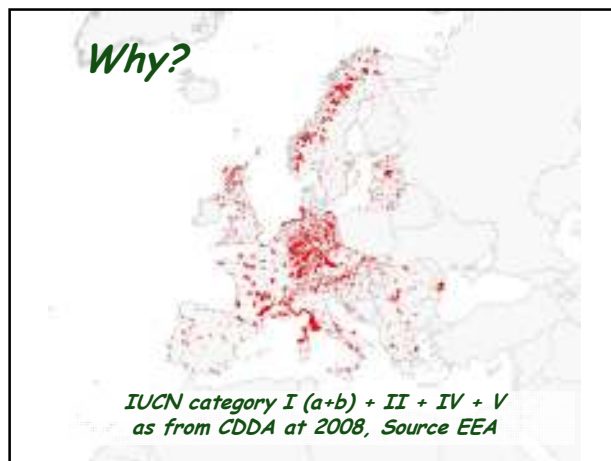
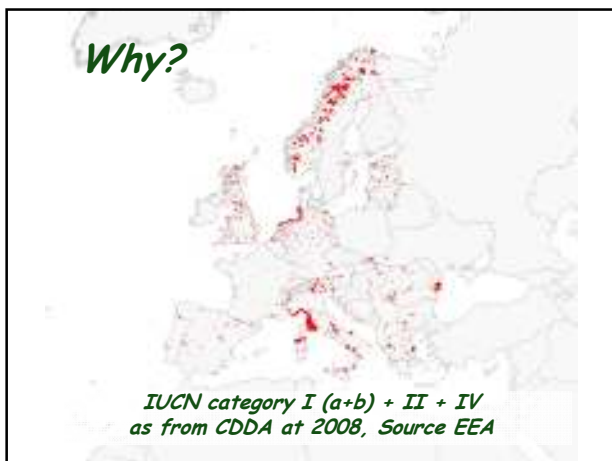
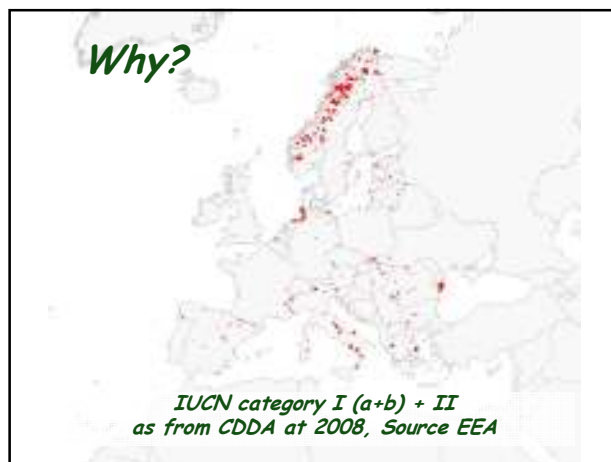
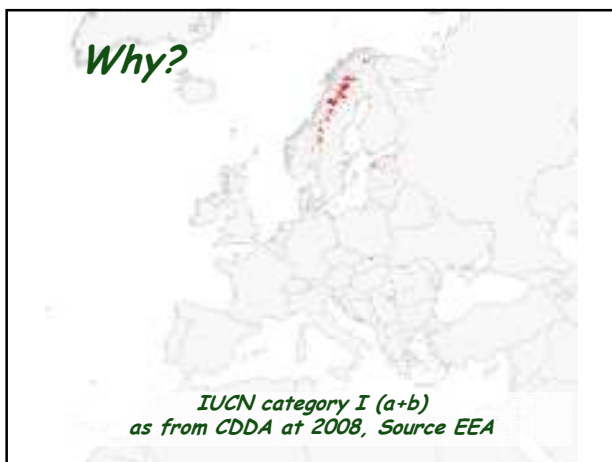
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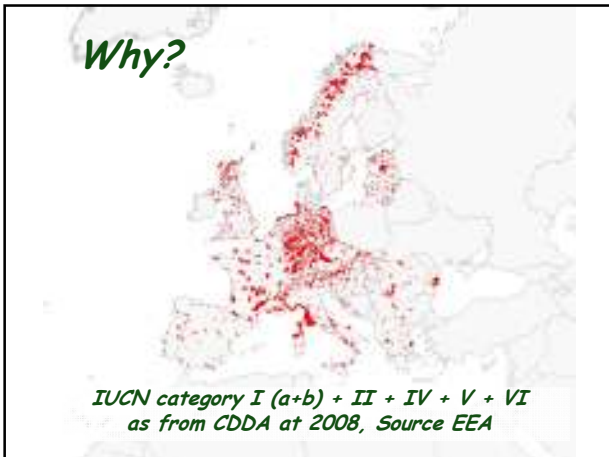
- Why?
- How?
- Estonian case
 - Success-stories
 - Problems and mistakes



Why?

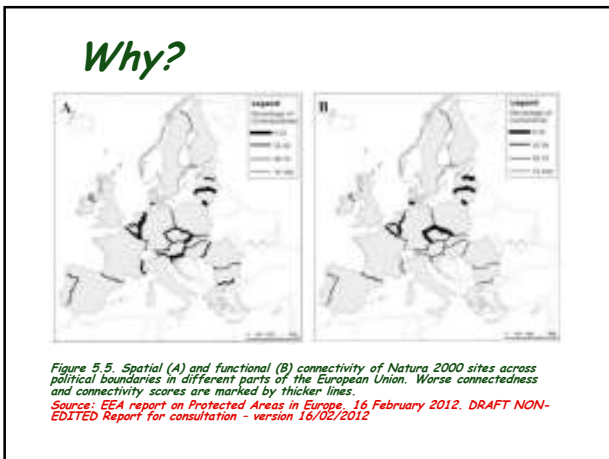
- Spatial planning of human economic activities **is currently not balanced** with planning of biodiversity and ecosystem services protection as well as with assessment of human impact to them.
- Biodiversity and ecosystem services **can not be safeguarded** only through spatial protection on limited, unconnected areas.





Why?

CBD strategy, EU BD strategy, many national strategies etc are targeted to avoid the loss of biodiversity and ecosystem services and especially focus to sectorized conservation policies and green infrastructure development actions.



Why? (How?)

-EU BD strategy 2020:

- Action 1b: Member States and the Commission will further integrate species and habitats protection and management requirements into key land and water use policies, both within and beyond Natura 2000 areas.
- Action 5: Member States, with the assistance of the Commission, will map and assess the state of ecosystems and their services in their national territory by 2014, assess the economic value of such services, and promote the integration of these values into accounting and reporting systems at EU and national level by 2020.
- Action 6b: The Commission will develop a Green Infrastructure Strategy by 2012 to promote the deployment of green infrastructure in the EU in urban and rural areas, including through incentives to encourage up-front investments in green infrastructure projects and the maintenance of ecosystem services, for example through better targeted use of EU funding streams and Public Private Partnerships.

Why? (How?) Estonian case

Habitats Directive:

Article 3

1. A coherent European ecological network of special areas of conservation shall be set up under the title Natura 2000. This network, composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, shall enable the regular habitat types and the species' habitats concerned to be maintained, where appropriate, in a favourable conservation status in their natural range.

Article 10

Member States shall endeavour, where they consider it necessary, in their long-term planning and development policies and, in particular, with a view to improving the ecological coherence of the Natura 2000 network, to encourage the management of features of the landscape which are of major importance for wild fauna and flora.

Such features are those which, by virtue of their linear and continuous structure (such as rivers with their banks or the traditional systems for marking field boundaries) or their function as stopping stones (such as ponds or small woods), are essential for the migration, dispersal and genetic exchange of wild species.

Nature Conservation Law:

§ 52. Protection of migratory routes

(1) Building activities should ensure as safe as possible living and migratory conditions for protected species.

(2) Minister of economy and communication has upon recommendation by minister of environment right to set temporary limitations for traffic in order to protect animal migratory routes.

Planning Law:

§ 6. State level plan (2) tasks are: set principles and guidelines for sustainable and balanced spatial development; shape basic for system that consists natural and semi-natural communities (from now on as "green network") and ensures existence of different types of ecosystems and landscapes as well as balances impacts of settlements and economic activities.

§ 7. County level plan (3) tasks are: set principles for sustainable and balanced development and linking them to spatial development as well as in plan completion ensure balanced consideration of development needs of economic, social, cultural and natural environment; plan measures for retention of natural resources, valuable agricultural lands, landscapes and natural communities as well as functions of green network.

§ 8. General plan (Municipal level) (3) tasks are: assessment of economic, social and cultural impacts as well as impacts to natural environment that may appear with planned spatial development and basing on that set conditions for sustainable and balanced spatial development; set conditions to ensure functions of green network.

How?

- Common agreement in EU and in Societies on what Green Infrastructure is and what should it serve;
- Common agreement on measures what should be taken for setting, managing and quality assurance of Green Infrastructure (for example: research, monitoring, avoidance, mitigation, compensation etc measures) - to keep it "working" also in reality;
- Involvement of all stakeholders in Society with all different means (legislation, incentives, supervision, penalties etc);
- In every economic sector and step in a long chain of activities - Do not lose the target - avoid the loss (either in quantity or in quality) of biodiversity and ecosystem services.

How?

- **First step is to find out the components - what You have and where?**
- **Second step is detection of movements and needs - who, how and where are moving?**
- **Third step is to formulate mitigation hierarchy and planning rules - what is needed to ensure "working" network?**

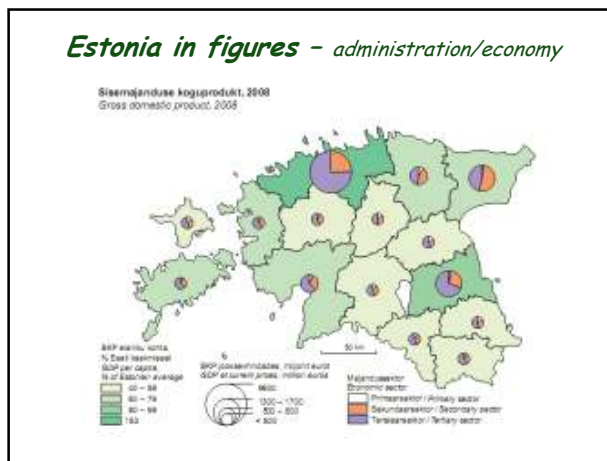
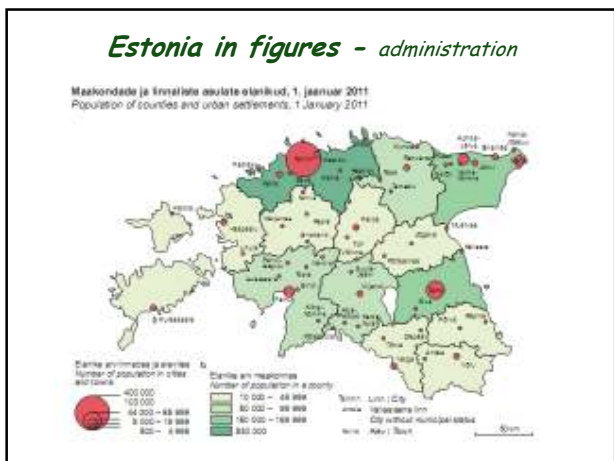
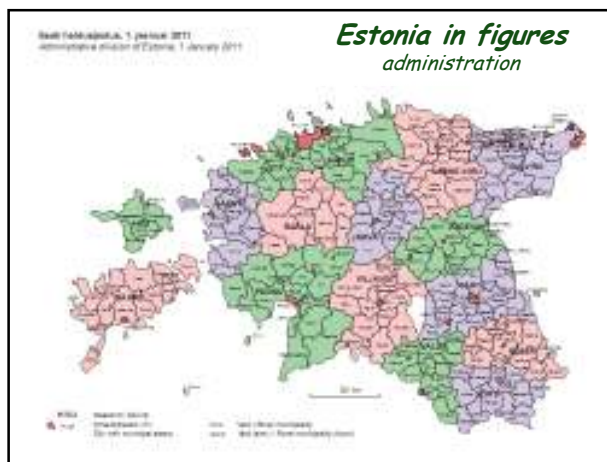
How? Estonian case (What and where You have?)

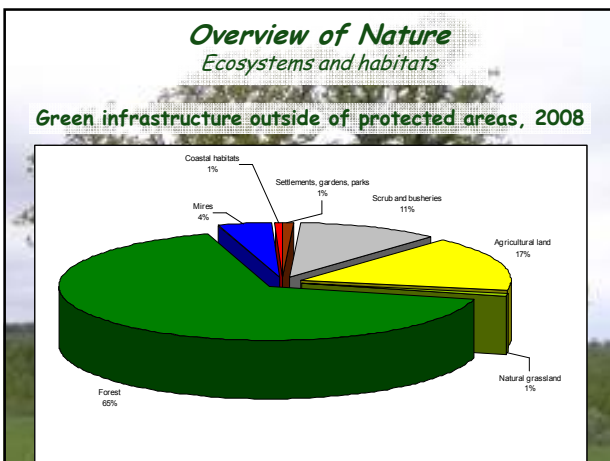
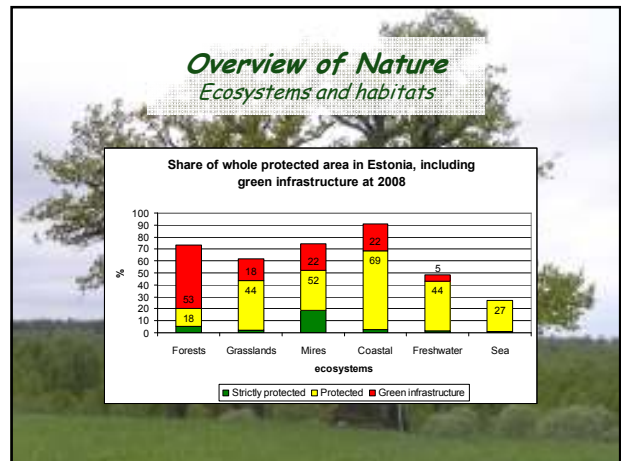
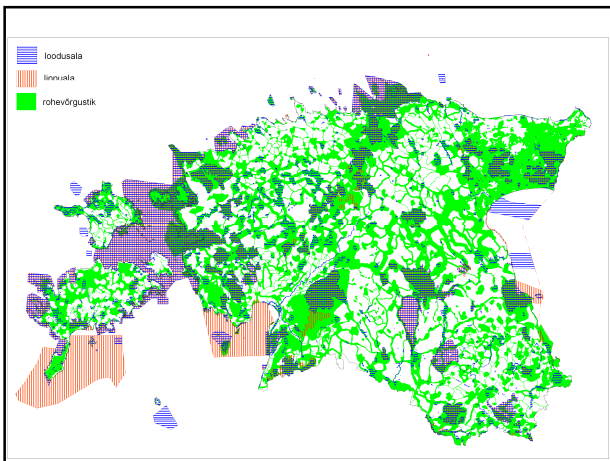
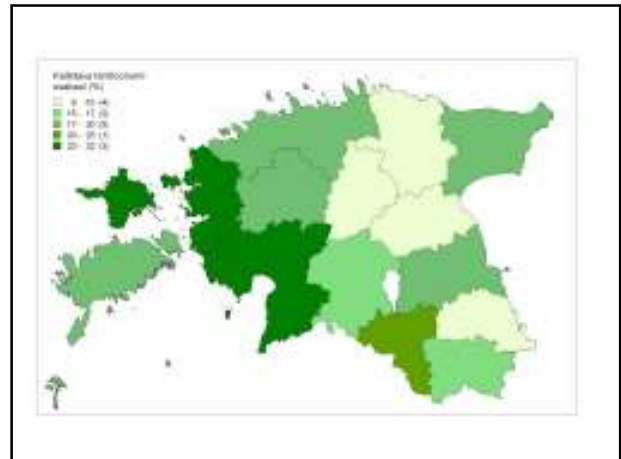
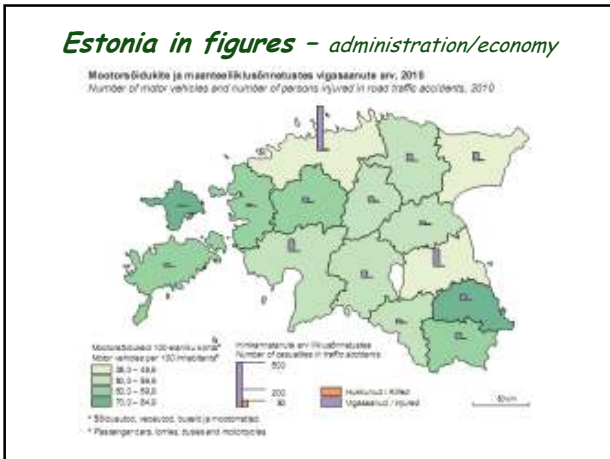
- Protected areas cover **18.1%** of Estonian territory
- Protected areas cover **31.1%** of Estonian aquatory
- Protected areas cover **22.7%** of Estonia (territory and aquatory together)
- **80%** of Estonian coastline is within protected areas
- **62%** of small lakes, **100%** of Lake Võrtsjärv and **35%** of Lake Peipsi aquatory are within protected areas
- **19%** of overall length of rivers is within protected areas.
- Natura 2000 sites cover **16,6%** of Estonian territory
- Green network covers ca **56%** of Estonian territory
- Green network with forest covers ca **34%** of Estonian territory ***
- Road network all together in Estonia is ca **58 thousand km** long and covers ca **1.3%** of territory
- State road network with 2 km wide impact-zone cover ca **18%** of Estonian territory (almost same share as protected areas - cores for green infrastructure)

Estonia in figures
Main statistics

- **Territory: 45 227 km²**
(W to E 350 km, N to S 240 km)
- **Aquatory: 24 185 km²**
- **Population: 1.34 mln**
- **Population density: 31 inh/km²**
- **Capital Tallinn: 450 000 inh (33%)**
- **Administrative structure:**
 - 15 counties (state authorities)
 - 226 local governments (33 cities, 193 rural municipalities and 14 cities without municipal status - local authorities)

Barn swallow *Corn flower*

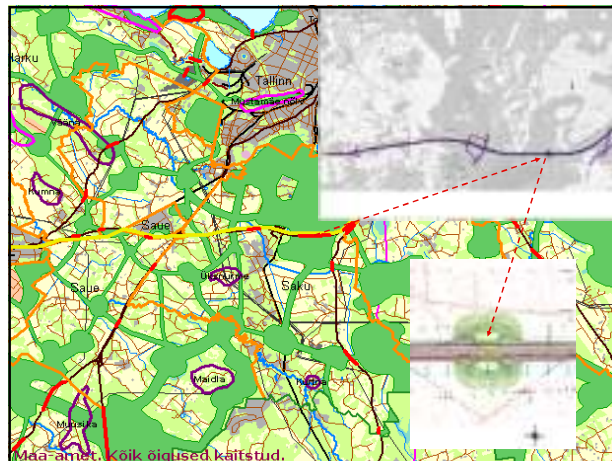
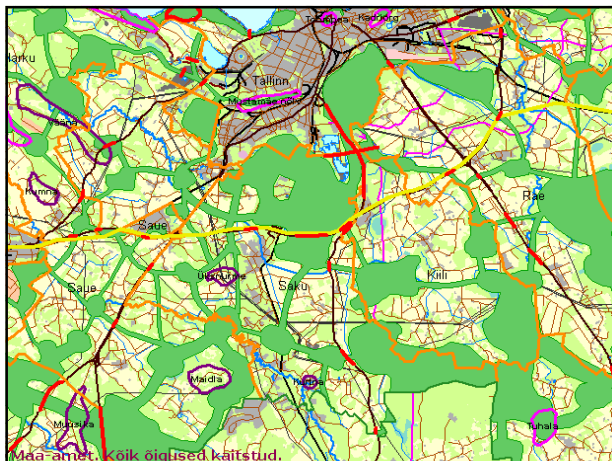
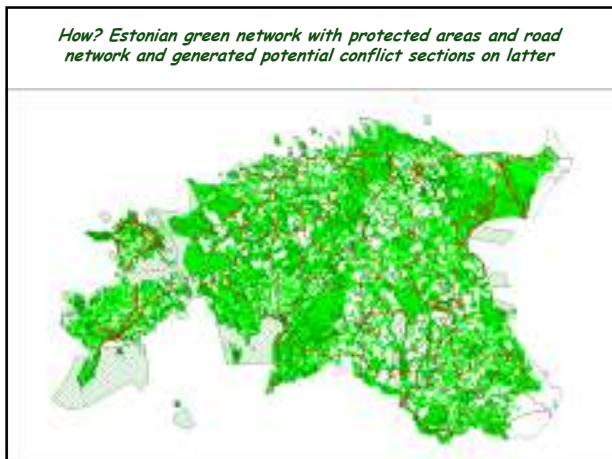




How? Estonian case

Environmental Information

- Green network planning according to planning law in Estonia was started at 1999.
- Today all counties have existing thematic plan for green network as well as for valuable landscapes (both plans were initiated by Governmental decree at 1999).
- County level green network plans based on existing protected areas as core areas and detected importance value for cores and corridors at two levels: state level and county level. There were special guidelines elaborated for county planners.
- Municipalities are obliged to integrate green network plans into their general plans.
- More than half of the municipalities have actual general plans where green network is integrated.



How? Estonian case - Success-stories

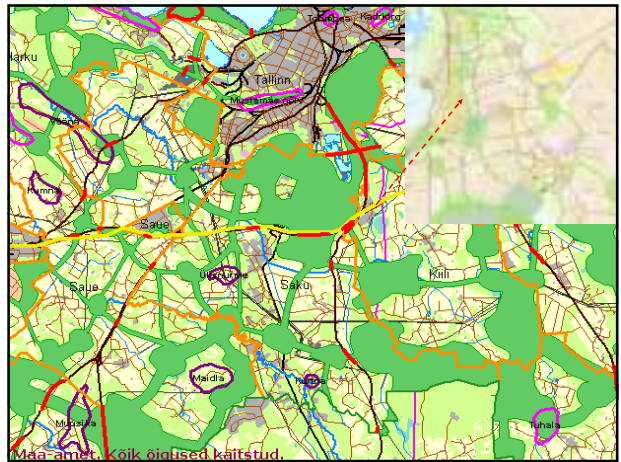
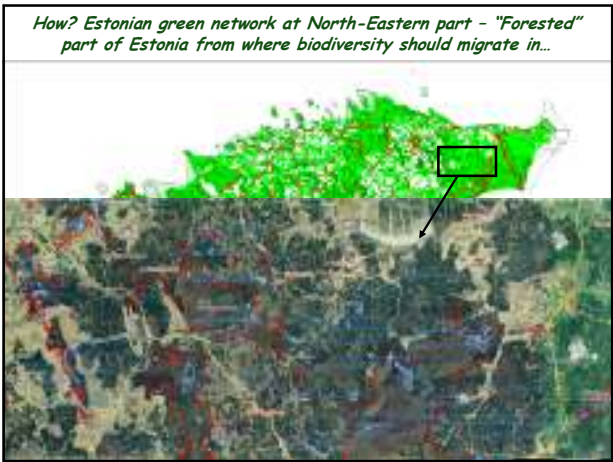
Environmental Information

- There are cases where private developers start detailed plans within green network area, municipalities have obliged them to go for EIA or asked for expert opinion (although any law does not directly ask them to do so. But there are also big problems with EIA process as such in Estonia) that has lead to either avoidance or mitigation measures.
- Estonian Road Administration is asking for all state road planning projects (both for EIA and architecture teams) special treatment for road sections that cross green network.
- Audru municipality for example has set more strict conditions to its green network within general plan than was in county level plan and is also keeping/controlling those conditions.
- Kose municipality (also some others) has ordered special work for checking county level green network at municipal preciseness and has justified crossings with state roads on a basis of known animal collision data.
- Kehtna municipality corrected green network at municipal level preciseness with county planners, State Forestry Company, hunters and other stakeholders and where cut was planned in green network it was compensated with similar size and condition nearby.
- Overall obligation is that if any human activity will cut whole corridor municipality should assure that connection with similar conditions will be shifted nearby, otherwise such cutting is not allowed.

How? Estonian case - Problems, mistakes and failures

Environmental Information

- Functional principles of green network as well as measures depending from that were not well enough studied and formulated before setting county level plans. Currently, except connectivity assurance rule, there are two main principles for green network - built up areas should follow not-dense settlement form (parcels more than 2 ha) and fencing should appear only around gardens.
- Big problem is that planning act allows detailed plans to change general plans, also within green network. That puts green network existence responsibility completely to depend from municipal level decision makers.
- Estonian Road Administration is asking for all state road planning projects (both for EIA and architecture teams) special treatment for road sections that cross green network. But currently only/mainly for such projects that are financed from EU funds, state budget does not require any mitigation measuring.
- Environmental specialists in municipalities around Tallinn have very low power over planners and leaders, but they do not at the same time have any funds to ask expert opinions.
- Lot of municipalities have taken county level green network into their general plans without any checking/correction work. But county level plans set up resolution was far not enough to use it at municipal level.
- There are no or is very little on green network functional needs in state level sectoral plans that leads to uncontrolled activities in forestry, mining, agriculture etc.



 *How to integrate Green Infrastructure into spatial planning ?*

Thank You!

Any further questions, please contact:
Lauri Klein,
Lauri.Klein@keskkonnainfo.ee
www.keskkonnainfo.ee



Nature Conservation Agency
of the Czech Republic

Czech Green Infrastructure concepts focus on Beskydy Protected Landscape Area

EUROPARC Nordic-Baltic section

Seminar „Protected areas as part of Green Infrastructure“

07. 03. 2012

Martin Strnad



Large mammals in the landscape

Space for life
(landscape fragmentation)



Migration corridors
(landscape connectivity)



Large mammals in the landscape

Space for life
(landscape fragmentation)



Migration corridors
(landscape connectivity)



Landscape fragmentation

- road constructions and human settlements (urban sprawl) are splitting the landscape into smaller and smaller units
- these parts gradually lose their potential to fulfill their ecological function



How to measure landscape fragmentation?



How to measure landscape fragmentation?

Methodology for determination of UAT
(= Unfragmented Area by Traffic)

How to measure landscape fragmentation?

Methodology for determination of UAT
(= Unfragmented Area by Traffic)

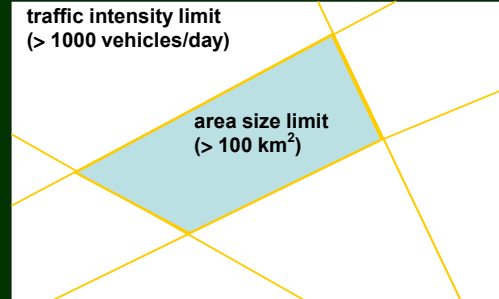
- methodology principles were established by Bundesamt für Naturschutz in Germany

Definition of UAT

Definition is based on two parameters:

traffic intensity limit
(> 1000 vehicles/day)

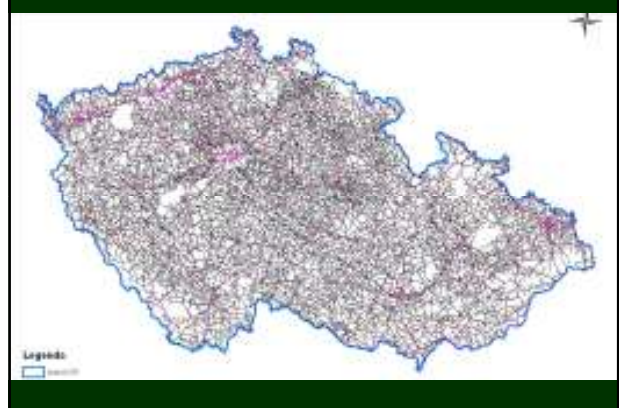
area size limit
(> 100 km²)



Traffic intensity

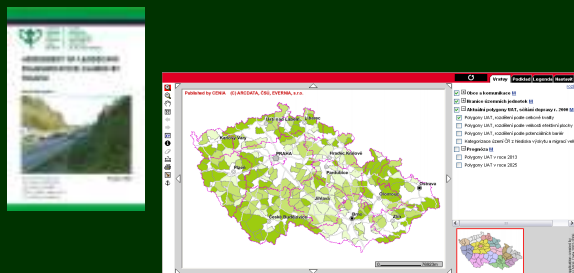


Road network in the Czech Republic



UAT methodology in the Czech Republic

- guidelines published by AOPK
- UAT at <http://geoportal.cenia.cz>

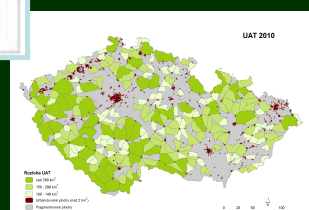


Landscape fragmentation development

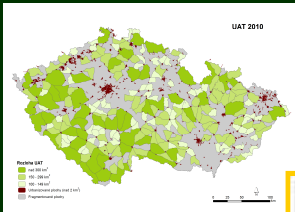
30 years



reduction
of unfragmented areas
84 → 63,4 % of the CR



Landscape fragmentation prognosis

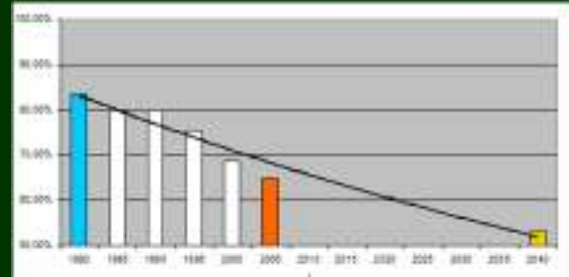


Prognosis based on the traffic model of the Directorate of roads and motorways



Landscape fragmentation development

Total unfragmented areas (% of the Czech Republic)



Large mammals in the landscape

Life space (landscape fragmentation)



Migration corridors (landscape connectivity)



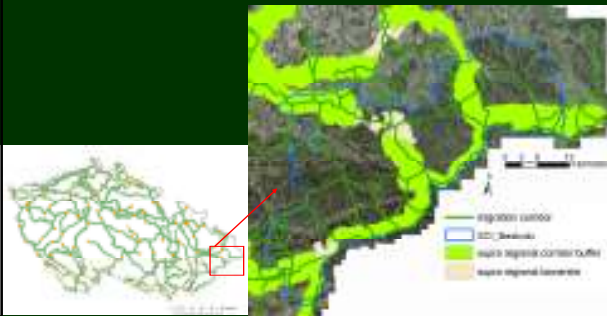
Territorial system of ecological stability

System of biocenters and biocorridors

3 hierarchical levels: supraregional
regional
local



Territorial system of ecological stability (supraregional level) – Beskydy PLA



Territorial system of ecological stability (regional level)



The concept of TSES vs. large mammals migration

- TSES concept focuses mainly on the connectivity of different type of habitats and does not take animal migration into account
- TSES methodology allows to interrupt corridors for up to 50 – 100 metres – for large mammals this means unacceptable disconnection of long-distance routes
- TSES does not follow real and verified migration corridors for large mammals

Research project

„Assessment of Landscape Migration Permeability for Large Mammals and Proposal of Protective and Optimization Measures in the CR”
2008 - 2010



Silva Tarouca Research Institute for Landscape and Ornamental Gardening



Nature Conservation Agency of the CR



EVERNIA Ltd. – Research Center for Applied Ecology

Focal species



Basic concept

3 levels:

- A. Significant migration areas
- B. Long-distance migration corridors
- C. Migration routes



detail increases in this direction

Basic concept

3 levels:

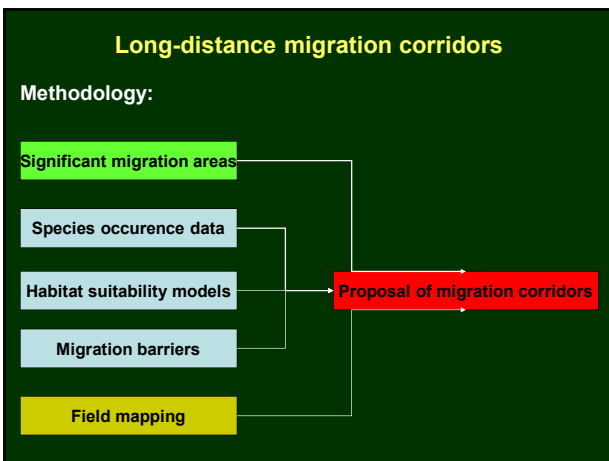
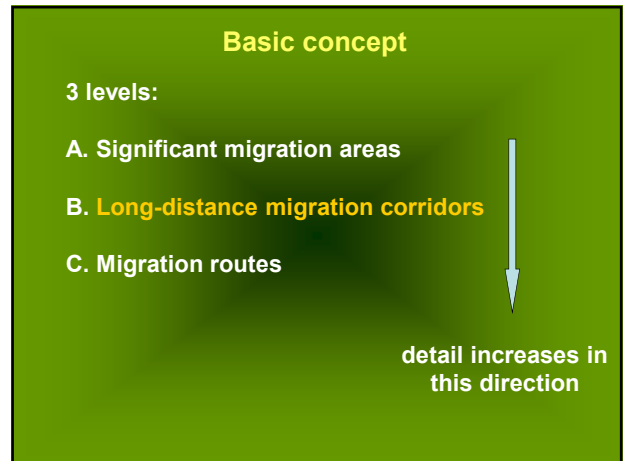
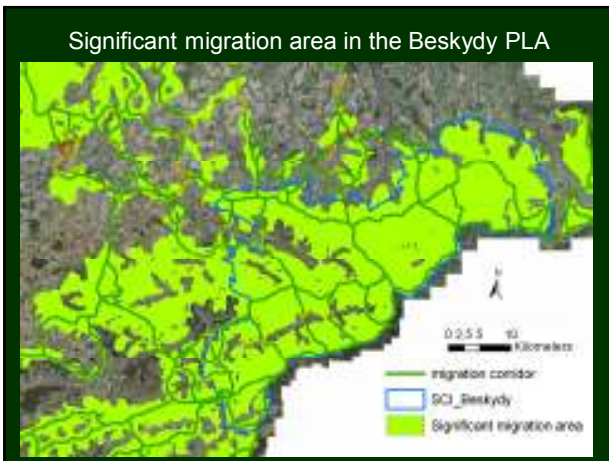
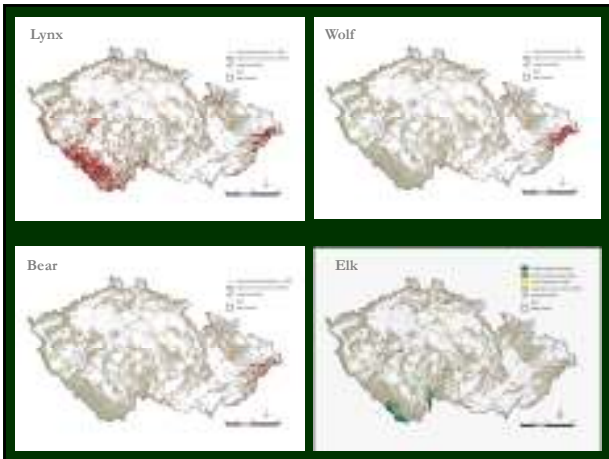
- A. Significant migration areas
- B. Long-distance migration corridors
- C. Migration routes



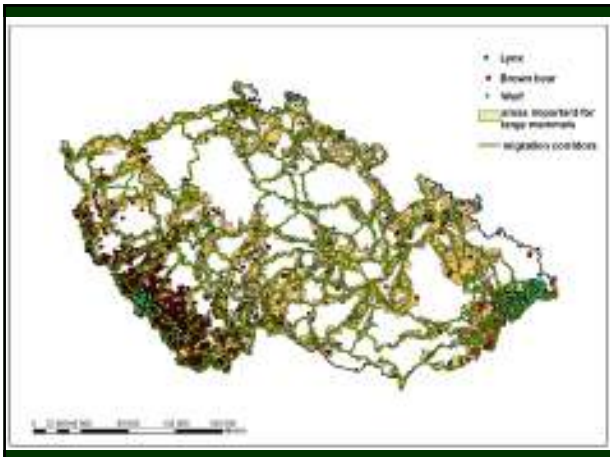
detail increases in this direction

Significant migration areas

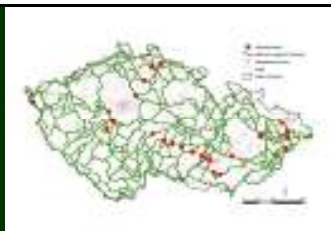
- designed to facilitate sustainable existence of the species populations and to secure their migration connectivity
- relatively wide areas, proposed protective regulations primarily have a framework character
- the protection of SMAs mainly involves protection of the landscape permeability as a whole with the view to providing sufficient quality of forest habitats and variability of their connections



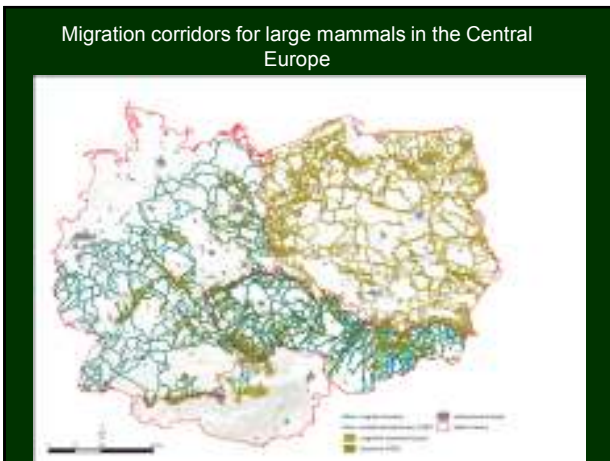
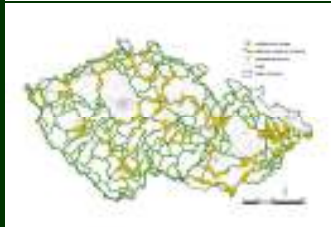
- Migration corridors**
- connecting areas significant for the permanent and temporal occurrence of large mammals (parts of PAs)
 - linear structures tens of kilometres long and on average 500 m wide, preferably in forests
 - urban areas not included
 - minimum or no interruptions (critical sites)
 - minimum sustainable connectivity of the landscape for large mammals



28 Entirely impermeable barriers (critical sites)
feasible measures could be adopted to secure permeability



128 Significant barriers (limited sites)
currently permeable only with great efforts, mostly due to multiple barriers



Basic concept of Ministry of the Environment

3 levels:

- A. Significant migration areas
- B. Long-distance migration corridors
- C. Migration routes – focus on Beskydy PLA

↓
detail increases in this direction

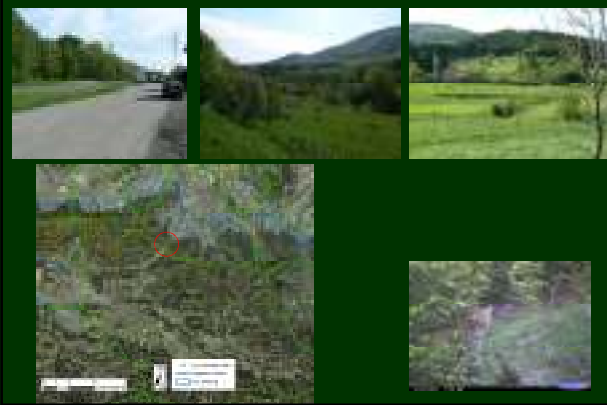
Migration corridors for large mammals in the Beskydy PLA

Migration routes in Beskydy PLA

Protective measures



Migration corridor confirmed by Lynx telemetry



publication



Map of migration corridors in the Czech Republic



Technical standard of the Ministry of Transport

Migration passages for the permeability of roads for wildlife

Technical standard No. 180

2006



Bridges over water streams

Methodological handbook

2008



Conclusions

- landscape fragmentation is not an issue only in the CR, but in all Europe
- primary causes of the landscape fragmentation: constructions in the open landscape outside existing urban areas and urban sprawl. These phenomena are closely linked to the development of transportation infrastructure, which further fragments the landscape
- the principal threat of landscape barriers and landscape fragmentation is their mostly irreversible character. Changes in the structure of settlements may never be taken back and natural ecosystems destroyed by direct or indirect interference will never be fully substituted.

Conclusions

- the situation is worsening very fast
- landscape connectivity is a vital precondition for conservation of ecosystems



Thank you for your attention



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Design, implementation and cost elements of Green Infrastructure projects

McKenna Davis


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Overview

- Context
- Data evidence
- Typology and definition of green infrastructure
- Design and implementation aspects
- Barriers and enabling factors
- Financing considerations
- Costs and benefits
- Recommendations



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Context

- ▶ Study conducted for DG Environment, European Commission
- ▶ Development of EU green paper on GI; Target 2 of EU Biodiversity Strategy to 2020
- ▶ Knowledge gaps
 - ▶ Type and extent of European GI projects/initiatives
 - ▶ Associated costs and benefits
 - ▶ Clear concept of GI for wider application
 - ▶ Potential for policy support and financing



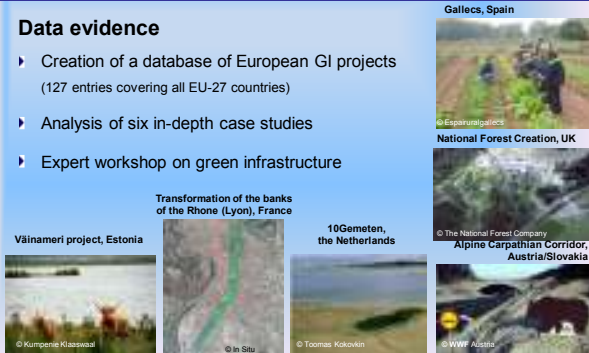
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Data evidence

- ▶ Creation of a database of European GI projects (127 entries covering all EU-27 countries)
- ▶ Analysis of six in-depth case studies
- ▶ Expert workshop on green infrastructure



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Typology and definition of green infrastructure

- ▶ Typology of green infrastructure projects - identification of key parameters
- ▶ Definition of green infrastructure:

Green infrastructure is the network of natural and semi-natural areas, features and green spaces in rural and urban, and terrestrial, freshwater, coastal and marine areas, which together enhance ecosystem health and resilience, contribute to biodiversity conservation and benefit human populations through the maintenance and enhancement of ecosystem services.

Green infrastructure can be strengthened through **strategic and co-ordinated initiatives** that focus on maintaining, restoring, improving and connecting existing areas and features as well as creating new areas and features.


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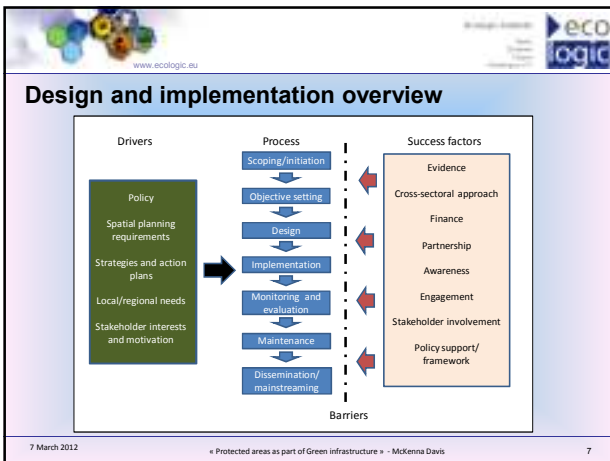
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Spectrum of green infrastructure projects

- ▶ **Objectives:** biodiversity conservation > human health & well-being > sustainable land management
- ▶ **Sectors targeted:** nature protection > water > urban and regional planning
- ▶ **Activities carried out:** increasing awareness > restoration > protection/maintenance
- ▶ **Elements addressed:** restoration zones > sustainable use areas > natural connectivity features > protected areas



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Barriers encountered

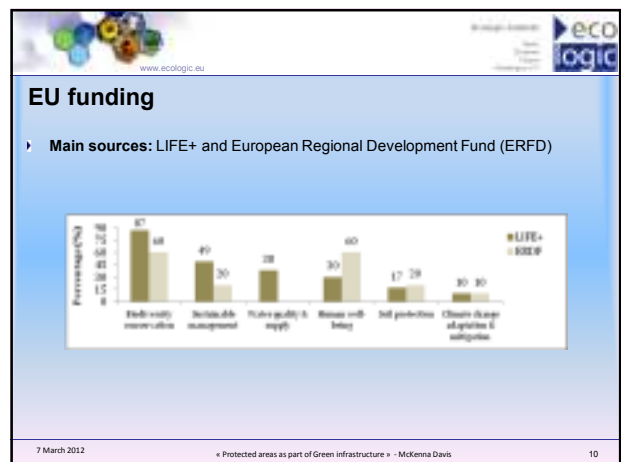
Cultural/behavioral	Priorities and points of view
Capacity	*Funding* Political will/motivating force Knowledge and evidence
Contextual	Historical factors Windows of opportunity
Structural	Management turnover rate Cross-border considerations
Regulatory	Paperwork and applications
Technical	Harmonizing activities while allowing public use Delays due to weather, bird breeding habits, etc

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Funding GI projects

- Currently **no funding scheme** specifically for GI exists
- Funding needs:** political, social and nature/physical components
- Utilized **sources of funding** for GI: EU, national/regional, private

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National and regional funding

- Rural development programmes
- Cross-national financing
- Example projects:
 - Väinameri Project
 - National Policy Plan for habitat de-fragmentation across transport corridors in Bulgaria

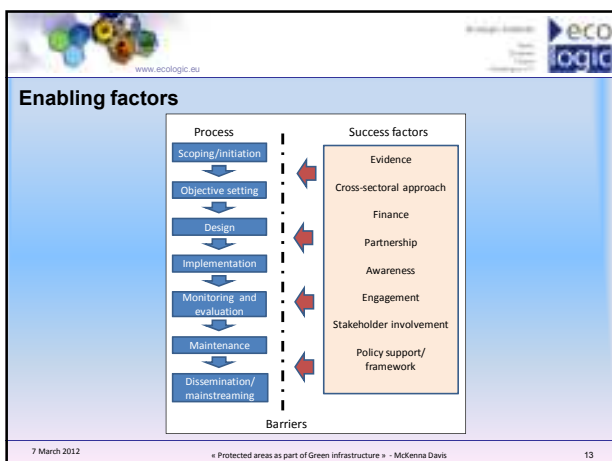
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Private funds

► **Sources:** foundations, NGOs, businesses and land owners

Potential for increased PPPs and partnerships between industry and NGOs (e.g. via corporate social responsibility)

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Costs of green infrastructure projects

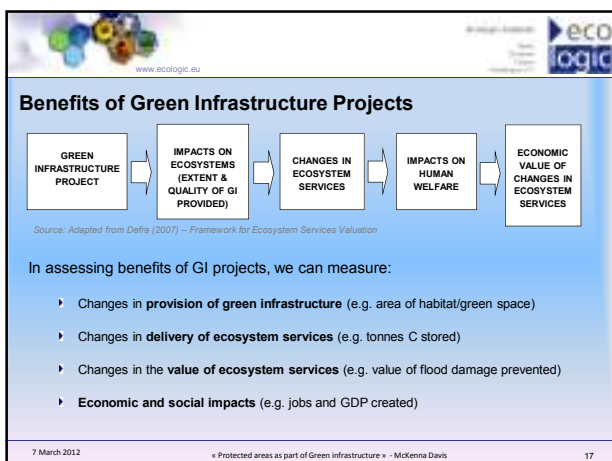
Financial Costs	One-Off Costs	Administrative, management and information costs	<ul style="list-style-type: none"> Establishing management bodies Surveys Research Consultation Management plans
		Costs of green infrastructure provision	<ul style="list-style-type: none"> Land purchase One-off compensation payments Creation of green infrastructure Restoration of green infrastructure
	Ongoing Costs	Administrative, management and information costs	<ul style="list-style-type: none"> Running of administrative bodies Monitoring Ongoing management planning Communications
		Costs of green infrastructure provision	<ul style="list-style-type: none"> Maintenance of green infrastructure Costs of management agreements Costs of protective actions (e.g. ongoing planning controls, site wardening)
Opportunity Costs (uncompensated)		Foregone development opportunities	<ul style="list-style-type: none"> Value of potential development foregone
		Foregone resource use	<ul style="list-style-type: none"> Loss of mineral extraction Loss of water abstraction Loss of land development rights
		Foregone output from land management	<ul style="list-style-type: none"> Foregone agricultural output Foregone forestry output
		Foregone socio-economic opportunities	<ul style="list-style-type: none"> Loss of regeneration opportunities Loss of community uses of land
		Reductions in land values	<ul style="list-style-type: none"> Price of land

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Costs of green infrastructure projects

- Six case study projects:
 - One off costs averaged € 24 million
 - Recurrent costs averaged €1.3 million (6% of one-off costs)
 - Land management largest element, followed by land purchase
- Opportunity costs are significant, but rarely documented
- Unit costs per hectare for restoration vary widely

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Benefits of green infrastructure projects

- Benefits tend to be much less quantified than costs
- Where evidence is available, it shows that value of benefits can greatly exceed the costs

B:C ratio 4.8: 1 (English National Forest), 10:1 (Mersey Forest)
 B:C ratios of 7:1 for Natura 2000 sites in France and Scotland

- Substantial one-off costs, but long-term benefits
- New valuation tools for GI are being developed (e.g. GI Valuation Toolkit)

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Recommendations

1. Explore and use opportunities for **cross-sectoral integration** of green infrastructure in relevant EU, national and regional policies
2. **Increase awareness** of green infrastructure, promote **capacity building** and **facilitate stakeholder involvement/consultation** in policy processes
[French awareness raising campaign about the need for GI](#)
3. **Highlight the benefits** received by various sectors and stakeholders, encouraging investments in GI

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Thank you for your attention.

McKenna Davis
Ecologic Institute
Pfalzburger Str. 43-44
D-10717 Berlin
Tel. +49 (30) 86880-0
mckenna.davis@ecologic.eu

Project report available at: www.ecologic.eu/3933
European GI project database available at: <http://ec.europa.eu/environment/enveco/studies.htm#4>

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Green Infrastructure – LDGC examples

What is Green Infrastructure?

Green infrastructure describes all elements of an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations.

It consists of natural and man-made elements, such as reforestation zones, wetlands, green bridges, green urban areas, green roofs and green walls, high nature value farmlands or forest areas.

By giving back space to ecosystems, green infrastructure can maintain and create landscape features which guarantee that ecosystems continue to deliver services such as clean water, productive soils and attractive recreational areas.

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Green Infrastructure – LDGC examples

Green Infrastructure – the concept

Green infrastructure is a concept that aims at recreating a system, which is robust and enables species and their communities to move and adjust.

Green infrastructure can therefore be regarded as the complementing element for protected areas.

Investing in a Green Infrastructure also makes economic sense.

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Green Infrastructure – LDGC examples

Lower Danube Green Corridor

Europe's most ambitious wetland restoration project

To create a functional network of wetlands:

- (a) 775,000 ha: existing protected areas
- (b) 160,000 ha: proposed new protected areas
- (c) 225,000 ha: proposed area to be restored to natural floodplain



Green Infrastructure – LDGC examples

Wetlands as Green Infrastructure

Wetlands are hotspots of biodiversity and provide a myriad of benefits and services, including flood protection, drinking water, nutrient removal, tourism and recreation, fish and fowl.

Wetlands as green infrastructure have multiple uses and benefits as example in terms of climate change adaptation can provide water storage and retention areas, reducing and slowing down peak flows and helping to alleviate river flooding.

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Green Infrastructure – LDGC examples


Why protecting and restoring wetlands on Danube?

80% of Danube's wetlands have been lost in the past century because of human intervention and the natural retention capacity of Danube was dramatically reduced.

In addition, large parts of the Danube are experiencing river bed erosion due to gravel extraction, dredging and dams, contributing to a lowering of water tables.

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WWF's objective: To protect and restore valuable wetland areas along the final 1,000 km of the Danube, including the globally important Danube Delta.



The aim is to secure effective implementation of the LDGC Agreement, including:

- Effective protection for 1 million ha of existing and new protected areas.
- Restoration of 224,000 ha of natural floodplain.
- Promotion of sustainable use and development along the lower Danube.

Lower Danube Green Corridor

REMAINING VALUES FOR CONSERVATION AND POTENTIAL FOR RESTORATION

Restoring potential of LDGC = 500,000 ha

By restoring an area of 100,000 ha of former wetlands, a volume of 1,6 billion m³ could be stored during floods.

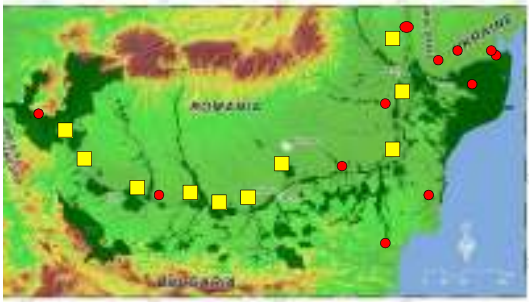
There is now a potential to restore about 25% of former floodplain

The costs for restoration of 100,000 ha of floodplain is less than the damages caused by floods and flood protection infrastructure maintenance

IMPLEMENTATION TO DATE

Conservation – Lower Danube Green Corridor
1,4 million ha of Protected Areas

Only ¼ of the task of wetland restoration



Ramsar sites

Lower Danube Green Corridor
Building Green Infrastructure

Examples of successful wetlands restoration projects

- Belene wetland restoration BG
- Restoration of Veselina river meander BG
- Danube Delta restoration projects in RO and UA
- Restoration of Rosenski Lom river BG

Legend

13

Green Infrastructure – LDGC examples

More space for rivers Restoring former meanders, wetlands and abandoned fishponds in Bulgaria



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Green Infrastructure – LDGC examples

Persin - Belene wetland restoration

The frame of action

- wetlands on Belene Island (800 ha) – among the most important places in the Lower Danube for the breeding and feeding of different water species of birds and fish.
- in the 50's, the island was surrounded by dikes and the wetlands drained.
- in 2007 the wetlands of Persina Island were re-linked to the Danube River under the "Project for Wetlands Restoration and Pollution Reduction" as part of the "Lower Danube Green Corridor" initiative.

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Green Infrastructure – LDGC examples

Persin - Belene wetland restoration



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Green Infrastructure – LDGC examples

Persin - Belene wetland restoration


Benefits

- after more than 50 year, the dykes were opened and the Danube flooded the island again
- was created a wetland that is home now to hundreds of rare birds: Dalmatian pelicans, Ferruginous duck, Pygmy cormorants, terns, herons and others.

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Green Infrastructure – LDGC examples

Restoration of Veselina river meander near the Mindya village



- Restored the connection of the Veselina river with its former meander near the village
- The slower and warmer waters of the meander provide breeding condition for many fish species, it also provides additional protection at high water

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Green Infrastructure – LDGC examples

Restoration of the Rossenski Lom River near Ivanovo Rock Monastries



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Green Infrastructure – LDGC examples

More space for rivers
Restoring wetland projects in Bulgaria

What we achieved

+100 ha of wetlands Belovo island	+2000 ha of marshes Kalinik	+120 ha of natural ponds Lanovica	+1000 m of meander Pezomir river
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WWF logo

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Green Infrastructure – LDGC examples

Ermakov and Tataru island
New life for the Danube Delta islands in Ukraine



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UKRAINE – Tataru island


Restoring the natural characteristics:

- hydro-morphology: allow regular flooding of the islands allow natural sedimentation to develop the outer ring
- Biodiversity associated with the natural habitats

Dykes were almost completely removed, allowing flooding of the middle part

A wooden bridge was built to allow visitors access

Guest house for visitors built



WWF logo

Ermakov Island (2009)



Ermakov Island (2010)




WWF logo

Green Infrastructure – LDGC examples

Ermakov and Tataru island
New life for the Danube Delta islands in Ukraine

What we achieved




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Green Infrastructure – LDGC examples

Babina and Cernovca islands
From abandoned polders and fish farms to rich wetlands in Romanian Danube Delta

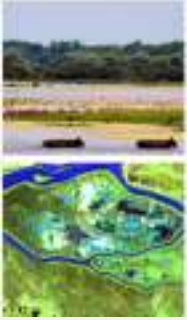


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Green Infrastructure – LDGC examples

Babina and Cernovca islands




- 3,600 ha of abandoned land (former wetlands) reconnected to the natural flooding regime
- 70 million m³ could be stored during floods
- 140,000 USD generated for local communities through ecosystem services (fish, reed, nutrient retention, cultural values, etc)

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Green Infrastructure – LDGC examples

Babina and Cernovca islands



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Green Infrastructure – LDGC examples

Lessons learned

- ecological restoration should be tuned to the specific conditions present at each site (opening or completely removing dykes, maintaining parts of the existing infrastructures or building new one, construct visitor facilities).
- Careful planning, feasibility studies and well designed solutions which take into account natural processes but also socio-economic aspects are needed to have successful projects
- Learning from nature, giving space to the river, reconnecting the floodplain to the river, will bring benefits for nature and people
- Recognize the economic value of Danube floodplain and use it to promote sustainable development
- Active involvement of the local communities and key partnerships (freshwater ecologists, conservationists and water managers) are essential for the success of the projects and for the long-term sustainable management of the sites

Green Infrastructure – LDGC examples

Thank you!

Raluca Dan – WWF Danube Carpathian Programme
rdan@wwfdcp.ro, tel. 004 0730 098 718

- www.panda.org/ro