

Intra-regional coordination	The Catalan Forest Laboratory is a joint initiative of CREAF and CTFC to make available for the public use information and data related to the forest generated by two research centers.
Extra regional impact	The extra regional impact hasn't been achieved yet.
Quality	<p>Three top scientists of two different institutions, CREAF and CTFC, provided the research basis of the Laboratory.</p> <p>The National Forest Inventory (NFI) provides the information about situation, property and protection regime, nature, legal status, probable evolution and production capacity of all types of goods (from wood to ecosystem services) in the Spanish mountains. The same measurements are repeated every 10 years covering the entire national territory in each cycle. The NFI methodology is based on the collection of data from plots of a sampling carried out in the forested area at the provincial level. The data obtained in the field work carries largely computerized process that provides exhaustive information in the form of tables and maps.</p>
Potential for learning or transfer	<p>First, the Laboratory provides ready to use practical information that eases decision making, management and learning.</p> <p>Second, it could be used at different scales, from local to regional levels.</p> <p>Third, it is based on the available information about the forest cartography. If such kind of a database is available at the national level, the Laboratory is easily transferable and replicable.</p>
Further information	http://laboratoriforestal.creaf.uab.cat/

5. Citizen Council for Sustainability

Summary: Barcelona's network of allies for sustainability is currently made up of more than 1 500 entities, companies, professional associations, universities, schools, facilities and public institutions. All these organizations are represented in the Citizen Council for Sustainability (CCS) on a democratic basis. The Citizen Council for Sustainability is consultative and participation city body acting in sustainability-related areas. It is a promoter of the Citizen Commitment for Sustainability 2012-2022 and provides a road map for moving towards creating more sustainable city (Barcelona). The CCS represents different groups and sectors involved in achieving objectives of the Citizen Commitment to Sustainability and has become a promoter of new strategies for engagement, co-responsibility and participation of citizens' organizations.

Good practice general information	
Title of the practice	Citizen Council for Sustainability
Organisation in charge of the good practice	Barcelona City Council
Description	
Short summary of the practice	<p>Barcelona's network of allies for sustainability is currently made up of more than 1,500 entities, companies, professional associations, universities, schools, facilities and public institutions. All these organizations are represented in the Citizen Council for Sustainability (CCS) on a democratic basis. The Citizen Council for Sustainability is consultative and participation city body acting in sustainability-related areas. It is a promoter of the Citizen Commitment for Sustainability 2012-2022 and provides a road map for moving towards creating more sustainable city.</p> <p>The CCS represents different groups and sectors involved in achieving objectives of the Citizen Commitment to Sustainability and has become a promoter of new strategies for engagement, co-responsibility and participation of citizens' organizations.</p>
Category of the good practice	Enabling environment.
Resources needed	<p>The direct costs of the good practice (GP) are mainly human resources:</p> <ul style="list-style-type: none"> - One full-time person dedicated to work for the secretariat of CCS and coordinate the More Sustainable Barcelona program (Please, check Visibility section for additional information.). - The team of the CCS Secretariat: 6 people dedicated to work on advising, accompanying and supporting more than 1000 allied entities and companies, secretariat of 7 working groups and facilitation of participatory processes; 4 people dedicated to work on advising for 100 trade associations and guilds and providing resources to retailers; 8 people dedicated to work on the More Sustainable Schools program, including teacher training and advice for more than 350 schools with sustainability projects, 1 person dedicated to work on communication.
Timescale (start/end date)	From 1998 onwards
Strategic relevance (long term impact)	Barcelona is firmly committed to progressing towards lasting and equitable development model that uses available resources wisely. This progress is only possible with participation and implication of the general public as a whole for defining horizons, seeking solutions and developing actions.

	<p>The Citizen Council for the Environment and Sustainability was set up in 1998. Its first objective was to help to spread the culture of sustainability throughout the city, promote Barcelona's Local Agenda 21, as well as its implementation and follow-up.</p> <p>The Citizen Commitment to Sustainability is the reference framework for all of the organisations which assume their part in the responsibility for building more sustainable Barcelona and contributing to this end through their actions.</p> <p>In 2012, the renovation of the Citizen Commitment to Sustainability led to challenge and opportunity of reorganising the Municipal Council for the Environment and Sustainability. After the reorganisation it represented various groups and sectors involved in achieving the Commitment's goals and at the same time also promoted new strategies for the involvement, co-responsibility and participation of civil society organisations.</p>
Evidence of success (results achieved)	<p>The Citizen's Council for the Environment and Sustainability promoted the first Citizen Commitment to Sustainability - Barcelona's Agenda 21 - a widely agreed document that defined principles, objectives and lines of action for the 2002-2012 period.</p> <p>In 2012, the Citizen Council for the Environment and Sustainability along with the network of organisations involved, participated in updating and renovating the previous Citizen Commitment to Sustainability - Barcelona's Agenda 21. This process led to the formulation of new, cross-cutting goals for the following 10 years from 2012 to 2022.</p> <p>The Citizen's Council and the network of signatories, both are the agents that led to the development of the Barcelona Climate Plan on 2018.</p> <p>More recently, on 2019, the Climate Emergency Committee was created, to produce the content of the Barcelona Climate Emergency Declaration. More than 300 city organizations were involved in participatory sessions. This is the Sustainability Council working group which aimed to maintain a spirit of collective participation and commitment with which the Barcelona Climate Plan was drafted. Different Departments of the City Council and supra-municipal bodies along with all municipal groups joined together in order to create a framework to commit the City Council and all other stakeholders involved to tackle the climate emergency. On 15 January 2020, the city of Barcelona declared the climate emergency and accelerated series of changes involving all players of the city.</p>

Tangibility	<p>The Plenary is the highest representative and participation body of the CCS. Its members represent Barcelona Sustainable Network and help to spread the culture of sustainability in the city, thus, promoting the Citizen Commitment to Sustainability, its implementation and monitoring.</p> <p>CCS members are municipal groups, representatives of the city districts, associative and civic sector (NGOs, citizens associations, foundations, etc.), business sector (including trade, tourism and services, construction, energy, telecommunications, environment, transport, etc.), educational centres, universities, professional associations (biologists, teachers, engineers, lawyers), unions and the Barcelona Administration.</p>
Durability	<p>With a recently achieved regulation, the CCS seeks to represent different groups and sectors involved in achieving objectives of the Citizen Commitment for Sustainability and, at the same time, it promotes new strategies for engagement, co-responsibility and participation of citizens' organizations.</p>
Visibility	<p>Continuous communication through the web with stakeholder groups, two fortnightly newsletters and social networks.</p> <p>Visibility through the network of allies and local media.</p> <p>Workshops, seminars, exchange meetings, networking and training are continuously organized.</p> <p>Institutional event every year for the World Environment Day.</p> <p>Solemn acts of signing the Citizen Commitment for Sustainability and approval of strategies at the Saló de Cent of the Barcelona City Council.</p> <p>Participation in international conferences and European projects.</p> <p>Citizen Council for Sustainability web page: https://ajuntament.barcelona.cat/ecologiaurbana/en/bodies-involved/citizen-council-for-sustainability</p> <p>More Sustainable Barcelona website: https://www.barcelona.cat/bcnsostenible</p> <p>More Sustainable Barcelona Map: https://www.bcnsostenible.cat/en/</p> <p>Decidim Barcelona: https://www.decidim.barcelona/assemblies/emergencia-climatica</p>
Added Value	<p>The CCS seeks to ensure quality public space, green and biodiverse city that is productive and resilient, the city committed to active and sustainable mobility with public involvement and commitment.</p>

	Collaborative dynamics of committed organizations and political will of the municipal government have progressively led to the consolidation of network of allies that generated a culture of sustainability in the city, enriched and promoted progress in climate policies, urban planning, the city's naturalization strategies and zero waste strategy among other issues. The work process is more important than its results, since through participation and co-creation the social innovation is made.
Effectiveness	Consultations facilitated by the CCS have resulted in such concrete actions as the Climate Emergency Declaration, which includes 7 model changes (urban, mobility and infrastructure, energy, economic, consumption and waste, food, and cultural and educational) and 2 adjustments (Taking care of health, well-being and environmental quality, and of water.)
Innovation	In comparison with other consultation tools, wide representation of citizen associations and meticulous pre-operational work makes the CCS highly dynamic and decisive. The innovation presented by this GP has a social character. It has been made by the co-creation process and successful involvement of society in the decision-making process.
Efficiency	<p>The Barcelona City Council's budget dedicated for the education about sustainability, participation and promotion of citizens' action on climate is minimal compared to budgets for environmental management and urban services. At the same time, it has facilitated approval and implementation of unconventional plans and projects.</p> <p>The participation of society enriches public policies with out-of-the-box approaches and facilitates political approval and social acceptance of more disruptive projects.</p> <p>Also, shared responsibility and networking promoted through the Citizen Commitment for Sustainability are facilitating coordinated and joint action.</p> <p>This action involves cultural changes and requires time to get going, but it is able to generate synergies that accelerate such changes.</p> <p>Ecological transition and significant climate action without the involvement of all actors does not seem like a realistic alternative.</p>
Externality	The CCS has already tackled a potential of ecosystem services in order to value ecosystems (including urban and peri-urban) sustainability but, in fact, objectives of the Council go beyond ecosystem services. The Council is an incredibly dynamic transfer tool from society to policy makers to many other

	subjects around sustainability – from climate change to urban planning.
Intra-regional coordination	The network of organisations involved has grown since 2002 and now includes a large number of municipal and supra-municipal bodies, associations, companies, schools, universities, guilds, professional associations, trade unions and all kinds of groups.
Extra regional impact	<p>The project has been presented during its lifetime in different meetings and collections of good practices of C40, ICLEI - Local Governments for Sustainability and other networks of cities. It has also been presented in workshops and seminars linked to European projects, and in response to demands from specific cities. Also, the CCS Secretariat attends visits of other cities' representatives on an ongoing basis. We know that specific tools and resources have been replicated. However, no recollection has been made.</p> <p>Recent studies:</p> <p>Ordonez-Ponce, E. (2018). Understanding the Strategic Engagement of Partner Organizations in Large Cross-Sector Social Partnerships Implementing Community Sustainability Plans. PhD thesis. SEED, University of Waterloo, Canada. <i>UWSpace</i>. http://hdl.handle.net/10012/13567</p> <p>Recent presentations:</p> <p>Urban Resilience in a Context of Climate Change Conference. October 2020. Climate resilience co-planning: A comparison between Barcelona and Seville by Mar Satorras (Universitat Oberta de Catalunya). Barcelona's coproduced climate action by Andoni González (Barcelona City Council)</p> <p>ICLEI World Congress, Montreal, Canada. June 2018. Workshop by Amelia Clarke (University of Waterloo), Eduardo Ordonez-Ponce (University of Waterloo), Megan Meaney (ICLEI Canada), Danielle Lussier (Montreal), Marta Cuixart (Barcelona) & Denise Yoon (Korea Institute - Center for Sustainable Development) on: Designing Sustainability Partnerships: Global Survey Results and Experiences of Barcelona, Gwangju, and Montreal.</p> <p>Universitat Oberta de Catalunya. Barcelona. March 2018. Research seminar "Co-production of Climate Policy: A Novel Opportunity for Engaging with Urban Stakeholders? Lessons Learned from the Pla Clima in Barcelona" by Mar Grau Satorras, TURBA Lab research group of the IN3, UOC.</p>
Quality	The CCS enshrined the spirit of Agenda 21, formulated at the Earth Summit (Rio de Janeiro, 1992) and the Charter of European Cities and Towns Towards Sustainability, otherwise known as the Aalborg Charter (1994).

Potential for learning or transfer	Considering difficulties of public consultations in order to provide an efficient management of ecosystem services the CCS provides a highly dynamic and decisive transfer tool. The methodology and procedure used to create the CCS are easily transferable to other interested city or administrative councils.
Further information	https://ajuntament.barcelona.cat/ecologiaurbana/en/bodies-involved/citizen-council-for-sustainability

6. Conservative management of habitats ROSCI0129 4070 and 9260 in the North West of Gorj, in Gorj County

Summary: The NORTHWESTGORJ project was aimed to restore two of degraded habitats of the “Nordul Gorjului de Vest” Natura 2000 network site and to establish conservation measures to secure their survival and long-term future. The targeted habitats were: 4070²⁹ (Bushes with mountain pine (*Pinus mugo*) and *Rhododendron myrtifolium*) and 9260 (sweet chestnut (*Castanea sativa*)). The restoration work involved the following: i) planting 10 ha of *Pinus mugo* and, respectively, 25 ha of *Castanea sativa* using seedlings created within the project; and ii) the application of biological and silvi-cultural methods to control the chestnut blight on 60 ha. Additional measures were expected to create long-term benefits for the biodiversity of the area through the development of an appropriate infrastructure for habitat protection and tourism control. The project also planned to raise the awareness about these issues by increasing public participation in nature-protection decision-making processes and conservation schemes.



General view (a) and detailed view (b) of juniper plantation on Mount Oslea (photo E. Juveloiu & C. Avram. Source: Life+11NAT/RO/825. Photos taken from: <https://www.lifegreenhabitatsgorj.ro/en/>

²⁹ Code according to EU Habitats Directive Annex I.

Good practice general information	
Title of the practice	Conservative management for 4070 and 9260 habitats of ROSCI0129 North of Western Gorj (NORTHWESTGORJ)
Organisation in charge of the good practice	Environmental Protection Agency of Gorj
Description	
Short summary of the practice	The NORTHWESTGORJ project aimed to restore two of degraded habitats of the “Nordul Gorjului de Vest” Natura 2000 network site and to establish conservation measures to secure their survival and long-term future. The targeted habitats were: 4070 (code according to EU Habitats Directive Annex I) (Bushes with mountain pine (<i>Pinus mugo</i>) and <i>Rhododendron myrtifolium</i>), and 9260 (sweet chestnut (<i>Castanea sativa</i>)). The restoration work involved the following: i) planting 10 ha of <i>Pinus mugo</i> and, respectively, 25 ha of <i>Castanea sativa</i> using seedlings created within the project; and ii) the application of biological and silvicultural methods to control the chestnut blight on 60 ha. Additional measures were expected to create long-term benefits for the biodiversity of the area through the development of an appropriate infrastructure for habitat protection and tourism control. The project also planned to raise the awareness about these issues by increasing public participation in nature-protection decision-making processes and conservation schemes.
Category of the good practice	<i>Enabling environment</i>
Resources needed	Total budget €1 987 742.00; EU contribution €993 871.00. Project location: South-West Oltenia region (Romania)
Timescale (start/end date)	02-JUL-2012 to 30-JUN -2017
Strategic relevance (long term impact)	The project team raised the public awareness on nature conservation and Natura 2000 as a part of the concept of sustainable development. Project beneficiaries established measures for the long-term conservation of restored habitats in the After-LIFE Conservation Plan. This included plans for extending the area of these two habitats and continuation of monitoring activities, as well as awareness-raising and education campaigns.
Evidence of success (results achieved)	- Restoration of the bush habitat 4070; the action consisted of the planting of mountain pine in the area destroyed by inappropriate management of pastures, tourism, and habitat protection. - Restoration of the damaged forest habitat 9260; the action was based on the European experience in developing and implementing biological control of the Asian pathogen <i>Cryphonectria parasitica</i> . The chemical control of fungus is not effective and hybridization with resistant Asian chestnut species is not allowed in protected habitats, the only effective method

	<p>being the biological control of invasive pathogen. European study field trials had demonstrated the efficacy of measures consisting of a complex integrated biological and forest control. This method of a biological control consists of applying an experimental biological product (based on local <i>C. parasitica</i> strains infected with a specific mycovirus – CHV1) coupled with hygiene and cultural operations. After the treatment, canker sores were healing, mycovirus was spreading and the whole chestnut forests were expected to recover. The chestnut habitat restoration was based on biological control for 60 ha chestnut forests severely affected by the cancer. In parallel, forestry tending operations were executed in the same area in order to reduce the infection and increase the chestnut resistance.</p>
Tangibility	<ul style="list-style-type: none"> - Restoration of 10 ha of shrubs of destroyed habitat 4070. - Ecologic reconstruction of 60 ha of the forest of 9260 habitat by using biological methods of treating the infections. - Restoration of total of 25 ha of the destroyed chestnut forest. - Adequate infrastructure in the restored habitat including a small-scale infrastructure for visitors to control tourism in these protected areas. - Informative materials: 5 boards with the habitats' information, 12 boards about the small-scale infrastructure for visitors, project presentation brochures (1000), 10 000 pieces of the guide promoting ecotourism in the protected area with the slogan "Change your attitude, protect the nature" in ROSCI 0129, two banners, 100 posters, 10 000 / DVDs and CDs informational materials, including photos and videos, 1000 leaflets on natural habitats management, 3000 ecology manuals for children. - 10 project events, including the launch of the Chestnut Festival. - Target groups made aware of the value of biodiversity and about the project funding.
Durability	<p>It was expected to create long-term benefits for biodiversity of the area through the development of an appropriate infrastructure for habitat protection and tourism control. The project also planned to raise the awareness about these issues by increasing the public participation in nature-protection decision-making processes and conservation schemes.</p>
Visibility	<p>Within the LIFE+ 11 NAT / RO / 825 - NORTHWESTGORJ - project, three main categories of target groups have been identified, on which the dissemination strategy and communication plan of this project should focus:</p> <ol style="list-style-type: none"> 1. Public authorities and institutions directly or indirectly interested - Gorj County Council and Prefecture, 11 local public authorities located in the ROSCI0129 ("Site of Community Importance" in Romania) Nordul Gorjului de Vest, public and

	<p>private forestry organizations, Gorj Agency for Payments for Agriculture, Gorj Agency for Rural Development, members of the Scientific Council of ROSCI0129 Administration, specialists of administration of protected natural areas, etc.</p> <p>2. Potential tourists and interested travel agencies. The awareness of tourists must be built mainly through printed informative materials and signboards placed in target areas, messages should be mainly related to restrictions and objectives of protected Natura2000 sites.</p> <p>3. Local population in protected nature areas of the North of Western Gorj (especially for the younger generation – preschool, pupils and students) - publicly interested in the intrinsic connection between environmental protection and conservation, and a long-term quality of life.</p>
Added Value:	<p>NORTHWESTGORJ has a wider relevance as the demonstration project for good practices relating to the management of protected areas on a large-scale and in difficult environments, especially practices developed for the management of territories with degraded areas of two targeted habitats. At the same time, the project contributed to the improvement of habitat conservation in Romania by implementing complex treatment and restoration activities, and by fostering communication activities related to conservation, environmental education and information campaigns. These activities also raised awareness about benefits that Natura 2000 network, in particular sites containing two target habitat types, provide to both, environment and human communities.</p> <p>Products obtained from chestnut forests (nuts, wood, honey) represented in the past an important source of income for the local community. Therefore, the local community has positively reacted to the project activities, offering land to be planted or plantations to be treated.</p> <p>Before the project, all the forests and orchards were dead or in advanced dying process all over Romania (with major financial and ecologic impact). Due to the project's results, the revitalisation of all types of chestnut cultures (forestry, horticulture, landscapes, green areas) may contribute to the rural sustainable development. Traditional use of chestnut products may also be maintained.</p>
Effectiveness	<p>Through the restoration of '<i>Castanea sativa</i> woods' habitat, the project contributes to the improvement of a traditional source of revenue for local people, which has declined and even been lost in these areas. The sweet chestnut forests are a very good example of the habitat that provided multiple ecosystem services to human population. The conservation of such habitat types is clearly demonstrating public benefits of biodiversity conservation. For the project this was carried out by using different communication tools, such as the Chestnut Festival organized by the LIFE project team. This successful event has been taken over by local authorities and transformed into an annual cultural event.</p>

Innovation	<p>The present practice also brought a certain degree of innovation:</p> <ul style="list-style-type: none"> • improved methods of mountain pine seedling production and plantation; • use of biological control for the chestnut affected by an invasive fungus <i>Cryphonectria parasitica</i>; • testing some improved methods of nut conservation, seedling production and sweet chestnut plantation; • raising awareness through the public participation in the nature protection in the decision-making process and the preservation of habitats important for the Community (Chestnut Festival and roundtables)
Efficiency	<p>The implementation of this good practice involved a very large volume of work with multiple activities that allowed:</p> <p>i) the successful restoration of +10 ha of a destroyed mountain pine habitat; the improved methodology contributes to a better stability of the new plantation and higher rate of success for similar activities;</p> <p>ii) the reconstruction of more than 60 ha of sweet chestnut habitat through biological control of pathogen; the mycovirus spreading ensures a better conservation status of chestnut in +305 ha of forests;</p> <p>iii) restoration of more than 25 ha by planting chestnut seedlings; the improved methodology of seedling production and plantation will ensure high efficiency in chestnut regeneration.</p> <p>The overall objective of the project was achieved with a maximum efficiency if the sustainable approach of this good practice is considered.</p>
Externality	<p>The project also contributed to the restoration and revitalization of two habitat types (4070* and 9260) listed in the Annex I of the EU Habitats Directive. The NORTHWESTGORJ has a wider relevance as demonstration project for good practices relating to reconstruction / restoration of protected areas on a large-scale and in difficult environments, especially for practices developed for the management of areas with degraded areas of two targeted habitats. At the same time, the project contributed to the improvement of habitat conservation in Romania by implementing complex treatment and restoration activities, and by fostering communication activities related to conservation, environmental education and information campaigns.</p>
Intra-regional coordination	<p>Coordinator: Environmental Protection Agency, Gorj. Partners:</p> <ul style="list-style-type: none"> • Gorj North West Site Administration; • National Research and Development Institute of Forestry "Marin Dracea" (former Forest Research and Management Institute).
Extra regional impact	<p>Spare mountain pine and sweet chestnut seedlings produced in the project have been already used in other projects applied in different regions (central, north-western and southern Romania).</p>

	Mycovirus was also spread in small areas (demonstration test) from neighbouring zones (Gorj, Mehedinți and Vâlcea counties), in forests, orchards and gardens, thus targeting different categories of stakeholders. This facilitates the virus spreading and chestnut healing.
Quality	The implementation of this practice has led to improvement of the management of protected areas, positive effects on all the actors involved – authorities, locals, stakeholders, etc.
Potential for learning or transfer	Demonstrated reconstruction solutions may be replicated in similar habitats all over their natural range. These were presented to numerous stakeholders (administrators of forests, orchards and protected areas, land owners, local and regional authorities, conservationists, etc.) in the dissemination actions of the project. The improved methodology of mountain pine reconstruction was already transferred to several projects (Life+, POIM). All the new / improved solutions on chestnut production and protection were practically applied to the local landowners and administrators of forests, orchards, gardens, etc. Some of them already spread the knowledge to the local community.
Further information	https://www.lifegreenhabitatsgorj.ro/en/



Juniper seedlings in the mountain nursery - produced in the plastic greenhouse (a) and through acclimatization (b) (photo E. Juveloiu & C. Avram. *Source*: Project Life+ 11 NAT/RO/825
Photos taken from: <https://www.lifegreenhabitatsgorj.ro/en/>

7. Protecting of the English oak in the cross-border area (Oak protection/ Hungarian – Croatian border area)

Summary: The comprehensive aim of the project was to stop the deterioration of habitats made by indigenous tree species (e.g. English oak), prevention of the spread of invasive species, an objective exploration of processes and working out recommendations for complex solutions. The full achievement of this aim required the implementation of two activities:

1) in the long run the Hungarian-Croatian subsoil water monitoring system was created, consisting of 62 measurement points to provide long term data for modelling the numeric movement of the subsoil water. The data collection also served for setting up the network of automatic meteorological stations to be created within framework of the project, followed by collecting further data on both sides of the border about precipitation falling. Based on the data collected the analysis of forest conditions was made. Also, it examined water ecosystems, forecast of the development trends of oak dominated ecosystems, and tackled a possibility of setting up an alarm system to forecasts malfunctions and creating “inundation” plans and possibilities of the retention of precipitated water.

2) The project was fighting back invasive species in order to protect the indigenous ones using the framework of assessing invasive species also in the Croatian areas under the coordination of Mecsekerdő (Mecsek Forestry Co). Parallel to this on the territories of the Sellye Forestry and the Szigetvár Forestry of Mecsekerdő fighting back of invasive ligneous plant species (black locust, false indigo and tree of heaven) took place on the total area of 155 ha. As a closing act, the methodology for fighting back species monitored by the Croatian side and already suppressed by the Hungarian side was prepared to summarise experiences collected during the elimination of these species.

In addition, the mobile phone application was developed to demonstrate the significance of protecting the English oak for all target groups (including hikers and the inhabitants).



Oak protection mechanical clearing of false indigo.

Oak protection marking

Oak protection monitoring

Photos: Mecsek Forestry Co

Good practice general information	
Title of the practice	Protecting of the English oak in the cross-border area (Oak protection) – Hungarian – Croatian cross-border areas
Organisation in charge of the good practice	Mecsek Forestry Co - (HU), HRVATSKE ŠUME d.o.o. Zagreb, Uprava šuma, Podružnica Našice (CR)
Description	
Short summary of the practice	<p>The comprehensive aim of the project was to stop the deterioration of habitats made by indigenous tree species (e.g. English oak), prevention of the spread of invasive species, an objective exploration of processes and working out recommendations for complex solutions. The full achievement of this aim required the implementation of two activities: measuring the subsoil water level and fight back invasive species in the project area.</p> <p>In the long run the Hungarian-Croatian subsoil water monitoring system was created, consisting of 62 measurement points to provide long term data for modelling the numeric movement of the subsoil water. The data collection also served for setting up the network of automatic meteorological stations to be created within framework of the project, followed by collecting further data on both sides of the border about precipitation falling. Based on the data collected an analysis of forest conditions was made. This document examined also the water ecosystems, forecast of the development trends of oak dominated ecosystems, and tackled the possibility of setting up an alarm system to forecasts malfunctions and creating “inundation” plans and possibilities of the retention of precipitated water.</p> <p>Next to monitoring the subsoil water level, another comprehensive objective of the project was fighting back invasive species in order to protect the indigenous ones using the framework of assessing invasive species also in the Croatian areas under the coordination of Mecsekerdő (Mecsek Forestry Co). Parallel to this, on the territories of the Sellye Forestry and the Szigetvár Forestry of Mecsekerdő fighting back of invasive ligneous plant species (black locust, false indigo and tree of haven) took place on the area of 155 hectares. As a closing act, the methodology for fighting back species monitored by the Croatian side and already suppressed by the Hungarian side was prepared to summarise experiences collected during the elimination of these species.</p> <p>In addition, the mobile phone application was developed to demonstrate the significance of protecting the English oak for all target groups (including hikers and the inhabitants).</p>

Category of the good practice	Empowering tools
Resources needed	The total ERDF funding of the project was 63 864 462 EUR, which covered 85% of the project's expenditures. Another 15% were provided as the own contribution. In Croatia the own contribution was covered by Hrvatske Šume (national forest company), while in Hungary 15% were provided by the State.
Timescale (start/end date)	The duration of the project was 22 months starting from 1 September 2017 until 30 June 2019.
Strategic relevance (long term impact)	<p>The role forests play in the environment protection has increased significantly over past decades, thus the EU lays a great emphasis on protecting forests, biodiversity and soil (see: EU Forestry Strategy & AP).</p> <p>The long-term goal of the analysis of condition of the ground water is to have, on the basis of study and data series, an exact water governance activity (e.g. construction of canals and locks) in order to increase the vitality of forests and the preservation of the soil's fertility. Another advantage is that modelling the level of subsoil water allows planning the forest renewal and ensuring the sustainability of the indigenous species in the future.</p>
Evidence of success (results achieved)	<p>The project was awarded with the prestigious "good practice" title of the Directorate-General for Regional and Urban Policy of the European Commission.</p> <p>The project has reached several tangible results:</p> <ul style="list-style-type: none"> - 38 monitoring wells were established in Hungary; - 5 monitoring wells were established in Croatia; - 17 existing wells were cleaned in Croatia; - 7 meteorology stations have been installed; - 155,17 ha of forest were cleaned from invasive species by chemical and mechanical technics; - new processes have been developed; - soil analysis was delivered; - analyses of the fauna were delivered: observing daytime butterfly stocks, night observation of insect stocks, population surveying. - the mobile application was developed that introduces the invasive species of the area, shows forest map with restrictions of visiting or fire, makes possible to report about different prohibited activities (fire, waste, vehicles, etc.) <p>Meteorology stations and wells permanently provide valuable data, while local communities become more and more active in using the app to support the protection of local ecosystems.</p>

<p>Tangibility</p>	<p>During the project period a subsoil water monitoring system consisting of sixty wells was created and supplemented by seven automated meteorology stations providing up-to-date information about one of the most significant factors of the forest management – precipitation.</p> <p>Another selected objective of the project as mapping and suppression of invasive ligneous plant species: on the Hungarian side more than 150 hectares of the forest area were freed from tree-of-heaven, black locust and plant species causing the biggest problem – false indigo. Parallel to this, the mapping of invasive species also took place on the territory of the Nasice Forestry.</p>
<p>Durability</p>	<p>The <i>forest companies</i> are state-owned structures with a stable financing and human background. Therefore, they will be able to maintain the wells and the meteorology stations, and continue cleaning the forests from invasive species after the termination of this cooperation as well.</p> <p>A sustainability of the monitoring system has been questioned several times, so the Croatian Forestry recommended the construction of an automatic system for which they found a partner and resources within the Oak Protection project. On the basis of dynamic data collection of a new system they get a complex picture of movements and characteristics of the subsoil water, which can also help to prepare for droughts.</p> <p>The data provided by measurement stations are available for all users of the WEB GIS platform equipped with maps and filters at the https://oak.geof.hr/gis site. According to plans it will be supplemented by the satellite observation system, which is currently being developed and will allow the monitoring of changes of the vegetation in the future.</p> <p>The analyses provided by the project are also available in the downloadable format for <i>forest companies</i>, national parks and any interested parties.</p> <p>Members of the cooperation intend to extend researches to other indigenous species. Also, water management actions based on the research findings are expected.</p>
<p>Visibility</p>	<p>During the implementation of project its' partners placed a great emphasis on the communication of project results not only to experts but also inhabitants. The mobile application developed for the reporting of invasive species was supplemented with functions reaching a wider target group then it was originally planned with the introduction of values of the Dráva Plain to be protected and the information of threatening ligneous invasive species. Also, it contains news, recommended forest programmes and maps. The application is downloadable for both Android iOS platforms.</p>

	<p>In addition, a brochure was made for inhabitants about the invasive species, but experts are also able to use detailed methodological guidelines concerning the suppression of the invasive plants.</p> <p>The project has organised kick off and closing conferences, and several workshops for ca 100 participants.</p>
Added Value	<p>Even ten years ago, costs of protecting the ecosystem from invasive species have reached approximately €12 billions in the European Union. Different scientific studies agree that the most remarkable risk among all factors threatening biodiversity is the penetration of invasive plants and animals. The most significant added value of the project is the cleaning of 155 hectares, which were freed from invasive species. Another project result is the methodology worked out for the suppression of false indigo (<i>Amorpha fruticosa</i>).</p> <p>The forest companies have also identified possibilities of an adaptive forest management applied for the stocks of oak. By analysing data on precipitation and temperature, measurements of soil layers and subsoil water level, and LiDAR based monitoring the forestry attempts to model the consequences of climate change. Besides the increase of a mean temperature during, both, extremely wet and too dry periods are expected. This all forecasts an increased importance of the water management activity.</p> <p>Studies delivered by the Oakprotection project will support forest managers in their everyday monitoring activities and plantation of oak forests.</p>
Effectiveness	<p>The project brought together environmental experts from Croatia and Hungary to prevent habitat loss of the English oak and other native trees. They worked on collecting data and analysing conditions in local forests and putting in place measures to stop the spread of invasive species. The effectiveness of cooperation was grounded by the involvement of scientific actors (Croatian Forest Research Institute, SM Növényvédelő Kft., NARIC Forest Research Institute, Institute of Geography and Earth Sciences University of Pécs), as well as experts of diverse forest management activities (e.g. pesticide producers) and forest managers, who possess practical everyday experiences from ground surveys and forest monitoring.</p> <p>The establishment/management of 60 measuring points of ground water monitoring system is a significant achievement. Thanks to this modern technology forest companies are able to perform professional forest management and decision-making supported by reliable measurements.</p> <p>Another key goal of the project was to fight back against invasive plant and tree species that threaten the viability of</p>

	<p>English oak and other indigenous species. The project assessed such invaders on both sides of the border. This work led to the clearing of about 155 hectares of three invasive species – acacia, false indigo and tree of heaven. The project drafted a methodology to monitor the progress of native species after the removal of unwanted plants and trees.</p> <p>In addition, the mobile app was developed to demonstrate the significance of issues tackled by the project for the benefit of local people and tourists.</p> <p>In total 95 people took part in the project’s joint educational training and awareness-raising events. Two environmental studies were published.</p>
Innovation	<p>Nature protection efforts are reflected by technologies applied in the project, on the one hand (e.g.: injection), and it was a goal, on the other hand, to restore original habitats, which create ecological conditions for protected plant and insect species that were formerly suppressed by false indigo.</p>
Efficiency	<p>The Mecsekerdő Zrt forest company succeeded to clear more than one-third (155 hectares) of its 400 hectares of infected forest area: 155 hectares.</p> <p>Two forest companies collaborated in the good practice: Mecsekerdő Zrt from Hungary, and Našice Forest Company from Croatia. Both forest companies manage large forest areas: 55.000 hectares are managed by the Hungarian forest company, while the operational area of Našice Forest Company is almost 74.000 hectares. The two companies employ altogether 948 workers, their everyday activities were supported by the good practice as on the one hand an efficient monitoring system could be set up, on the other hand protecting indigenous species from invasive plants became easier with the decrease of the invasive population’s size.</p> <p>As a result of the good practice the information flow between the two forest companies became more frequent.</p>
Externality	<p>Experiences of the Oak protection project can be channelled into the implementation actions of the EU Biodiversity Strategy and particularly to the tasks related to the fight against Invasive Alien Species. The project can be also interpreted as a local ‘projection’ of the information exchange mechanism developed by the European Commission, which strives to facilitate the implementation of the EU policy on invasive alien species: the European Alien Species Information Network (EASIN). It’s an online platform that aims to facilitate access to existing information on alien species from a range of sources.</p> <p>The EASIN includes the Species Search and Mapping tool allowing basic and advanced search of a database including over 14 000 alien species in Europe and showing their</p>

	<p>distribution on a map. The EASIN includes the notification system (NOTSYS) for the Member States to inform the Commission about new observations of the invasive alien species (IAS) and rapid eradication measures taken. The app of the Oak protection project includes the same features: descriptions on invasive species, map and a notification system. Users of this app may become 'citizen scientists' and monitor invasive alien species in their regions. The experiences of the project's app can be forwarded to the EC. This could base a new level of cooperation among the European Commission's Joint Research Centre and local forest companies and support early detections of new invaders.</p>
Intra-regional coordination	<p>Protecting forests' ecosystem presents an increasingly serious challenge for <i>forest companies</i>, as the climate change causes a significant problem in the field of forest management, e.g. winters becoming milder and precipitation patterns more extreme year by year. Thus soil water balance and microclimates are changing, and forest zones sometimes are shifting. Consequently, many invasive species have appeared, which are more resistant to new circumstances (e.g.: the lack of rainfall). As a new tendency, native species die off as their habitats are steadily declining.</p> <p>The above mentioned problems exist in both, the area of Mecsekerdő Zrt. and the Forestry of Nasice in Croatia. The lack of drought and groundwater present the major source of concern in the area of operation of both forest companies. 10.000 m³ of the English Oak registered to die off annually in the Forestry of Koska (Croatia). Among native species the most affected and the most sensitive one is the English Oak having a significant natural and economic value. However, tan, ash and beech are also at risk on the Hungarian side. In addition, next to the lack of water there is a great new problem that invasive species drown native species in this habitat (e.g.: Black Locust, Amorpha, Tree of Heaven). The estimated infected area of forests managed by Mecsekerdő Zrt. is more than 400 hectares. The infected part of the project area is 155.17 hectares and the most common species are Amorpha. Based on similar professional challenges, geographical proximity and existing working relationships the two forest companies have decided to jointly find a solution to the problem above.</p>
Extra regional impact	<p>The project activities are in line with the European Commission's LIFE programme and the purpose of LIFE platform meeting on Invasive Alien Species. The event took place in Milan, Italy on 29th and 30th November 2017, within the framework of the LIFE GESTIRE2020 (LIFE14 IPE IT 018) project. Invasive Alien Species (IAS) and their impact to the environment are one of the key topics addressed by LIFE projects over the years, which should deserve adequate</p>

	dissemination and which should act as example for the development of further ideas and proposals. The meeting brought together LIFE projects and other organizations, to share many experiences and case studies on this topic, assess strength and weaknesses of the LIFE programme in relation to the implementation of the EU Regulation of IAS, evaluated future challenges and opportunities, including links with other nature protection legislation and with other EU financial resources. The results of the Oak protection can be channeled to the activities of this network.
Quality	<p>The outstanding quality of the project concept and its results are proven by the fact that it was selected as the best practice by the Interreg V-A Hungary-Croatia Co-operation Programme 2014-2020.</p> <p>Regarding the preparation of studies, practical information was collected during on-the-spot visits. The ecological study is a key document of the cooperation. During its preparation the fieldwork was carried out. It included investigation of the structure of stands on the test plots, determination of the growth of pedunculate oaks, analysis of the features of forest soils, as well as the field research on the status of aquatic ecosystems. The data on forest stands and performed forest work were taken from the Croatian Forests database and the data on the LiDAR imaging were processed. This action was performed twice for the study area: April 2018 and April 2019.</p>
Potential for learning or transfer (1000 char)	<p>Results of the pilot actions (chemical and mechanical cleaning), monitoring well establishment and operation, meteorology station measurement results and cooperation among different stakeholders of the area can be analysed by other regions.</p> <p>Also, the cooperation has revealed an interesting social aspect – the community of foresters is a closed circle in certain respect, which hinders gathering of the information about their work and dissemination of their experiences. This shows that in the future co-operation the attitude shaping impact has to be considered and related supporting activities have to be integrated.</p>
Further information	http://oakprotection.eu/en

8. Introducing airborne imaging technologies in forest management near the Drava River

Summary: The good practice was implemented as an activity of the project 'Restoring Ecological Diversity of Forests with Airborne Imaging Technologies (RED FAITH)' financed by the Hungary-Croatia Cross-border Co-operation Programme. Climate change adaptation and environment protection are important challenges in the EU, and due to its remarkable natural values it has a special importance for the Hungarian-Croatian border region. With its manifold ecosystem services forests of the area are not only valuable reserves of biodiversity and pristine landscapes for recreation, but also provide renewable resources, bioenergy and offer employment in rural areas. A healthy forest possesses the ability to sustain the unique species composition and processes that exist within it. Through climate change, forests are highly endangered by hail, drought, diseases and by spread of invasive species. The forest companies of the border region agree that monitoring of forests is the first step to impede the spread of invasive species and other endangering factors.

The project sets out the overall objective of contributing to preservation and protection of biodiversity in forest areas by supporting *forest companies* and other organizations responsible for managing habitats in detailed up-to-date monitoring with airborne imaging. As a specific objective it accelerates reactions to emerging hazards, protects/restores natural assets by enabling *forest companies* to select the most efficient interventions, as well as improves knowledge of forest engineers, raise awareness on forest values and sets up CB (cross-border) cooperation of *forest companies*.

Initially, *forest companies* compared their surveys applied, conducted research on airborne technologies and defined parameters for monitoring. As the pilot action it was planned to monitor 24 838 ha by aerial imagery. The evaluation of pilot results (differentiating species, calculating stocks, recognizing invasive species and diseases, etc.) was delivered by experts, while integration of images into digital regional planning maps for energy and environment related investments were delivered by the cooperating organisations of the RED FAITH project, using ArchGIS. In Croatia, low altitude photos were taken by drones where irregularities were identified by the pilots. Afterwards, results were evaluated jointly with Hungarian and Croatian partners.



Red Faith Forest
Photos: Mecsek Forestry Co



Red Faith training of forest managers

Good practice general information	
Title of the practice	Introducing airborne imaging technologies in forest management near the Drava River
Organisation in charge of the good practice	Mecsek Forest company Co (HU) Project partners in RED FAITH project: Baranya County Municipality (HU), FOOZOS (CR), Croatian Forest company - HRVATSKE ŠUME d.o.o. (CR)
Description	
Short summary of the practice	<p>The good practice was implemented as an activity of the project 'Restoring Ecological Diversity of Forests with Airborne Imaging Technologies (RED FAITH)', financed by the Hungary-Croatia Cross-border Co-operation Programme.</p> <p>Climate change adaptation and environment protection are important challenges in EU, and due to its remarkable natural values it has a special importance for the Hungarian-Croatian border region. With its manifold ecosystem services, forests of the area are not only valuable reserves of biodiversity and pristine landscapes for recreation, but also provide renewable resources, bioenergy and offer employment in rural areas. A healthy forest possesses the ability to sustain the unique species composition and processes that exist within it. Through climate change, forests are highly endangered by hail, drought, diseases, and by spread of invasive species. The forest companies of the border region agree that monitoring of forests is the first step to impede the spread of invasive species and other endangering factors.</p> <p>The project sets out the overall objective of contributing to preservation and protection of biodiversity in forest areas by supporting <i>forest companies</i> and other organizations responsible for managing habitats in detailed, up-to-date monitoring with airborne imaging. As a specific objective it accelerates reactions to emerging hazards, protects/restores natural assets by enabling <i>forest companies</i> to select the most efficient interventions, improves knowledge of forest engineers, raise awareness on forest values and sets up CB (cross-border) cooperation of <i>forest companies</i>.</p> <p>Initially, <i>forest companies</i> compared their surveys applied, conducted research on airborne technologies and defined parameters for monitoring. As the pilot action it was planned to monitor 24 838 ha by aerial imagery. The evaluation of pilot results (differentiating species, calculating stocks, recognizing invasive species and diseases, etc.) was delivered by experts, while integration of images into digital regional planning maps for energy and environment related investments were delivered by the cooperating organisations of the RED FAITH</p>

	project, using ArchGIS. In Croatia, low altitude photos were taken by drones where irregularities were identified by the pilots. Afterwards, results were evaluated jointly with Hungarian and Croatian partners.
Category of the good practice	Empowering tools
Resources needed	The total ERDF funding of the project was 485 401.94 EUR, which covers 85% of the project's expenditure. Further 15% were provided as own contribution. In Croatia the own contribution was covered by partners themselves, while in Hungary 15% were provided by the State.
Timescale (start/end date)	The duration of the project was 2 years from 1 October 2017 until 30 September 2019.
Strategic relevance (long term impact)	The project directly addresses the challenge of a climate change and contributes for the sustainable management of ecosystem via providing detailed, up-to-date information on forest conditions. Partners foster the introduction of airborne monitoring technology, which represents very high resource efficiency. The current good practice didn't include any component to make economic analysis, but the financial saving potential of airborne imaging was already calculated by a project (CHANGEHABITATS 2) financed by the 7 th Framework Programme, which concluded that cost savings up to 3.4 Billion Euros at EU level could be achieved by reducing field work for habitat mapping by analysis of airborne sensed data. Pilot actions, CB action plan, trainings and awareness raising can all contribute to ensure a sustainable operation of this process. The pilots ensure better reaction of the results of climate change (weather events, invasion of insects, diseases & invasive species), as aerial imaging provides a possibility for early recognizing these problems and intervening rapidly.
Evidence of success (results achieved)	<p>The applied technologies (multispectral imaging, hyperspectral imaging, LiDAR - Light Detection and Ranging) ensure much better access to forest areas than ground surveys, and they are able to map large surfaces quickly. However, automatic recognition and identification of different species is a challenge, as the high quality of images must be permanently ensured. Even so, the introduction of multispectral, hyperspectral and Lidar technologies can be evaluated as a breakthrough in forest monitoring, which can be advised and supported by other forest companies and national parks in Europe. The reasonability of their application is proved by the high level of interest of forest managers, environmental experts and other stakeholders, such as local authorities.</p> <p>The good practice targeted to reach 276 persons directly at project events, such as workshops and conferences. Two</p>

	national parks and four forest companies have benefited from the project. Besides providing professional knowledge to forest managers, 76 children were also targeted to raise their awareness on the values of the ecosystem.
Tangibility	The cooperation resulted in tangible results, such as aerial images of the forest area covered by pilot actions, databases generated from aerial images, studies like “Forest company Applications of Airborne Remote Sensing Techniques”, “The mysteries of modern mapmaking and remote sensing”, “Evaluation Study of Experimental Action”. Besides, the introduction of the aerial imaging technologies, the Forest House of Tikves (Croatia) was renovated and multimedia devices were procured to introduce natural assets and values of forests for children. Two national parks, four forest companies and a county municipality benefited from experimenting the possibility of forest monitoring by airborne technologies. 76 children were educated at two already existing forest schools in the two countries.
Durability	<p>The <i>forest companies</i> are state-owned structures with stable financing and human background. Therefore, they are able to maintain the achieved results and apply the airborne technologies tested by the project as pilot actions in long terms. The joint action plan creates the framework for the cross-border cooperation, sharing knowledge and building individual relationships.</p> <p>To embed this knowledge into everyday work of <i>forest companies</i>, trainings for professionals were organized. As the aerial images present a spectacular experience for wider public, they were inserted into training materials of forest schools and trainings for children were organized at forest houses of Mecsekerdő and forest house of Hrvatske Sume at Tikves. The forest schools were equipped with multimedia devices for visualization of training materials. Continuation of a joint work was supported by the cross-border action plan, network of <i>forest companies</i> and intranet.</p> <p>Also, other <i>forest companies</i> are ready to take over experiences of the good practice and have expressed an interest in a long-term cooperation by issuing the letters of support. Awareness raising will be continued by using training materials at forest schools, which are regularly organized by the <i>forest companies</i>. Besides, the cross-border action plan will be forwarded to the relevant ministries of both partnering countries, Hungary and Croatia, for consideration and utilization for updating the national forest management guidelines and strategies.</p>
Visibility	The cooperation produced several internal and public communication actions. The conceptual questions on forest monitoring methods, technological requirements, analysing

	<p>the results and educating forest managers were discussed at 5 project meetings in Hungary and Croatia. The project partners also launched the project website (https://www.redfaith.hu/en). Besides, leaflet and brochure were prepared to describe objectives and duties of the cooperation. The partners informed wider public about actual tasks at the kick off conference in Hungary and the closing conference in Croatia. Four workshops were organised for professionals (2 in HU, 2 in CR), where mainly airborne imaging technologies, their benefits and practical results have been introduced, and the feedback from forest managers and stakeholders was collected. The studies delivered by the project (currently applied processes of forest monitoring, comparative analysis of current processes of forest monitoring, study on available airborne imaging technologies, legal regulations related to airborne monitoring) were made available for public.</p> <p>Another important strand of the communication was provided by training activities; forest managers were trained to use new imaging technologies. Besides, trainings were organised for pupils about the forest vegetation and their protection. For this purpose, the Forest Company House at Tikves (CR) was renovated and prepared for forest school's activities; multimedia devices for trainings were installed at forest school's premises. Partners have elaborated a joint training material for experts - forest managers, environment experts, and 2 training materials for children studying at forest schools (1CR, 1HU). The organisation of trainings for experts and children were also a part of the project.</p>
Added Value	<p>The accessibility of forest areas is diverse. Their unified monitoring can be efficiently ensured by technologies used by the good practice – containing aerial imaging, and also evaluation of these images. Limited accessibility is one of the main reasons why airborne monitoring is necessary, as some forest areas can be reached with more difficulties. Aerial imaging eliminates this obstacle and provides the possibility of monitoring all forest areas without facing the problems deriving from the differences of landscape – only favourable weather conditions are needed for the flights and taking images. Besides, as these forest areas are not located at transport hubs, they are not well-known for tourists. Awareness rising is important to attract visitors - with special attention on children - to these destinations. The promotion of forests as ecosystems is also an added value of the project, which is delivered via trainings and diverse communication actions.</p>
Effectiveness	<p>Usually, the forest monitoring is handled by ground surveys, but this is time-consuming and expensive process, besides</p>

	<p>forest managers are not able to check the crowns of trees, which would make it possible to recognize irregularities earlier.</p> <p>The airborne hyperspectral remote sensing technology might be the best technique to map invasive species, as images can cover large area quickly with relative high ground and radiometric resolution. It can detect small patches that otherwise might have been missed by ground surveys. In its most common form, it is an airborne optical remote-sensing technology that measures scattered light to find range and other information on a distant target. The ability to capture the height at such high resolution is Lidar's principal advantage (Lidar stands for light detection and ranging.). Traditionally, foresters and land managers have relied on topographic maps for terrain classification and field surveys to obtain tree volumes and height information. Lidar penetrates the tree canopy to return a more accurate interpretation of the ground surface. This increases the accuracy of terrain classification and thereby the resultant interpretation and analysis of the geographic features. Forest inventories can be conducted at nearly the single tree level, offering more accurate representations of the true forest stand structure and damages.</p>
Innovation	<p>Although penetration of geographical information systems (GIS) in the forest industry of countries with developed forest management has made possible the optimization of these working methods, <i>forest companies</i> of the CR-HU border region haven't exploited this possibility yet. The focus of the project was on hyperspectral, multispectral point cloud-based data, airborne remote sensing, pixel- and cloud-based vegetation mapping. These technologies represent the latest trends of spatial data application at the forest company.</p>
Efficiency	<p>The penetration of geographical information systems (GIS) into the forest industry of countries with developed forest management (Canada, UK) has made possible the optimization of working methods. The GIS is becoming one of the most essential tools for the forest management. In this context, there is a business need for a continuous up-to-date inventory of existing forest resources (location, condition). This is compelling for foresters to look for more cost-effective and faster alternatives of ground surveys. The CR-HU border region hasn't exploited this possibility yet, as technologies were not known in these countries – airborne monitoring (mostly Lidar and hyperspectral) is a very innovative technology itself.</p>
Externality	<p>The area of remote sensing and global information system is extremely active in Hungary. Within this area, a successful co-operation between forest company management departments, universities and scientific institutions can be effectively</p>

	<p>realized by applying the latest devices and methods. The integration of airborne laser mapping (LiDAR), airborne digital photography (making of digital orthophotos) and airborne hyperspectral imaging will be suitable to determine the woody vegetation structure of the examined area, thus to differentiate them on the level of species and to locate invasive wood species. An important feature is that this technology can be used in other regions as well, as the forest vegetation does not stop at regional or country borders.</p>
Intra-regional coordination	<p>More than 124 000 ha of forests are managed by the partners, where share of the Natura 2000 sites is extremely high (76% in HU). By involving the other two forest companies (Somogy County, Zala County) of South Transdanubian Region and the Danube Drava National Park to the analysis of the results and evaluation of their applicability, the project covers the entire forest land of the border area.</p>
Extra regional impact	<p>The challenge of mapping forest areas by new technologies to identify invasive species and diseases needs to be tackled by interregional (cross-border) cooperation, as forests are composed of similar species and the natural and human hazards always cross the borders. Risks & benefits of airborne imaging will be jointly analyzed, which makes the initiation of innovative technologies safer.</p> <p>The beneficiaries have widened their cooperation by involving 2 other forest companies (SEFAG Zrt, Zalaerdő Zrt), 2 national parks (Duna Dráva Nemzeti Park, Javna ustanova Park prirode Kopački Rit) and 3 environment protection related organizations (J.U. Agencija za upravljanje zaštićenim prirodnim vrijednostima na području Osječko-baranjske županije, Sveučilište Josipa Jurja Strossmayera u Osijeku, Izviđački klub Javor Osijek) as supporting stakeholders. The <i>forest companies</i> and national parks will use the training material developed in result of project implementation for professional trainings. For them the results of pilot actions are also important as remarkable share of the <i>forest companies</i> belong to Natura 2000 sites: from the 55 000 ha forests of Mecsekerdő Zrt 40 765 ha (76%) are registered as Natura 2000 sites. Moreover, <i>forest companies</i> will set up a network, which will be widened by the other regional offices of Hrvatske Šume and other Hungarian forest companies.</p>
Quality	<p>The quality can be interpreted as a process quality and also as an accuracy of the data gained from the imaging. Regarding the processes, the concept proved to be successful – hyperspectral, multispectral, lidar airborne imaging combined with low altitude drone monitoring is a complex tool for analysing the vegetation. In addition, as the application of these technologies in forest management is an innovation, some ‘beginner’</p>

	problems have appeared in terms of the data accuracy – the automatized identification of different species might sometimes bring false results. This shortage can be eliminated by more routine in the aerial imaging and fine-tuning of the evaluation software.
Potential for learning or transfer (1000 char)	<p>The results of pilot actions (aerial imaging of forest areas) can be discussed with Hungarian and Croatian forest companies, the evaluation of an experimental action can be downloaded and analysed for the local adaptation. After setting the goals for other regions – like creating a repository of species, identifying invasive species, detecting diseases of the vegetation – the applicable imaging technics can be selected, mixed tools can be defined.</p> <p>The expected costs of the airborne imaging and quality of images, potential obstacles, timeframes can be predicted from experiences of the pilot action.</p> <p>With this support, efficiency of monitoring of the European forest areas can be raised and databases can be unified.</p>
Further information	https://www.redfaith.hu/en