PROGRESS
Interreg Europe

European Union
European Regional
Development Fund

PROmoting the Governance of Regional Ecosystem ServiceS

SECOND HANDBOOK OF GOOD PRACTICES

Policy theme:

Support the horizontal integration of the ecosystem concerns into the sectoral policies and plans at regional and/or national level.

04/012/2021

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1862 RIGA TECHNICAL UNIVERSITY
Institute of the Civil Engineering and Real Estate Economics
Faculty of Engineering Economics and Management

TOLNA COUNTY Development Agency

UNIVERSITATEA DIN CRAIOVA

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Tionól Réigiúnach Oirthir agus Lár-Tire
Eastern and Midland Regional Assembly

Contents

I. Introduction

The objective of the PROGRESS project Second Handbook of Good Practices (GPs) is to present 8 good practices of project partners presented during the 2nd Interregional Thematic Seminar (ITS) that was supposed to take place online from Dublin, Ireland on 27-28 October 2020. The policy theme of the 2nd ITS was "Support the horizontal integration of the ecosystem concerns into the sectoral policies and plans at regional and/or national level." And it particularly targets forest ecosystems.

The eight selected PROGRESS good practices:

1. Dublin Mountains Makeover (DMM) – Ireland;
2. Forest Ecosystem Services Mapping and Assessment Methodology – Latvia;
3. Definition and indicators for the characterization of the Agricultural Areas – Catalonia, Spain;
4. Catalonian Forest Laboratory – Catalonia, Spain;
5. Citizen Council for Sustainability, Catalonia, Spain;
6. Conservative management of habitats ROSCI0129 4070 and 9260 in the North West of Gorj - Gorj County, Romania;
7. Protecting of the English oak in the cross-border area – Hungary;
8. Introducing airborne imaging technologies in forest management near the Drava River – Hungary.

The IE definition of a good practice (GP) provides that *"The good practice is defined as an initiative (e.g. methodology, projects, processes, techniques) undertaken in one of the programmes thematic priorities[1] which has already proved successful and which has the potential to be transferred to a different geographic area. Proved successful is where the good practice has already provided tangible and measurable results in achieving a specific objective."*

Therefore, identification, analysis and sharing of good practices is a part of the PROGRESS mutual policy learning process to achieve the improvement of policy capacity or capitalization of its partners and regions. In addition, transferring of good practices from one partner region to another can be included in the regional action plan if it can result in a policy change.

In line with the above capitalisation objective, the PROGRESS project aims to: "*initiate a process of policy change in the partners' regions improving the implementation of the policy instruments under Structural Funds programmes and other regional strategies dedicated to the conservation of biodiversity and the maintaining nature's capacity to deliver the goods and services that we all need, through policy learning and capacity building activities*".

The idea of the Handbook of Good Practices is to further extend the capitalization and achieve spill-over effects outside the PROGRESS partners' territories to those interested parties, which might wish to transfer and implement good practices developed by other regions in their own area. In addition, information on the selected good practices will also be shared on the Interreg Europe Policy Learning Platform.

This Second Handbook of Good Practices is one of four handbooks describing the best good practices of PROGRESS partners under the four policy themes:

1. Promote the measurement of the costs and benefits of ecosystem services derived from land use.
2. Support the horizontal integration of the ecosystem concerns into the sectoral policies and plans at regional and/or national level.
3. Explore innovative financial and marketing mechanisms for payment for ecosystem services.
4. Improve landscape governance for economic and environmental sustainability.

The Third Handbook of Good Practices on the policy theme "Explore innovative financial and marketing mechanisms for payment for ecosystem services." is expected during 2021.

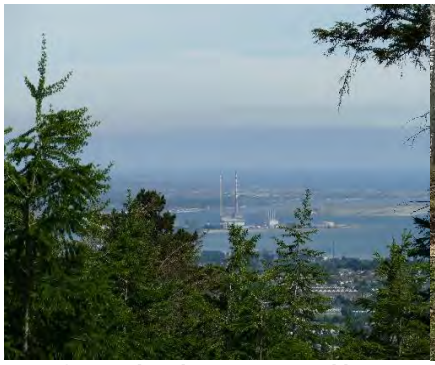
[1] In the case of the IE program, the thematic priorities are four policy topics related to the regional development:

- Research, technological development and innovation
- Competitiveness of SMEs
- Low-carbon economy
- Environment and resource efficiency.

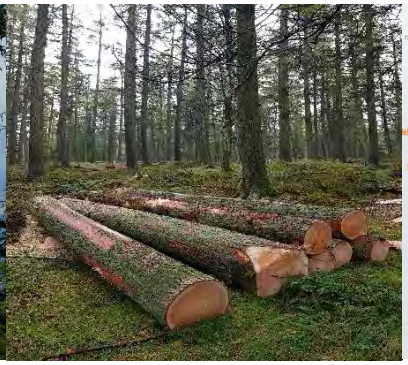
II. Descriptions of Good Practices

1. Dublin Mountains Makeover (DMM)

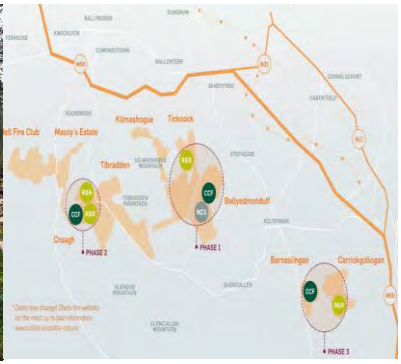
Summary: The Dublin Mountains Makeover (DMM) involves the implementation of a multi-generational forest management model across an area of over 900 hectares of forest at the southern edge of Dublin City. The practice is being implemented across nine Coillte forests in the Dublin Mountains. The DMM involves a transition away from a traditional clearfell and replanting cycle, with 'Continuous Cover Forestry' (CCF) principles[2] being applied to maintain the green canopy on a permanent basis. In areas where the CCF technique is not suitable, non-native Sitka spruce and lodgepole pine trees are being removed and replanted with native species such as Scots pine, birch, rowan, oak, holly and willow to provide habitat for nature. The adoption of this model improves biodiversity, enhances the recreation appeal and, as such, horizontally integrates ecosystem services considerations into the forest management practices of a commercial entity. Over the last ten years, the "Dublin Mountains Partnership" - which is a partnership between Coillte and wide-ranging stakeholders - has been managing and improving recreation facilities in the Dublin Mountains. The Dublin Mountains Makeover is an initiative born of this partnership with the improvement of forest resources for nature and people at its core.



View from Ticknock Forest over Dublin City and Bay, © Coillte Nature, May 2020



Continuous Cover Forestry (CCF) thinning at Cruagh Forest, Dublin Mountains © Coillte Nature, October 2020



Dublin Mountains Makeover - Map © Coillte

Good practice general information	
Title of the practice	**Dublin Mountains Makeover (DMM)**
Organisation in charge of the good practice	**Coillte** (meaning "forests" in Irish) is a commercial forestry business owned by the Irish state, managing 7% of Ireland's land[3]. The Dublin Mountains Makeover is an initiative of **Coillte Nature**, the not-for-profit branch of Coillte that is dedicated to the restoration, regeneration and rehabilitation of nature across Ireland. Coillte forests are open for public access with an

[2] https://www.coillte.ie/a-beginners-guide-to-continuous-cover-forestry/

[3] Mc Guinness, S.K. & Bullock, C. (2020). Mobilising Finance for Biodiversity: A policy and institutional review of finance arrangements for biodiversity conservation in Ireland. Report prepared for the National Parks and Wildlife Service and the Irish Research Council. University College Dublin, Dublin.

	estimated 18 million visitors annually. 20% of the Coillte estate is currently managed for biodiversity [4] (managed for the protection of wild species and habitats).
Description	
Short summary of the practice	The Dublin Mountains Makeover (DMM) involves the implementation of a multi-generational forest management model across an area of over 900 hectares of forest at the southern edge of Dublin City. The practice is being implemented across nine Coillte forests in the Dublin Mountains. The DMM involves a transition away from a traditional clearfell and replanting cycle, with 'Continuous Cover Forestry' (CCF) principles[5] being applied to maintain the green canopy on a permanent basis. In areas where the CCF technique is not suitable, non-native Sitka spruce and lodgepole pine trees are being removed and replanted with native species such as Scots pine, birch, rowan, oak, holly and willow to provide habitat for nature. The adoption of this model improves biodiversity, enhances the recreation appeal and, as such, horizontally integrates ecosystem services considerations into the forest management practices of a commercial entity. Over the last ten years, the "Dublin Mountains Partnership" - which is a partnership between Coillte and wide-ranging stakeholders - has been managing and improving recreation facilities in the Dublin Mountains. The Dublin Mountains Makeover is an initiative born of this partnership with the improvement of forest resources for nature and people at its core.
Category of the good practice	Enabling environment
Resources needed	Coillte Group turnover in 2019 was €327.4 million with an operating profit of €63.3 million[2]. The DMM is a project of Coillte Nature, the not-for-profit branch of Coillte which was launched in June 2019. A new diverse team of four people (with internal and external expertise) was appointed to Coillte Nature in October 2019. This includes a director, a specialist in environmental communications & partnerships, an ecologist and a forestry operations expert (professional forester). In January 2020, work commenced on four key projects, including the DMM. Coillte intends to continue growing Coillte Nature into a successful not-for-profit business and is investigating a range of external funding sources to help scale up activity in the near term[2] (see www.coillte.ie/introducing-the-nature-trust/ for example).

[4] Coillte (2019) *Annual Report 2019.* Newtownmountkennedy, Wicklow: Coillte.
[5] https://www.coillte.ie/a-beginners-guide-to-continuous-cover-forestry/

Timescale (start/end date)	January 2020 – long term (possibly decades)
Strategic relevance (long term impact)	The European Green Deal aims to transform the EU from a high- to a low-carbon economy, while improving people's quality of life and the environment, without reducing prosperity. Within the Green Deal it is recognised that forest ecosystems are under increasing pressure as a result of climate change. It states that the EU's forested area needs to improve, both in quality and quantity, for the EU to reach climate neutrality and to secure a healthy environment. A new EU forest strategy is to be prepared by the EU Commission covering the whole forest cycle and promoting many services that forests provide, with respect for ecological principles favourable to biodiversity. Furthermore, the Green Deal states that national strategic plans under the Common Agricultural Policy should incentivise forest managers to preserve, grow and manage forests sustainably. In Ireland, this is the CAP Strategic Plan post 2020 which is currently being prepared by the Department of Agriculture, Food and the Marine. The EU Strategic Environmental Assessment (SEA) Directive (2001/42/EU) approaches environmental concerns from a broad strategic perspective, necessitating sectoral, regional or national planning to include a wider consideration of environmental impacts. This includes consideration of the sustainable development of the forestry sector. According to the Europe-wide Eurobarometer Survey (2019), climate change and biodiversity loss are some of the most important issues for European citizens. For the youth of Europe, the clear-felling of forests is something they don't want to see at all. As such, the ethical and symbolic dimension is clearly as important as the economic aspect. Public policy and public opinion across Europe now clearly recognise the potential environmental and socio-cultural benefits associated with sustainable forest management (SFM) practices. In Ireland, forest policy is improving in this regard, with more requirements on type and location of planting, including a requirement that 15% of the planted area should comprise native broadleaf species[1]. Initiatives such as the DMM demonstrate that the commercial sector is beginning to recognise and adapt to new knowledge and new values. Coillte currently owns 54% of the national forest estate in Ireland[6] with forestry accounting for 11% (770 000 ha) of the total land area of the state. The national forest estate contains a high proportion (68%) of commercial plantation, much of

[6] DAFM (2019) *Forest Statistics - Ireland 2019*. Johnstown Castle, Wexford: Department of Agriculture, Food and the Marine (DAFM).

	which (85%) is comprised of single-age, non-native conifer species, of which 51% is fast-growing Sitka spruce[4] (Picea Sitchensis) which has a low biodiversity value. The strategic aim of the DMM is to improve biodiversity, climate resilience and recreation by regenerating urban forests. The ongoing transition to the multi-generational forest management model at the heart of the DMM is a slow and careful process, conducted in a manner that minimises disruption to local residents and visitors, while locking in benefits for nature and recreation that will be enjoyed by generations to come.
Evidence of success (results achieved)	A key aspect of the DMM is that project activities are continually documented on the dedicated webpage: https://www.coillte.ie/coillte-nature/ourprojects/dublinmountainsmakeover/. This webpage includes news articles, blogs and videos. So far, this approach has allowed stakeholders to keep track of upcoming and completed project actions, while being informed about various SFM methods being used and challenges identified. This approach helps to record measurable outputs, while engaging stakeholders, thereby, contributing to the long-term success of the DMM.
Tangibility	Tangible outcomes of the DMM are carefully documented as implementation continues. By example, works to be carried out in 2020 were divided into three phases, each of which is described in detail in terms of action, location and extent. The implementation of these phases has been documented on the project website, allowing accurate measurement of results. For example, Phase 1 was described as the planting of 14 hectares of "Continuous Cover Forestry" (CCF) and 6 hectares of "Remove & Replant with a mix of native and non-natives" (R&R-mix) in Ballyedmonduff, and 3 hectares of Remove & Replant (R&R) in Ticknock. News items on the project webpage have documented the progress of this phase as follows: • 26/06/2020 - Ballyedmonduff CCF - https://www.coillte.ie/work-begins-on-the-dublin-mountains-makeover/ • 10/07/2020 – Ticknock R&R - https://www.coillte.ie/visitng-ticknock-look-out-for-our-first-rr-site-as-part-of-the-dublin-mountains-makeover/ • 14/08/2020 – Ballyedmonduff R&R-mix - https://www.coillte.ie/the-dublin-mountains-makeover-continues-in-ballyedmonduff/ Furthermore, long-term biodiversity monitoring plots will be installed across each habitat and forest type from 2021 to monitor changes over time.

Durability	In the Dublin mountains, Coillte owns and manages around 50% of the forested area. The remaining area is owned and managed by private forest owners. When the Coillte forests were first planted between the early 1940s and late 1960s, limited environmental criteria were applied. Thus, these areas were deemed to be of limited biodiversity value[1] and the main objective of the tree planting was to provide timber. Back then, Dublin was a much smaller city more remote to the Dublin Mountains, and nobody thought much about outdoor recreation activities in forests. Growing recognition of the biodiversity value of these locations - in addition to changes in grant support structures - has encouraged the set-aside of a proportion of planted areas to biodiversity or open space and native broadleaf planting[1]. Regulations to protect waterways, differential thinning techniques and dedicated grant premium categories for higher biodiversity value species have been introduced[1]. Specific initiatives include the Felling and Reforestation Policy (2017) and the Forest Service's Native Woodland Scheme (2015). Through the DMM, Coillte have designated forest areas for biodiversity and are also supporting forest enhancement by means of corporate offsetting ventures through Natural Capital Partners and Microsoft. Furthermore, the private company 'Green Belt' has provided supplementary capacity[1]. The nine forests included in the DMM are among the most important recreational sites for a growing urban population seeking fresh air and green space. They are the most frequently visited forests in Ireland, with the DMM very much framed by the amenity and recreation value of the selected forests. As such, the DMM presents itself as a durable model for the following key reasons: 1. Coillte – as a state-owned entity - owns a large proportion of the forested area of the Dublin Mountains. 2. Prevailing policy developments now favour biodiversity restoration and enhancement. 3. The DMM provides recreational and amenity benefits for the proximate urban population of Dublin City with an established relationship with recreation users through the Dublin Mountains Partnership.
Visibility	Coillte Nature has a stated commitment to minimise impacts on local residents and to engage with all of their stakeholders to ensure that everyone knows what they're doing, how, where, when and why. They do this by: • Making regular updates on the Coillte Nature webpage: www.coillte.ie/coillte-nature/

	• Posting key dates and locations on Twitter, Facebook and Instagram • Engaging with local and national media (newspapers, radio and TV) • Putting up signs on-site to show what they're doing, where, when, why and how • Holding information days, walks, talks and other events (to commence as soon as COVID-19 restrictions allow) • Circulating information leaflets (An informational leaflet was sent to 13,200 homes across South Dublin at the commencement of the DMM) In line with these commitments: • The DMM is currently showcased on the Coillte website: https://www.coillte.ie/, as well as having its own dedicated webpage: https://www.coillte.ie/coillte-nature/ourprojects/dublinmountainsmakeover/ • Coillte has: 7,695 followers on Twitter; 14,371 followers on Facebook; 2,762 followers on Instagram (Information correct as of 21/09/2020) with regular updates relating to the DMM posted on each. The DMM communications campaign reached an audience of 2.5 million people during its launch week of May 25th 2020. This resulted in substantial local and national media attention. For example: • Articles in The Irish Times national newspaper: 27th June 2020: https://www.irishtimes.com/news/science/the-ultimate-restoration-project-rescuing-ecosystems-for-a-diversity-of-users-1.4330225 and 27th August 2020: https://www.irishtimes.com/news/science/the-ultimate-restoration-project-rescuing-ecosystems-for-a-diversity-of-users-1.4330225 • Coverage by RTÉ, Ireland's national broadcaster (9th July 2020): https://www.rte.ie/brainstorm/2020/0706/1151597-dublin-mountains-forests-makeover-climate-change-health/ • Coverage in the local media: e.g. https://www.dublinlive.ie/news/dublin-news/work-begin-plans-transform-nine-18306743 (25th May 2020) and https://www.echo.ie/tallaght/article/dublin-mountains-undergoing-a-massive-makeover (25th June 2020) • Coverage by local and national interest groups:

	https://wicklowuplands.ie/dublin-mountains-makeover-to-commence-this-summer/ https://www.dublinmountains.ie/news/latest_news/?no_cache=1 https://www.treecouncil.ie/post/dublin-mountains-makeover Social media also drove significant public engagement with the DMM project. For example: • Over the 4-day launch period, the campaign reached 227,394 people • 11,273 people engaged with (liked, clicked, commented, shared) Coillte's posts across the four channels • Positive comments overwhelmingly outweighed isolated negative comments • Coillte Nature reports that engagement rates were exceptionally high compared to industry standards Information boards are set up at each of the forests where work has commenced. For example, here is a link to the signage which was erected at the commencement of CCF work at Ballyedmonduff: https://www.coillte.ie/media/2020/07/DMM-Ballyedmonduff-signage-FINAL-PRINT-v2.pdf
Added Value:	In addition to achieving strategic objectives of reforesting landscapes, restoring biodiversity, regenerating urban forests, and rehabilitating ecosystem services, the DMM provides an important recreational function. The target forests are among the most important recreational sites for Dublin's growing urban population seeking fresh air and green space: Ticknock, Coillte's most popular forest, sees over 550 visits a day. The DMM is designed to be a slow and careful process, conducted in a way that minimises disruption to local residents and visitors, while locking in benefits for nature, recreation and the landscape of the Dublin Mountains that will be enjoyed by generations to come.
Effectiveness	The effectiveness of the DMM is underscored by the involvement of wide-ranging stakeholders in the development of the DMM as the vision for the Coillte estates in the Dublin mountains. For many years, there have been calls by multiple stakeholders to improve biodiversity and amenity access in these publicly-owned forests. These include 1) the Dublin Mountain Initiative (DMI) representing recreational users of the Dublin Mountains including Mountaineering Ireland, Cycling Ireland, the Irish Mountain Running Association and the Irish Orienteering

	Association, 2) Scouting Ireland, 3) Local Authorities (Dublin City Council, South Dublin County Council and Dún Laoghaire-Rathdown County Council), and 4) the National Parks and Wildlife Service. These stakeholders came together with Coillte to form the "Dublin Mountains Partnership" which worked to develop a shared vision for forests in the Dublin mountains. The DMM is at the heart of this vision - the culmination of this partnership approach coupled with Coillte's own desire to manage up to 20 per cent of its forests principally for biodiversity and recreation. The DMM has thereby provided a means to create multi-purpose forests which respect the diversity of stakeholder views, while creating more biodiverse forests with improved ecosystems and wide-ranging ecosystem services including socio-cultural services related to recreation.
Innovation	It is estimated that native woodlands in Ireland are worth approximately €35 million annually in amenity use alone[7]. The concept of 'Green Infrastructure' is now increasingly mainstreamed within policy discourse to include human health and wellbeing linked to functioning ecosystems[8]. Related to this, there have been repeated calls to improve the biodiversity and amenity access of public-owned forests in the Dublin Mountains. The DMM is the largest forest transformation project of its kind ever carried out in Ireland. The approach to planting trees in these forests – 90 per cent of which up until the commencement of the DMM were dominated by non-native coniferous trees – is radically changing. Sections with suitable soils are being planted with native trees, and trees will no longer be clear-felled. Instead, Continuous Cover Forestry (CCF) techniques are being used. This approach sees the removal of a small number of trees over time, allowing a mix of species and ages of trees to co-exist at the same time. CCF allows the light to reach the forest floor and new seedlings to grow. This leads to a multigenerational forest with greater species diversity into the future. The DMM is thereby creating new biodiverse habitats and landscapes, while improving the resilience of forests by having trees of different ages growing alongside each other. Furthermore, with recreation and amenity at its core, the DMM is a project that will transform the Dublin Mountains for the benefit of the environment and population well-being – this is the very essence of the European Green Deal.

[7] Bullock, C. and Hawe, J. (2014) *The Natural Capital Values of Ireland's Native Woodland*. Rathfarnham, Dublin: Woodlands of Ireland.
[8] Scott, M., Lennon, M. and Douglas, O. (2019) 'Mainstreaming green infrastructure as a health- promoting asset', *Town and Country Planning*, pp. 151–156.

Efficiency	The Dublin Mountains forests were planted with timber in mind. Today, Coillte recognises that their most significant value is in recreation for the people of Dublin City and their potential in enhancing biodiversity. The DMM is taking place on land that is already owned and planted by Coillte. There has, therefore, been no necessity for Coillte to acquire new land for the DMM. The DMM is targeting the 9 highest footfall forests for amenity and recreation in the Dublin Mountains. Every year about 600,000 people go to woods in Massey's Estate, Hell Fire Club, Cruagh, Kilmashogue, Tibradden, Ballyedmonduff, Barnasligan and Carrickgollogan to walk their dogs, hike, run, mountain bike, orienteer or horse-ride. With 550 visitors a day, Ticknock woods – right in the centre of this green east-west band of upland forestry – is Coillte's most popular forest in Ireland. As such, the long-term success of the DMM in terms of enhancing forest recreation is well-targeted. Furthermore, the former commercial plantation management approach (primarily clearfell and replant non-native conifers on a 40-year rotation) was becoming increasingly controversial and difficult to implement in these high recreation forests. The actions of the DMM will improve the biodiversity of target forests, enhance their recreational appeal and bring more autumn colour to the landscape - while still producing some timber for the sawmilling sector - and engaging an urban population in the understanding of the life-cycle and the uses of trees. As such, the DMM can be considered to be an economically, socially and environmentally efficient practice.
Externality	Where forestry is proximate to other agricultural activities and habitats (e.g. heathland in the Dublin Mountains), the biodiversity restoration benefits all. Ultimately, agriculture and forestry rely on good soil fertility which depends on vital ecosystem services provided by soil biodiversity - from soil bacteria, fungi, rotifers and earthworms [9]. The accurate valuation of the majority of these ecosystem services remains complex. Overall, it is estimated that pollinators contribute €59 million to the Irish economy[10], while the new EU Biodiversity Strategy recognizes that more than 75% of global food crop types rely on animal pollination and identifies pollinator decline as one of the five main direct drivers of biodiversity loss. Biodiverse forests will attract pollinators, which in turn help with crop pollination. This is a Nature Based Solution (NBS) which can help to ensure that biodiversity and resilience are secured at the landscape scale.

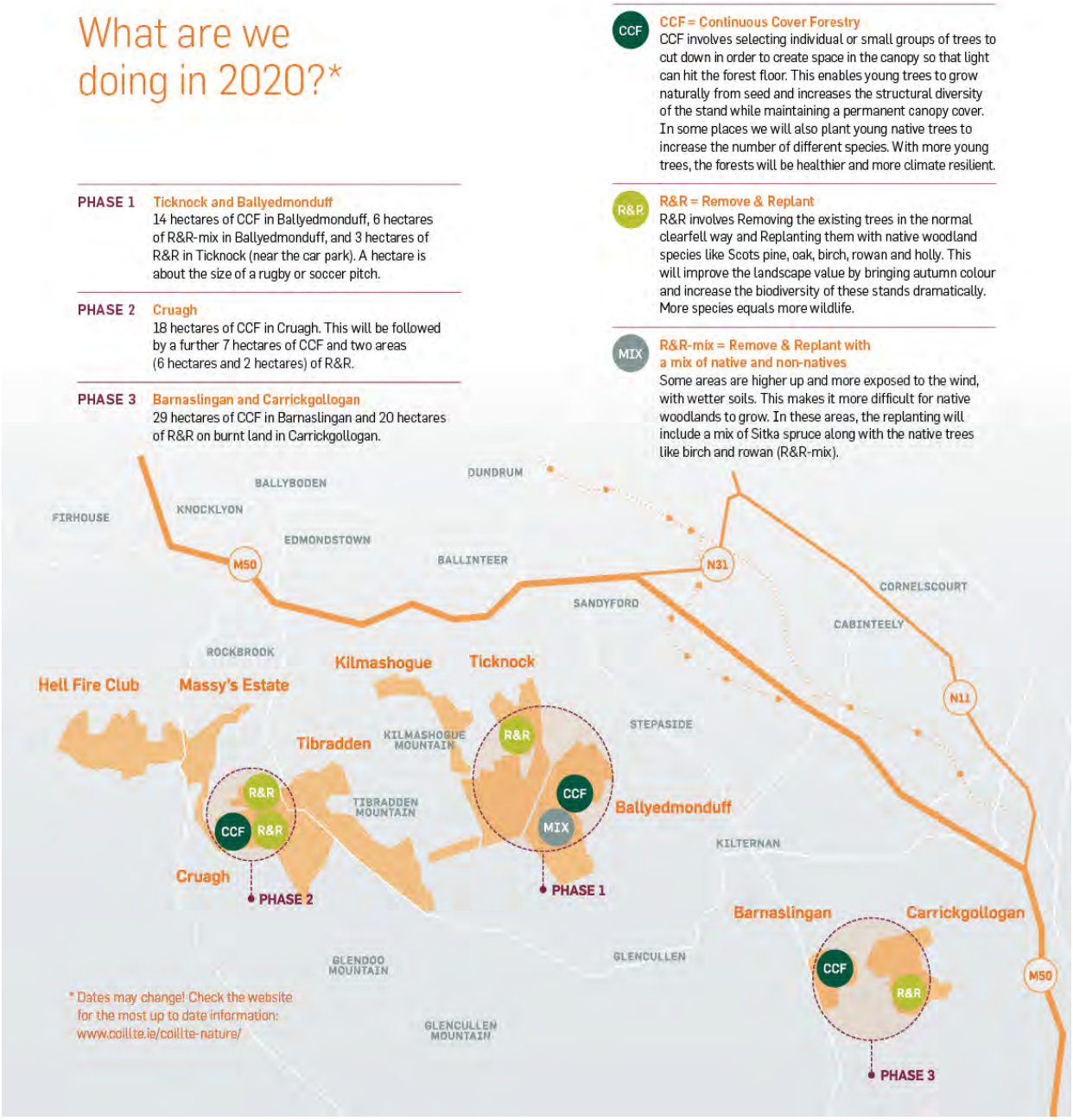
[9] Bullock, C., Kretsch, C. and Candon, E. (2008) *The Economic and Social Aspects of Biodiversity: Benefits and Costs of Biodiversity in Ireland*. Dublin: Department of Environment, Heritage and Local Government. doi: ISBN 978-1-4064-2105-7.
[10] NBDC (2015) *All-Ireland Pollinator Plan 2015-2020*. Waterford: National Biodiversity Data Centre. Available at: internal-pdf://1.72.242.14/NBDC 2015, All-Ireland Pollinator Plan.pdf.

	The "Dublin Mountains Partnership" brought together wide-ranging stakeholders to develop a vision for the Dublin mountains. This approach underlies the DMM and can provide a template for similar interactions elsewhere. Indeed, the publicity around the DMM has led to calls for other Coillte forests to be similarly converted. This clearly raises important questions for the forestry sector to ensure the economic viability of commercial forestry in the context of "nature friendly" forest management and public perceptions of acceptability.
Intra-regional coordination	Interactions between stakeholders in the forestry sector are extensive in Ireland. This interaction is facilitated through collaborative research, advice and regeneration projects, and through the administration of broad-ranging grant schemes[1]. The DMM is a key project for the continued successful co-ordination of wide-ranging stakeholders in the Dublin Mountains and has acted to strengthen co-operation between key groups and organisations which make up the Dublin Mountains Partnership.
Extra regional impact	The DMM has drawn interest from a number of different groups nationally and internationally. Presentations on the practice have been given by the Coillte Nature team at the Society of Irish Foresters Sean McBride annual lecture; an online An Taisce (the Irish Heritage Trust) webinar as part of their Climate Ambassador programme and a scheduled webinar of the Institute of Chartered Foresters in the UK will take place in January 2021. The DMM project received a 'Highly Commended' award at the Irish Planning Institute Awards in 2020. The Irish Planning Institute is the all-island professional body representing planners engaged in physical and environmental planning in Ireland. In the future, Coillte may consider changing the management objective of other forests close to other urban centres beyond the Dublin region in line with the DMM approach.
Quality	This GP emphasises the objectives and values of biodiversity and recreation. Within the GP, the ongoing forest management approach includes: • An element of timber production in the areas where mature non-native spruce will be felled and converted to native woodland. • Thinning where the conifer plantations are gradually transformed to more mixed woodlands and managed by CCF principles and maintaining a permanent forest canopy. Continuous Cover Forestry (CCF) – as applied in the DMM – facilitates high quality outdoor recreation, enhances the

	landscape, stabilises soils, protects water and enriches biodiversity, while also producing valuable renewable timber. This approach may be an appealing 'starting point' for commercial foresters who are trying to balance economic viability with responsibilities for biodiversity and recreation in line with the European Green Deal. This will necessarily involve the incorporation of a multifunctional approach into forest management processes by providing pockets and networks of biodiversity/recreation opportunity if commercially viable, and if selected forests are considered suitable for CCF. The DMM, therefore, represents a high quality and well documented example of a "nature friendly" forest management approach proximate to an urban population centre.
Potential for learning or transfer	50% of the Natura 2000 sites in Europe are forests. As such, good examples of sustainable forest management approaches are vital to achieve key targets contained in the European Green Deal. The DMM is a practical example which can inform better forestry planning for biodiversity enhancement and forest recreation proximate to a large urban centre, while maintaining overall commercial viability of the forestry company. While the practice owner is state-owned, an increasing proportion of forestry activity in Ireland is being conducted on a private basis. With climate change and biodiversity now firmly at the top of EU and national agendas, private sector foresters require new knowledge in order to improve the diversity of their forests to respond to these challenges. The need for forest owners to adopt sustainable forest management (SFM) techniques is vital for biodiversity restoration and to enhance the resilience of Europe's forests. In terms of challenges: 1) there is a need to carefully manage plantation forestry for carbon sequestration. While such potential has been recognised in Ireland for some time[11], the impacts of this management technique on biodiversity (and hence on other ecosystem services) can be counterproductive if not carefully planned (e.g., Forestry located on peatland can be a net carbon emitter and cause substantial ecological degradation; 2) there has been limited concrete progress in terms of adaptation planning to ensure that biodiversity is protected in the context of climate change, while recent reviews of climate action have recommended measures that could counteract biodiversity protection measures. This includes the potential for increased afforestation without consideration of the implications for biodiversity[1]. These challenges highlight the need for better information for forest owners and managers in order to balance the

[11] Byrne, K. and Black, K. (2003) *Carbon Sequestration in Irish Forests*. COFORD Con. Dublin: COFORD.

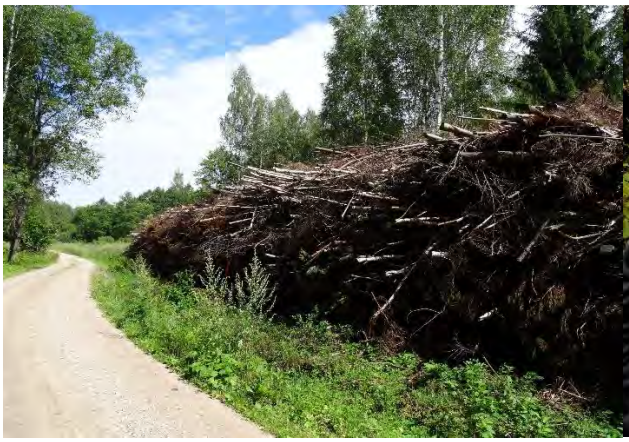
	commercial viability of their operations with climate change mitigation and biodiversity enhancement responsibilities, in addition to recreational and amenity considerations. Implementation of this type of GP is not without practical challenges. In particular, converting areas of fast-growing spruce with a timber production objective into native woodland may not be a realistic option for many private growers. These growers have likely planted forests to provide an alternative income source and may not see any income for decades from slower growing broadleaves. Also, the Continuous Cover Forestry (CCF) approach is not suitable in all locations. CCF can be challenging to practice in Ireland due to consistently strong winds and storms, high rainfall and mild climate which results in strong vegetation growth from species such as bramble, bracken and rhododendron - many of which compete with tree seedlings. Furthermore, many of the dominant soil types are too wet to allow repeated thinning interventions required for CCF. Sharing of the DMM as a Good Practice can potentially inform the New Forest Strategy for the EU, particularly for forest restoration initiatives close to urban centres. It can also be used as a potential template for state-owned and large private commercial forestry companies across Europe to horizontally integrate ecosystem service concerns into their plans and strategies.
Further information	Dedicated webpage for the DMM: *https://www.coillte.ie/coillte-nature/ourprojects/dublinmountainsmakeover/*



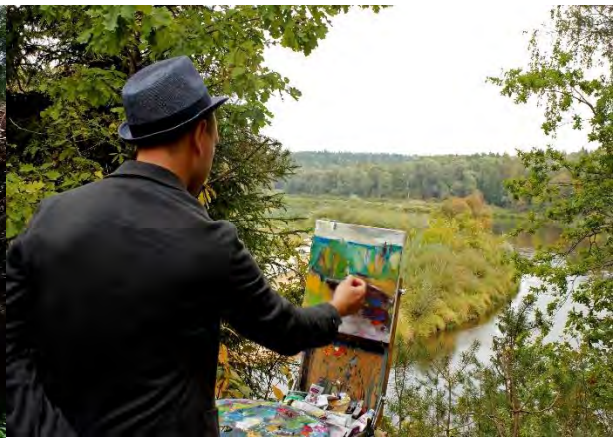
Dublin Mountains Makeover - Map & Key,
© Coillte Nature

2. Forest Ecosystem Services Mapping and Assessment Methodology

Summary: In Latvia, forests are the most widespread terrestrial ecosystems covering 53% of the country. Apart from timber resources, forests provide a number of other ecosystem services (ES), many of which in the opinion of the society are more important than wood. The aim of the Forest Ecosystem Services Mapping and Assessment Methodology is to spatially map and evaluate various benefits provided by the forest, as well as changes in the provided ES over time and in the result of anthropogenic intervention, e.g., different forest management operations. To systematize the ES, the Common International Classification of Ecosystem Services (CICES)[12] was used. For a spatial evaluation of the ES the matrix model was applied [13][14][15](Burkhard et al. 2009, 2012, 2014). It presents a flexible approach which is able to deliver comparable results on various spatial scales depending on the geospatial units used in this model. Depending on the scope of assessment and data availability, the indicator scales may be built on the basis of biophysical data or expert assessment. During the research programme "Impact of forest management on ecosystem services from forests and related ecosystems", 33 ES indicators of all three ES types - provisioning, regulating and cultural - have been developed.



Eneregy wood, photo by Zane Libiete



Forest as inspiration for art, photo by Ilze Paulina

Good practice general information

[12] European Environment Agency. Towards a Common International Classification of Ecosystem Services (CICES) for Integrated Environmental and Economic Accounting. Retrieved from: https://cices.eu/resources/

[13] Burkhard, B., Kroll, F., Müller, F., and Windhorst, W. (2009). Landscapes'Capacities to Provide Ecosystem Services – a Concept for Land-Cover Based Assessments. Landscape Online 15: 1-22, DOI:10.3097/LO.200915

[14] Burkhard, B., Kroll, F., Nedkov, S., and Müller, F. (2012). Mapping ecosystem service supply, demand and budgets. Ecological Indicators 21: 17-29, DOI: 10.1016/j.ecolind.2011.06.019

[15] Burkhard, B. Kandziora, M., Hou, Y., and Müller, F. (2014). Ecosystem Service Potentials, Flows and Demands – Concepts for Spatial Localisation, Indication and Quantification. Landscape Online 34: 1-32, DOI: 10.3097/LO.201434

Title of the practice	**Forest Ecosystem Services Mapping and Assessment Methodology**
Organisation in charge of the good practice	Latvian State Forest Research Institute "Silava" (LSFRI "Silava")
Description	
Short summary of the practice	In Latvia, forests are the most widespread terrestrial ecosystems covering 53% of the country. Apart from timber resources, forests provide a number of other ecosystem services (ES), many of which in the opinion of the society are more important than wood. The aim of the Forest Ecosystem Services Mapping and Assessment Methodology (FESMAM) is to spatially map and evaluate various benefits provided by the forest, as well as changes in the provided ES over time and in the result of anthropogenic intervention, e.g., different forest management operations. To systematize the ES, the Common International Classification of Ecosystem Services (CICES) [16] was used. For a spatial evaluation of the ES the matrix model was applied [17][18][19]. It is a flexible approach which is able to deliver comparable results on various spatial scales depending on the geospatial units used in this model. Depending on the scope of assessment and data availability, the indicator scales may be built on the basis of biophysical data or expert assessment. During the research programme "Impact of forest management on ecosystem services from forests and related ecosystems", 33 ES indicators of all three ES types - provisioning, regulating and cultural - have been developed.
Category of the good practice	Empowering tools
Resources needed	Approximate costs of the development of FESMAM – €180 000. The team of one senior researcher, two researchers and three scientific assistants were involved in this task. Further 100 000 EUR are needed in the coming years to update the FESMAM, complementing it with indicators for cultural ES,

[16] European Environment Agency. Towards a Common International Classification of Ecosystem Services (CICES) for Integrated Environmental and Economic Accounting. Retrieved from: https://cices.eu/resources/

[17] Burkhard, B., Kroll, F., Müller, F., and Windhorst, W. (2009). Landscapes' Capacities to Provide Ecosystem Services – a Concept for Land-Cover Based Assessments. Landscape Online 15: 1-22, DOI:10.3097/LO.200915

[18] Burkhard, B., Kroll, F., Nedkov, S., and Müller, F. (2012). Mapping ecosystem service supply, demand and budgets. Ecological Indicators 21: 17-29, DOI: 10.1016/j.ecolind.2011.06.019

[19] Burkhard, B. Kandziora, M., Hou, Y., and Müller, F. (2014). Ecosystem Service Potentials, Flows and Demands – Concepts for Spatial Localisation, Indication and Quantification. Landscape Online 34: 1-32, DOI: 10.3097/LO.201434

	and to upscale the forest ecosystem evaluation for the whole territory of Latvia. It is planned that the team with a similar capacity as for developing the FESMAM will be involved in the further work.
Timescale (start/end date)	January 2016-ongoing
Strategic relevance (long term impact)	The FESMAM can be applied for the evaluation of ES provided by any forests regardless of their ownership. It is suitable for an initial evaluation of the ES in a given area, as well as for the assessment of changes under the influence of external factors (either natural or human-induced) and, as such, it may be used for the strategic planning of forest management measures targeted to balance economic, environmental and social sustainability goals.
Evidence of success (results achieved)	The FESMAM has been currently tested in a model area (forested catchment of approximately 3000 ha size) typical for the state forests where intensive forest management operations have been carried out during the time period from 2015 to 2018. The evaluation of ES has been repeated twice (before and after the management intervention) to evaluate the short-term changes of ecosystem services values after forest management operations. Results of this evaluation are currently available as a research report (in Latvian, yet unpublished). It is planned that final results of the research programme "Impact of forest management on ecosystem services from forests and related ecosystems" will be available online in 2021. Individual indicators (e.g., bilberry and lingonberry yields, carbon sequestered in above-ground living biomass) according to this methodology have been calculated for the whole country; summarizing maps are included in the monograph "Latvia: land, nature, nation, state".[20]
Tangibility	FESMAM will be integrated in the decision-making system of the JSC "Latvia's State Forests" to facilitate the spatial planning of forest management. JSC "Latvia's State Forests" currently manages all public forests in Latvia that constitutes around a half of the total forest area. Public forests are managed for the benefit of the entire society and are freely accessible to the general public for recreation and non-wood forest product gathering. Therefore, up-to-date and scientifically sound information about the benefits provided by these forests is crucial to ensure multifunctional forest management.

[20] Nikodemus, O., Kļaviņš, M., Krišjāne, Z., & Zelčs, V. (2018). Latvija. Zeme, daba, tauta, valsts. *Rīga: Latvijas Universitātes Akadēmiskais apgāds*, *752*.

Durability	The FESMAM has a potential for a practical application in the forest management planning in all forests of Latvia (public and private), as well as, with particular adjustments, in other countries (depending on the data availability). As the FESMAM is based mainly on the forest inventory data, it can be used for modelling changes of the ES provision under different scenarios of the forest development.
Visibility	The visibility of this good practice has been ensured by dissemination activities of the FESMAM in national and international events (workshops and conferences, e.g., Latvian discussion forums "Cooperation and experience exchange about ecosystem services evaluation in Latvia" in 2017[21], 2018 and 2019[22], IUFRO Congress in 2017[23], international Ecosystem Service Partnership conferences in 2018[24] and 2019[25]). Apart from regularly informing the funder (JSC "Latvia's State Forests") of the research programme "Impact of forest management on ecosystem services from forests and related ecosystems", the FESMAM and first results of its evaluation have been presented to practitioners involved in the forest management (Forest Science Days) and regularly disseminated to students of the forest science, as well as private forest owners.
Added Value:	The added value of the FESMAM lies on improved possibilities for the multi-functional forest management planning, related to the results of ES assessment in different ES categories. The detailed forest compartment data enable the assessment on different spatial scales starting from local planning opportunities to regional and country-wide assessments.
Effectiveness	An assessment of fifteen ES indicators before and after intensive forest management operations (clearfelling and road construction) in a model area has been carried out to evaluate the short-term impact of forestry. On a catchment scale, the obtained results indicated slight decrease of most assessed provisioning services but, at the same time, values of regulating services increased in the short-term. In the final stage of methodology (FESMAM) development (by the end of 2020) changes of remaining indicator values will be assessed. Further development of the methodology (FESMAM) is planned by including cultural forest ecosystem services that lately have gained increasingly high importance.

[21] https://ekosistemas.daba.gov.lv/public/lat/jaunumi1/2064/
[22] https://ekosistemas.daba.gov.lv/public/lat/pasakumi11/seminari/
[23] http://iufro2017.com/wp-content/uploads/2017/11/IUFRO17_Abstract_Book.pdf
[24] https://www.espconference.org/eu2018/wiki/384868/book-of-abstracts#.W-BpGJNKhPY
[25] https://www.espconference.org/esp10/wiki/479895/proceedings

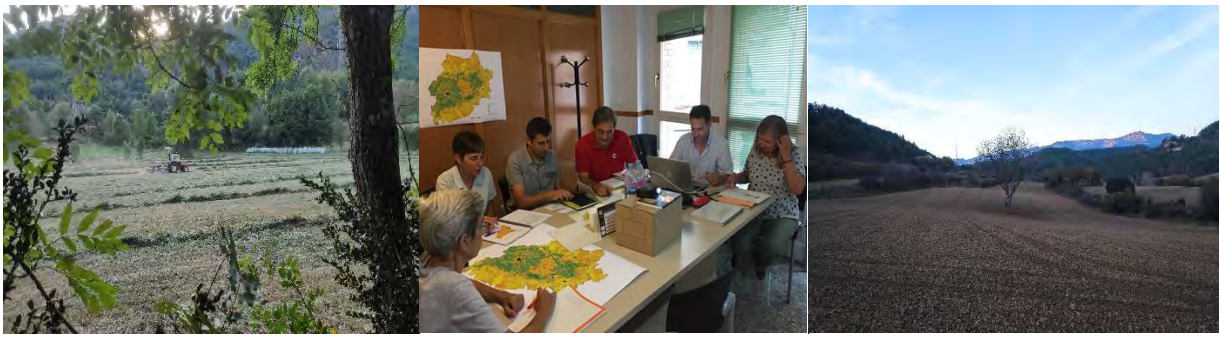
Innovation	So far, there has not been a methodology for comprehensive assessment of forest ES applicable on various planning levels. The FESMAM, with its high spatial resolution, is applicable for any forest in Latvia.
Efficiency	Regarding human and monetary resources needed, please, see a part "Resources needed".
Externality	The basis of the FESMAM (CICES classification and the Matrix model) is applicable and is already being used for the ES evaluation in several countries in different types of ecosystems. Specific forest-related indicators developed in Latvia may provide ideas and guidance for other countries with similar conditions and data availability. There already has been a collaboration of the project team with other projects implemented in Latvia, for example, "LIFE Ecosystem Services", "LIFE Restore".
Intra-regional coordination	The project team is involved in the Latvian Discussion Forum "Cooperation and experience exchange about ecosystem services evaluation in Latvia" and has presented project results in this forum's meetings in 2017, 2018 and 2019. There has been a collaboration with projects "LIFE Ecosystem Services" and "LIFE Restore" in a format of consultation, and indicator development. Lectures about programme`s "Impact of forest management on ecosystem services from forests and related ecosystems" results and ES approach in general have been held in the Latvia University of Life Sciences and Technologies, as well as presented to private forest owners during their training courses organized by the Latvian Rural Advisory and Training Centre.
Extra regional impact	Results of the project "Impact of forest management on ecosystem services from forests and related ecosystems" have been presented in the IUFRO (International Union of Forest Research Organizations) Congress in 2017 [26] and two international conferences organized by the Ecosystem Service Partnership (in 2018[27] and 2019[28]). Further outreach to the international audience is planned in a form of scientific publications and conferences.
Quality	Forest inventory data provide the spatial information with a comparatively high accuracy and resolution, enabling the evaluation on a compartment level. The developed indicators are largely based on the biophysical data, thus, providing

[26] http://iufro2017.com/wp-content/uploads/2017/11/IUFRO17_Abstract_Book.pdf
[27] https://www.espconference.org/eu2018/wiki/384868/book-of-abstracts#.W-BpGJNKhPY
[28] https://www.espconference.org/esp10/wiki/479895/proceedings

	higher accuracy contrasting with more subjective approach of the expert evaluation method. The annual results of project "Impact of forest management on ecosystem services from forests and related ecosystems" are presented and evaluated during meetings of the Scientific Advisory Board of the funder JSC "Latvia's State Forests" involving experts from academia and forest sector companies.
Potential for learning or transfer	The ES approach in general and FESMAM in particular have a wide potential for use in different geographical regions, as specific indicators may be adjusted and new indicators may be developed in the same framework depending on data availability and particular conditions. Indicators developed in Latvia may have a potential of transfer to other countries with similar forest structure and detail of forest inventory. They may also provide ideas for new indicators applicable under different conditions. The inclusion of all three ES types in the assessment highlights the multifunctionality of forest ecosystems and may help to raise awareness on sustainable management of natural resources.
Further information	*http://www.silava.lv/70/section.aspx/View/179* *https://www.lvm.lv/petijumi-un-publikacijas/mezsaimniecibas-ietekme-uz-meza-un-saistito-ekosistemu-pakalpojumiem*

3. Definition and indicators for the characterization of the Agricultural Areas

Summary: This project was promoted by the Rural World Foundation in collaboration with the Agri-territory Foundation of Catalonia, Spain, is a part of the desire to establish a consensus on the concept of 'agricultural space' in the first phase to work on the characterization of these spaces on the later phase based on objective indicators that allow their assessment. The designed indicators analyze several important variables when evaluating and determining the value of agricultural areas, such as agricultural productivity, degree of biodiversity, value of landscape, productive model or its vulnerable areas among others.



Photos of Dr. Enrique Doblas Miranda, CREAF Researcher

Good practice general information	
Title of the practice	**Definition and indicators for the characterization of the Agricultural Areas**
Organisation in charge of the good practice	It was the Rural World Foundation but this initiative has disappeared. Currently, the Directorate General of Rural Development, Catalan Department of Agriculture, Cattle, Fisheries and Food is in charge.
Description	
Short summary of the practice	The project, promoted by the Rural World Foundation in collaboration with the Agri-territory Foundation, is a part of the desire to establish a consensus on the concept of 'agricultural space' in the first phase, to later work on the characterization of these spaces based on objective indicators that allow their assessment. The designed indicators analyze several important variables when evaluating and determining the value of agricultural areas, such as agricultural productivity, degree of biodiversity, value of landscape, productive model or its vulnerable areas among others.
Category of the good practice	Information dissemination and awareness rising.

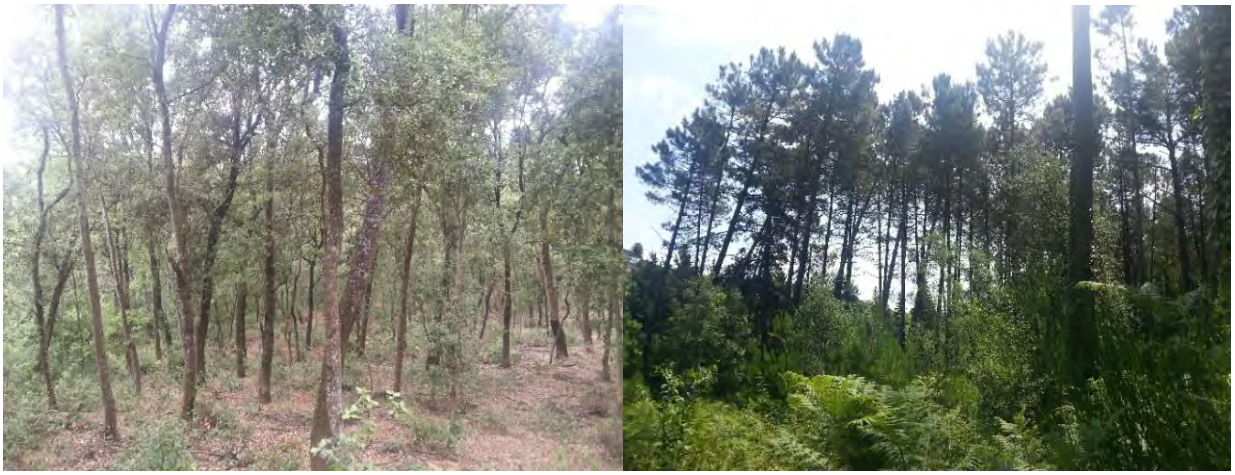
Resources needed	The cost of the project implied 25.000 €. The Characterization was based on stakeholders' meetings, implying almost zero cost.
Timescale (start/end date)	2014 - 2018
Strategic relevance (long term impact)	At present, according to the Catalan urban legislation, the land is classified into the three categories: urban, building and non-building. Agricultural areas are treated as undevelopable land only in cases without any valuation or more attribution. In this sense agrarian organizations historically have demanded a specific treatment for agrarian spaces, which was supported by the Government and the Parliament of Catalonia. The project aims to provide a tool for analysis and assessment of agricultural areas in Catalonia, expand the vision on these spaces and promote an active treatment when urban or spatial planning is required.
Evidence of success (results achieved)	In 2015, the Rural World Foundation and the Agri-territory Foundation created the Working Group of Agricultural Spaces with representation of experts from different disciplines and different institutions, which prepared the Report on Agrarian Spaces: definition and indicators for their characterization. Subsequently, the Working Group on Agricultural Areas (GTEA) developed the Protocol for the methodological analysis of characterization of agricultural areas of Catalonia in Geographical Information Systems, which analyses, integrates and interprets the indicators identified in the first document on the environment cartographic. These indicators were considered when developing the Catalan Agrarian Areas Law.
Tangibility	The designed indicators allow to analyze several important variables when evaluating and determining the value of agricultural areas, such as agricultural productivity, degree of biodiversity, value of the landscape, the productive model or its vulnerable areas among others. There are 20 indicators, which are grouped into 5 composite indicators categories and finally into 3 groups. The Protocol for the methodological analysis of the characterization of agricultural areas of Catalonia in GIS was completed in March 2018 and became a basic work to study and analyze agricultural areas through cartographic means. Different working proposals have been presented to assess the agrarian spaces in an analysis of the Catalan territory on a scale of 1: 500,000.
Durability	Although, the promoter of the Characterization, the Rural World Foundation, no longer exists, their activities have been assumed by the Directorate General of Rural Development (Catalan Department of Agriculture, Cattle, Fisheries and Food), which is committed to continue with the designed methodological analysis.

Visibility	Public report: *Agrarian Spaces: definition and indicators for their characterization. Agrarian Spaces Working group 2015*. This report establishes a broad consensus around the concept of agricultural space. Public report: *Protocol for the methodological analysis of the characterization of agricultural areas of Catalonia in GIS. Agrarian Spaces Working group 2018.* On July 26, 2018 the Rural World Foundation made a public presentation of the methodological Protocol for the characterization of agrarian spaces of Catalonia in GIS at the Department of Agriculture, Livestock, Fisheries and Food of the Generalitat (Catalonian Government).
Added Value:	The characterization includes environmental, socio-economic and territorial indicators enhancing the multifunctional value of agricultural lands.
Effectiveness	In 2018, the report of a group of experts was provided to evaluate how the Methodological Protocol model for the characterization of agricultural areas of Catalonia in GIS works in a practical territorial field: Terres de Ponent.
Innovation	In a pioneering way, the characterization of agricultural spaces facilitates identifying objectifiable indicators that determine the basic characteristics for its assessment during urban planning. The Protocol for the methodological analysis of the characterization of agricultural areas of Catalonia in GIS is a pioneer in Catalonia, which has become a basic work to study and analyse agricultural areas through cartographic means. The aim of this new tool is to equip the sector, for the first time, with the method of analysis and characterization of these spaces that allows determining their value based on an objective parameters.
Efficiency	The Characterization took more than 4 years from the initial conception until its realization. It had a low cost considering that most of the work was assumed for free by the working team described in the "Intra-regional coordination" section.
Externality	As mentioned in the Tangibility section, the Characterization includes not only environmental indicators (where ecosystem services could be found) but also socio-economic and territorial indicators.
Intra-regional coordination	The work team was composed by members of both organizers, two departments of the regional government, universities, the regional council, research centers, and citizens' associations and foundations. Also, external contribution was provided by

	local, national and international Universities, administrations outside the region, and forest owners and farmers associations.
Extra regional impact	None
Quality	The characterization is based on the study of geographical theses, law definitions, landscape indexes, cartographic sources, rural perspectives, stakeholder feedback and territorial planning guidelines.
Potential for learning or transfer	Agricultural areas are shared on the entire European territory and their valorisation is a common issue all over Europe. The characterization is based mainly in local perceptions but external advisory and bibliography were considered in the public reports. In any case, the designed methodology is easily transferable and can be adjusted to conditions of a local characterization.
Further information	*http://www.agroterritori.org/web2/wp-content/uploads/2016/04/EspaiAgrari_definicio-indicadors.pdf*

4. Catalonian Forest Laboratory

Summary: The Catalan Forest Laboratory is a joint initiative that makes available the information and data related to forests generated by two research centers for general public, experts and/or beginners. This data has been pre-processed by researchers and technicians from both research centers to minimize errors during processing the raw data. In this way, the Catalan Forest Laboratory became the starting point for researchers, students, managers or administration staff which needed an access to the data for carrying out their work. The data is stored on a portal where information, apps and other tools could be used and/or downloaded. It also offers a possibility to get to know more about one of the main treasures of the Catalan land – the forest, for the general public.



Photos of the Catalan forest made by Dr. Enrique Doblas Miranda, CREAF Researcher

Good practice general information	
Title of the practice	**Catalonian Forest Laboratory**
Organisation in charge of the good practice	CREAF & Center for Forestry Science and Technology of Catalonia (CTFC)
Description	
Short summary of the practice	The Catalan Forest Laboratory is a joint initiative that makes available the information and data related to forests generated by two research centers for general public, experts and/or beginners. This data has been pre-processed by researchers and technicians from both research centers to minimize errors during processing the raw data. In this way, the Catalan Forest Laboratory became the starting point for researchers, students, managers or administration staff which needed an access to the data for carrying out their work. The data is stored on a portal where information, apps and other tools could be used and/or downloaded. It also offers a possibility to get to know more about one of the main treasures of the Catalonian land – the forest, to the general public.
Category of the good practice	Information dissemination and awareness rising.
Resources needed	The cost of the project was €34,000 per year. One technician was fully dedicated for coordinating and developing apps (please check "Tangibility" section) and other 5 were involved at different moments.
Timescale (start/end date)	2019 – 2021
Strategic relevance (long term impact)	The Laboratory will be a backbone of the new Catalonian Forest Portal together with the Catalonian Forest Observatory.
Evidence of success (results achieved)	Right now, the Laboratory is in a testing phase and, through a citizen science initiative, people are using it to spot bugs and propose improvements. In any case, both the Climate Change Catalan Office and the Catalan Deputy Directorate-General of Forests have showed their support and interest, as well as provided funds and maintenance.
Tangibility	Available applications: FES App, to view and download data of forest ecosystem services of Catalonia. Allometr App, to calculate new variables from equations designed by species, geographical areas and levels (for all Spain). IFN App, to access, view and download the data of the National Forest Inventory in Catalonia.

	LiDAR App, to access, view and calculate forest variables from LiDAR data in Catalonia.
Durability	The Laboratory has been conceived as a dynamic instrument in order to adapt available tools (please check "Tangibility" section) for current and future information. Both, the Climate Change Catalan Office and the Catalan Deputy Directorate-General of Forests have assured its maintenance.
Visibility	More than 12 manuals including tutorials for each app, guides, practice cases and examples of use. The Laboratory was presented to potential users and the general public in March 2019 at the Catalan Department of Agriculture, Cattle, Fisheries and Food, showing total institutional support. A similar presentation is planned in 2021 to present operative improvements. The Laboratory was presented in February 2019 at a national research meeting, SIBECOL: *A new tool to visualize National Forest Inventory Data*
Added Value:	The added value of the laboratory is that it contains all the data in one place and it's free of errors. The data can be consulted using a very intuitive map viewer and can be downloaded in different formats to use for research or management.
Effectiveness	Since the beginning of 2020, the Catalan Forestry Laboratory has been made available. It is, an initiative that brings together all the information available on the forest of Catalonia in a single website.
Innovation	The data, such as the National Forest Inventory and the LiDAR data source are public but not necessarily processed. This transfer from science to policy makers and society tool directly provides useful information processed from these rough data, which are also stored in the Laboratory. Such information - forest related processed data for free in a single portal, is very useful for decision making, management or educational purposes.
Efficiency	The Laboratory took more than 3 years from the initial conception until the realization. It had a very low cost (only salaries of staff) considering that there was a technical team composed by 3 researchers and 3 senior technicians.
Externality	The Laboratory is not only focussed on the ecosystem services but it also provides very useful apps and data for forest managers and interested stakeholders, such as variables from equations designed by species, geographical areas and scales, as well as the data of the National Forest Inventory and other forest variables.