

Report containing the list of measures and the method for elaborating the forest mitigation projects

ACTION C8

CPF

CENTRE DE LA PROPIETAT FORESTAL(CPF)



LIFE16 CCM/ES/000065

CLIMARK

Forest management promotion for climate change mitigation through the design of a local market of climatic credits



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Report containing the list of measures and the method for elaborating the forest adaptation and mitigation projects

The first part of this report contains an exhaustive list of forest management measures that can contribute to the climate change mitigation/adaptation objectives in Catalonia, in accordance with the definition of Climate Credit, as well as the link between these and the requirements that must be met by the stand where they are applied in order to generate the maximum impact on climate change (CC) mitigation/adaptation. In the second part, the various phases included in the development of a CC mitigation and adaptation project (PROMACC) are identified and described, and an initial index proposal is made. Finally, an annex is attached containing a list of maps, either generated by the CLIMARK project or already in existence, which can contribute to the landscape-scale diagnosis of carbon, water and biodiversity required for a PROMACC.

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PART I.- List of forestry mitigation/adaptation methods, eligible for climate credits and their applicability in the Catalan context

For a forestry project to generate climate credits, it must guarantee climate coherence, in other words, it must consider actions adapted to the local context that positively impact **climate change mitigation**, but which also **respond to that mitigation**, in line with the proposals of *Climate Smart Forestry*.

In Catalonia, and in general throughout the Mediterranean, there are three key climate change vectors on which forest management can have a positive impact: the **carbon balance** (mitigation), the **water balance** (adaptation) and the conservation of **biodiversity** (mitigation/adaptation).

The list presented here specifies, for each of these three vectors, which **forest management actions could generate a positive impact**, specifying in each case the process by which they produce this benefit.

One of the new features of this list, with respect to the measures contemplated in other forestry compensation initiatives, is that, in addition to **tree plantations**, it includes the management of existing forests, with a **wide range of tree thinning/felling** actions.

However, the potential benefits of the forestry actions listed cannot be guaranteed for all forests or for all conditions. For this reason, a second section has been included where **measures have been initially selected** according to their applicability and potential impact in the Catalan context, starting from the knowledge generated in Actions C1-C5 of the project, and specifying for each the initial requirements that the forest must meet in order to guarantee the greatest possible impact.

The definitive selection of measures included in the Climate Credit market and the definition of requirements will be finalised in the definition of the climate credit itself, as envisaged in Action C6 of the project. Finally, each forestry project will have to apply the measures considered most appropriate to its particular context, at landscape level, in accordance with a diagnosis involving key local players.

I.1 List of forestry measures that impact climate change and their effects

a) Mitigation measures centred on maintaining, increasing and restoring carbon

1. Maintenance/Increase of CO₂ sink capacity	
Treatments that increase CO ₂ sequestration capacity at the individual tree scale (and, in the medium term, maintain or increase this at the forest stand scale)	Regrowth thinning Thinning
Treatments that increase the CO ₂ sequestration capacity of a <u>forested area</u>	Enrichment planting Reforestation (post-disruption) Regeneration felling
Treatments that increase the CO ₂ sequestration capacity of an <u>agricultural area</u>	Agroforestry plantations Afforestation
2. Conserving carbon stocks/reducing CO₂ emissions	
Treatments that reduce the risk of CO ₂ emissions from mortality (= increased vitality) or fires	Thinning (in the SMPs and beyond these) Regrowth thinning Selective clearing
Treatments that maintain carbon stocks in woody vegetation for longer	Lengthening of rotations Maintenance of potentially cut trees (or groups) through the rotations
Treatments that conserve or increase soil carbon stocks	Post-fire soil conservation measures No path construction or breaks in high C-stock areas Maintenance of dead wood (including cuttings) - treatment? Agroforestry plantations and/or with mycorrhiza
3. Substitution of fossil materials/energy	
Production of long-life timber products	Lengthening of rotations Tree-oriented forestry for quality wood (conversion to trees >20 cm in diameter) Thinning Regrowth thinning
Biomass and cork production (for energy or as a substitute for synthetic materials)	Regrowth thinning Thinning Cork removal

B) Measures for adapting water resources to CC

4. Improving the quantity of water and using it more efficiently	
Treatments that increase the capacity for infiltration and runoff (blue water)	Transformation into pasture (recovery of terraces) Felling to produce under-tree grazing (dehesa) Thinning (especially conifers?) Regrowth thinning Selective clearing Regeneration felling (temporally)
Treatments that increase Water Use Efficiency (<u>green water</u>)	Regrowth thinning Thinning
5. Maintenance or improvement of water quality	
Treatments that conserve or improve the forested area and forest soil in <u>watersheds where water is used</u> (= restore the forest area or increase the vitality of existing stands and/or reduce the risk of fire)	Reforestation (post-disruption) Enrichment planting Agroforestry plantations Afforestation Promotion of mixed forests with broadleaf trees Regrowth thinning Thinning (in SMPs and beyond) and selective clearing Less impactful hauling methods No path construction or breaks in areas close to catchments
Treatments for buffering increased water temperature	Maintenance of riparian forests
6. Intense flood control	
Conservation of forest cover in headwaters	Same as 5.1

Measures (mitigation/adaptation) to conserve/enhance biodiversity

7. Prioritising the conservation objective	
Treatments that bring the forest closer to a mature stage, aiming for the presence of the distinct forest growth phases in a natural way	Natural dynamic preparation actions Lengthening of rotations
8. Integration of conservation criteria into forests managed for production	
Increased structural complexity to support adaptive capacity and resilience: boosting genetic, species and layer diversity	Promotion of mixed forests with trees of various ages Favouring of trees grown from seed Selective clearing Enrichment planting
Treatments that seek to conserve old trees and trees with unique elements (MH), to favour the maximum diversity of taxonomic groups in the forest	Maintenance of potentially-cut trees (or groups) Maintenance of sporadic species and key Micro-Habitats (MH)
Generation of large pieces of dead wood either standing or on the ground, in order to favour saproxylic organisms	No felling or hauling of existing large pieces of dead wood Ringing of trees with diameters > 20 cm Felling that leaves a certain number of tall stumps Felling where a certain number of large trunks are left on the ground
Treatments that promote the presence of floricultural species, to encourage butterflies and pollinators	Felling concentrated at specific points (opening of clearings) to allow light to enter the area Clearing of track margins

I.2 Initial selection of stand measures and requirements that will maximise the impact in the Catalan context

Actions to increase carbon sequestration and/or conserve stocks:

a) Felling

Action	Location / Stand characteristics
1. Regrowth thinning /Sprout selection	Post-disruption regeneration with high biomass accumulation not managed since the disruption
2. Felling in adult forests: 2.1 Regulated thinning of competition / Selective felling As a high station, models involving long rotation periods (pine forests) or conversion to trees >20 cm in diameter	Dense adult forests (pines and oaks) with current growth lower than that corresponding to the quality of the station Mixed forests and high quality beech forests, underbrush used for firewood
3. Actions for structuring the landscape to prevent fires	Strategic management points (SMPs) or high-risk emission zones

B) Plantations

Action	Location / Stand characteristics
1. Enrichment planting	Low tree cover forest stand (CCF <20%) and high quality station areas
2. Post-fire reforestation	Forest stand, affected by fire, with no tree regeneration after the period estimated in the ORGEST model
3. Afforestation	Agricultural stand, which changes the forest use
4. Agroforestry plantation	Agricultural stand, which maintains the forest use

I2.2 Actions to improve blue water supply (quantity)

Action	Location / Stand characteristics
1. General felling to recover grazing land	Pine forests in basin headwaters where surface water is used for consumption or located over aquifers Rainfall > 500 mm
2. Felling to produce under-tree grazing (montado)	Scots pine, oak and cork oak groves with use of grazing land, in basins where surface water is used for consumption, or located over aquifers. Rainfall > 500 mm
3. Selective thinning / felling, approximately at the upper margin of the upper range (%) of trees that may be extracted	Pine forests in basins where surface water is used for consumption or located over aquifers Rainfall > 500 mm

The **biodiversity conservation measures** described in the previous section can, and should, be applied in any situation that requires them, based on an accurate diagnosis of the potential for hosting biodiversity, using the Potential Biodiversity Index.

PART II. PART II.- Method for developing the PROMACC

II.1 Development phases of a CC mitigation and adaptation project (PROMACC) for a region

a) Identification and definition of the scope of strategic planning

In this first phase, the limits of the area where forestry mitigation and adaptation measures to CC are to be implemented will be established, based on strategic planning according to three basic principles:

- definition of the scope of study on a landscape scale (massif, basin, large municipality or group of municipalities);
- revitalisation of the region led by an association, forest owners group, service company, etc.;
- grouping of the region by identifying common cultural, landscape, environmental or economic values.

b) Diagnosis of forest ecosystem services (FES) within the scope of the selected plan

This phase includes drafting, or revising if it already exists, a landscape-scale plan where forest sector agents and other stakeholders, according to the chosen or existing planning instrument, establish the strategic and tactical objectives of the area in relation to CC mitigation and adaptation.

The strategic planning must meet the following criteria:

- it will be a legally recognised planning instrument, affecting the surface area and forest management of the chosen region (Urban Master Plan, Joint Technical Plan for Forest Management and Improvement, others);
- it must include a diagnosis of the FES in the selected planning area based on mapping and basic information related to carbon, water and biodiversity in the study area. This information will be provided by the CPF from an analysis of the existing IOFs, LIDAR technology, growth models of the forests in the area, and by studying the provision of water resources, among other aspects.
- it must identify the main FES to be promoted in the strategic area, with advice from the CPF, according to the location, general characteristics and main objectives of the region, through a local participative process that includes the creation of a group of selected entities and people involved in the planning of the territory (LPG). The LPG will be key to identifying a possible message or dynamic slogan for revitalising the territory.

c) Selection of the forestry mitigation/adaptation measures to be implemented

Based on identifying the main FES and the list of forestry mitigation and adaptation measures that can be financed in the climate credit market, according to the final credit designs:

- the possible forestry actions to be implemented over the next 5 years will be selected based on the drafting of a CC mitigation and adaptation project (PROMACC) for forestry management, a tactical and operational planning instrument that may be the subject of transactions in the Climate Credit market created as part of LIFE CLIMARK.
- the measures previously selected from the baseline calculation and the magnitude of their impact on the identified FES will be chosen from standard methods proposed by the CLIMARK project, based on national and international scientific knowledge and experience, including information from the IPCC, the Potential Biodiversity Index of Catalonia and other existing reference information.
- The measures selected will be agreed upon and prioritised with the local participation group (LPG) established in the previous phase.

d) Drafting of the PROMACC: programming and assessment of the forestry mitigation/adaptation measures to be implemented over the next 3-5 years

This phase includes specifying the actions to be carried out at stand level, their annual scheduling, and the ownership agreements and administrative authorisation necessary to implement the measures.

The baseline and the impact on services will be specifically addressed in this instrument.

The PROMACC will also include the transaction, execution and monitoring costs of the mitigation/adaptation actions to be implemented over the 3-5 year period.

II.2 Possible index of forest mitigation/adaptation projects (PROMACC)

1. Which climate change mitigation/adaptation service can impact your forest management?

1.1 According to the landscape scale diagnosis (analysis of stand location and characteristics in relation to carbon, water and biodiversity)

2. What forestry mitigation/adaptation measures will you implement over the coming X years?

2.1 Results of the participatory forestry project

2.2 List and schedule of the measures to be applied over the coming 3-5 years

3. What impact are these measures expected to have? (According to the method developed in Action C6)

3.1 List of indicators and methods

3.2 Assessment of the benefit compared to the baseline

3.3 Calculation of climate credits generated by the project

ANNEX 1. Maps, either generated by CLIMARK or already in existence, used in PROMACCs.

Available maps to be used as a prerequisite, to be able to determine priorities for action or as weighting when calculating credits.

In the meeting of experts held on 05/11/19 it was advocated that the investment priorities be set or validated by an authority and at a more local level in the area where the project is located. Mechanisms for local participation/validation of the maps generated could be considered.

Information and maps available relating to CARBON:

CARBON			
INFORMATION AND MAPS	Scale	Information	Possible use in the mitigation projects
C-stock in the soil 0-30 cm and 30-100 cm)	1:50 000	Identification of areas with greater carbon stock in the soil	Within the project, areas with "high C stocks in the soil" cannot be ploughed or transformed into grazing land Restrictions on the construction of tracks and plantations
Areas of potentially high emissions due to fire	All Catalonia at a scale of 150 x 150 m	Identification of areas where action will further reduce emissions	Prioritise work in areas identified as "areas of potentially high emissions" + "SMPs" that protect the areas with the greatest C stocks
Map of SMPs		Identification of areas that most impact stock protection	
Maps not available. Considered unnecessary since it would always require local validation	It is proposed that maps be produced from stand-scale data (AB, growth corr., variable maps?)	Identification of areas with stagnant growth	Prioritise work in areas identified as "Stagnant Growth Areas".

Information and maps available relating to WATER:

WATER			
INFORMATION AND MAPS	Scale	Information	Possible use in the mitigation projects
Map of basins	Any scale	Identification of the watercourse impacted by forest management	Assess (or prioritize) whether or not to compute the impact on the water ecosystem service according to the location of the action
Precipitation map and minimum runoff threshold	Any scale	Identification of areas above and below a threshold (e.g., > 500 mm) beyond which point management impacts water	
Map of catchments or river/aquifer criteria	Pending group of experts in water	Identification of priority catchments	
Runoff / infiltration calculation map according to Zhang method (or according to position in basin)	Pending University of Lleida - group of experts in water	Identification of locations more favourable to generating impact on water (e.g., headwaters)	

Information and maps available relating to BIODIVERSITY:

BIODIVERSITY			
INFORMATION AND MAPS	Scale	Information	Possible use in the mitigation projects
Map of Espais d'Interès Natural (EIN)/SCI/ high value areas	For areas with some kind of protective instrument	Identification of high-value areas	Prioritise/avoid work in areas identified as "High ecological value areas"