

SUSTAINABLE MANAGEMENT CRITERIA FOR AGROFORESTRY IN THE EUROPEAN UNION

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1.1 Introduction

Interest is growing in extending the scope of sustainable forest management certification to trees outside the forest (de Foresta et al. 2013; PEFC 2015). This paper suggests sustainable management criteria and guidelines for agroforestry in Europe, since this land use is growing in importance, and should have sustainable management guidelines in a similar way to agriculture and forestry. These would form the basis of future certification of products from sustainably managed agroforestry systems. This approach will bring agroforestry to the attention of European consumers, while emphasising its importance for the sustainable production of food, timber, fuel and environmental services.

1.2 Definition of Agroforestry

Article 23 of Regulation 1305/2013 (European Commission 2013) provides a definition of agroforestry (AF) within the European Common Agricultural Policy (CAP), and sets the framework for its inclusion in national and regional Rural Development Programmes (RDPs).

“Agroforestry” refers to land use systems in which trees are grown in combination with agriculture on the same land. The minimum and maximum number of trees per hectare shall be determined by the Member States taking account of local pedo-climatic and environmental conditions, forestry species and the need to ensure sustainable agricultural use of the land.”

National Land Parcel Identification Systems (LPIS) provide information on whether farmers fields (parcels) are classified as either "agricultural land" or "forest land". They also give geospatial data on hedges and forest strips between parcels, and provide a basis for a possible agroforestry typology (**Table 1**).

Table 1: Suggested Typology for Agroforestry Systems in Europe (particularly as implemented within EU agricultural, biodiversity, bio-energy and climate regulations) (Dupraz et al. in press).

Tree Location	AF System	Official Land Use Classification (Cadastre/LPIS)	
		Forest Land	Agricultural Land
Trees within parcels	Silvopastoral	Forest Grazing	Wood pasture Orchard grazing
	Silvoarable	Forest Farming	Alley Cropping Alley Coppice Orchard Intercropping
	Agrosilvopastoral	Mixtures of the above	
Trees between parcels	Linear Agroforestry	Forest Strips	Shelterbelt Networks Wooded Hedges Riparian Tree Strips

1.3 Sustainable Forest Management

Sustainable forest management has received much attention recently in Europe (Köhl and Rametsteiner 2007; Forest Europe 2015). Criteria and indicators for sustainable forest management have been created at both national and European levels (Baycheva et al. 2013). Forest certification has been successful, with 103 million hectares certified by 2014, or 57.7% of the total area of forest and other wooded land in the EU28. 37.5% is contributed by national certification schemes which are recognised by the Programme for the Endorsement of Forest Certification schemes (PEFC) and 20.2% in certificates recognised by the Forest Stewardship Council (FSC) (UNECE 2015).

1.4 Sustainable Agricultural Management

Sustainable agricultural management does not have the same clear criteria and indicators as forest management, except for organic farming. However, a list of “Good Agricultural and

Environmental Conditions” (GAEC) are set in Annex II of EU Regulation 1306/2013 (**Table 2**), which controls eligibility for basic payments and which Member States (MS) transpose into their national regulations. GAEC-7 is particularly important for agroforestry as it provides MS with the option of declaring trees in line, in groups or as isolated trees to be “Landscape Features”. These trees (along with “permanent crop” trees like fruit trees and short-rotation coppice) will not count towards the tree-density or crown-density thresholds which determine whether a parcel is declared “agriculture” and therefore eligible for Pillar I payments.

Table 2: Extract from Regulation 1306/2013 (Annex II)... “Rules on Cross Compliance”

Requirements and Standards	
Water	SMR1: Comply with Directive 91/676/EEC concerning protection of waters against pollution caused by nitrates from agricultural sources)
	GAEC 1: Establishment of buffer strips along water courses
	GAEC 2: Where use of water for irrigation is subject to authorisation, compliance with authorisation procedures
	GAEC 3: Protection of ground water against pollution: prohibition of direct discharge into groundwater and measures to prevent indirect pollution of groundwater through discharge on the ground and percolation through the soil of dangerous substances, as listed in the Annex to Directive 80/68/EEC in its version in force on the last day of its validity, as far as it relates to agricultural activity
Soil and carbon stock	GAEC 4: Minimum soil cover
	GAEC 5: Minimum land management reflecting site specific conditions to limit erosion
	GAEC 6: Maintenance of soil organic matter level through appropriate practices including ban on burning arable stubbles, except for plant health reasons
Biodiversity	SMR2: Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds
	SMR 3: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna
Landscape	GAEC 7: Retention of landscape features, including where appropriate, hedges, ponds, ditches, trees in line, in group or isolated, field margins and terraces, and including a ban on cutting hedges and trees during the bird breeding and rearing season and, as an option, measures for avoiding invasive plant species
Plant Protection Products	SMR 10: Regulation (EC) No 1107/2009 of 21 October 2009 concerning the placing of plant protection products on the market

1.5 Sustainable Agroforestry Management

The following **criteria** and **operational guidelines** for a Sustainable Agroforestry Management Standard are based on the PEFC Sustainable Forest Management Standard (PEFC Council 2010). Numbering of the Operational Guidelines is comparable between Standards (hence there are some gaps if the forestry text was completely inappropriate to agroforestry). A detailed comparison of the two Standards is available online (Lawson et al. 2015).

1.1.1 Criterion 1: establishment, maintenance and enhancement of agroforestry resources, including mitigation of and adaptation to climate change

Operational Guidelines. a) Increased use of trees outside the forest should be made to enhance the economic, ecological, cultural and social values of the farm resources, including soil and water quality. b) Increased resource efficiency can be gained by mixtures of trees, animals and crops. c) Improved mapping of trees outside the forest should be carried out, including farm-scale inventories of timber, non-timber products, carbon-storage and GHG emissions. d) Agroforestry management plans should be used, with a level of detail appropriate to the size and complexity of the farm, and can e) be produced for groups of farms with assistance provided by Rural Development Programmes. f) Farmers or landowners who receive public funding should make a summary management plan available (e.g. in a LPIS portal). g) Monitoring of agroforestry parcels on land classed as “agriculture” will take place periodically by payments agencies to ensure that agriculture remains the primary land use. h) Responsibilities for sustainable management will be clearly defined (e.g. between landowners and tenants). i) Management of agricultural and tree resources will balance the needs of both components and minimise damage to soil and water resources. k) Agroforestry can take place on parcels which are classified as either forestry or agriculture, but change of use from one to the other will occur only in compliance with national and local legislation.

1.1.2 Criterion 2: maintenance of agroforest ecosystem health and soil fertility.

Operational Guidelines. a) Management shall increase the health and vitality of ecosystems and rehabilitate degraded areas where possible. b) Monitoring of ecosystem health should take place, especially of key biotic and abiotic factors such as pests, diseases, overgrazing, fire hazard, as well as damage from climatic factors, air pollutants and poor management. c) Opportunities to change management to minimise negative effects of these biotic and abiotic factors should be exploited, and d) ways to mitigate these risks should be specified in Management Plans. e) Management should make best use of natural processes and preventive biological control measures. f) Fires shall be avoided and agroforestry used as a fire-break or fuel-break where possible within forest areas; g) Tree, crop and animal species and provenances that are suited to site conditions should be used, and tending, harvesting and transport techniques which damage soil resources and the environment should be avoided. h) Use of pesticides and herbicides should follow EU guidelines for products, application methods and staff training.

1.1.3 Criterion 3: maintenance and encouragement of productive functions of agroforests (wood and non-wood).

Operational Guidelines. a) Management shall maintain the capability of the land to produce a range of agricultural, wood and non-wood products and services on a sustainable basis. b) Management shall aim to achieve sound economic performance, but should also account for non-market benefits. c) Management Plans shall account for the multiple functions of agroforests, and for any conditions of public subsidies received. d) Management should improve or maintain agricultural or tree resources and encourage a diverse output of goods and services over the long term; e) ... f) Harvesting levels of wood, non-wood and agricultural products shall not exceed a rate that can be sustained in the long term, paying regard to nutrient removal and the preservation of soil fertility and structure. g) Where appropriate, and included in the management plan, the exploitation of non-timber forest products should be regulated, including hunting and fishing. h) Adequate infrastructure of roads and extraction routes shall be planned, established and maintained to ensure that wood resources on a farm can be exploited while minimising negative impacts on the environment.

1.1.4 Criterion 4: maintenance, conservation and enhancement of biological diversity of agroforest ecosystems.

Operational Guidelines. a) Management should aim to maintain, conserve and enhance biodiversity on ecosystem, species, landscape and genetic levels. b) Agroforestry planning and management should protect significant concentrations of protected, rare and sensitive ecosystems, areas with endemic species and endangered genetic resources *in situ*. c) Protected and endangered plant and animal species shall not be exploited for commercial purposes, unless species are planted or bred with that purpose. d) Management could ensure successful natural regeneration of seedlings or coppice shoots, or replanting of high quality seedlings or rooted cuttings. e) For new areas of agroforestry, native tree species and provenances are preferred, although introduced species, provenances or varieties can be used if their impacts on the ecosystem and on the genetic integrity of native species and local provenances has been evaluated. f) New agroforestry plantations should promote ecological connectivity with existing woodlands, and planting can be phased over several years to reduce risk and promote diversity; g) Genetically modified trees shall not be used and this ban will be in place till the end of 2022; h) Management practices should promote a diversity of both horizontal and vertical structures and a diversity of species; i) Traditional practices such as hedgerow management and coppicing shall be supported. j) Management operations should not cause lasting damage to ecosystems and measures should be taken to improve biodiversity. k) Infrastructure should be planned to minimise damage to ecosystems. l) The pressure of domestic and wild animals should be balanced with the regeneration and growth of trees. m) Standing and fallen dead wood can be retained, on occasion, to enhance biodiversity, except where it poses a risk of increased pest damage.

1.1.5 Criterion 5: maintenance and appropriate enhancement of protective functions in agroforest management (notably soil, water and air quality)

Operational Guidelines. a) Management shall enhance the protective function of agroforests for society, e.g. in relation to soil erosion, water quality, floods, avalanches. b) Parts of agroforests that fulfil specific protective functions shall be mapped and noted in management plans. c) Special care shall be taken on sensitive and erosion-prone soils, and measures taken to minimise the pressure of wild and domesticated animals. d) Special care should be taken on areas with water protection functions to avoid adverse effects on water quality and quantity, including inappropriate use of harmful chemicals. e) Construction of roads and other

infrastructure should minimise bare soil and preserve the natural level and function of water courses. f) sustainable soil management practices should be used, with minimum tillage and maintenance of vegetation cover.

1.1.6 Criterion 6: maintenance of other socio-economic functions and conditions

Operational Guidelines. a) Management should respect the multiple functions of tree, crop and animal mixtures to society, and enhance the role of agroforestry in rural development, and its opportunities for employment creation. b) Agroforest management should promote the long-term health and well-being of adjacent communities. c) Property rights and land tenure arrangements should be clearly defined and documented, including d) the rights and responsibilities of landowners and tenant farmers. e) Adequate public access to agroforests for recreation should be provided, consistent with preventing damage to crops, livestock and biodiversity. f) Sites of special historical or cultural significance should be protected. g ... h) Staff and contractors shall be provided with continuous training in meeting the management requirements of this “Standard”. i) Agroforest management practices should incorporate the best available local knowledge and j) ensure communication with local people and stakeholders in a way that handles the resolution of complaints and disputes. k) Agroforestry planning should identify work related risks, inform workers of these, and take measures to mitigate them. l) Working conditions shall conform with appropriate EU Health and Safety at work legislation. m ... n) Management should utilise the results of scientific research and contribute to this research and data collection.

1.1.7 Criterion 7: Compliance with legal requirements

Operational Guidelines. a) Management should comply with all appropriate EU and national legislation applying to forest and agricultural land. b) Trees outside the forest should be protected from activities such as illegal logging, fires and unauthorised land use.

Conclusion

This paper gives a first draft of sustainable management criteria and operational guidelines for agroforestry systems. Suggestions for refining these are welcomed by the authors. An additional step, not considered in this paper, could be to create a label for certified “agroforestry based products”. However it seems preferable to utilise the proposed PEFC “Trees Outside the Forest” certification process. In this way certified agroforestry (and urban-forestry) products would receive recognition in the market through a PEFC logo, with evidence that they originate from sustainable systems.

References:

- Baycheva T, Inhaizer H, Lier M, et al (2013) Implementing Criteria and Indicators for Sustainable Forest Management in Europe. European Forest Institute. 2013. European Forest Institute.
- de Foresta H, Somarriba E, Temu A, et al (2013) Towards the assessment of trees outside forests. IRC, FAO
- Dupraz C, Lawson GJ, Lamersdorf N, et al Temperate Agroforestry: the European Way. In: Gordon AG, Newman S (eds) Temperate Agroforestry Systems (2nd Edition, in press).
- European Commission (2013) REGULATION (EU) No 1305/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on support for rural development by the European Agricultural Fund for Rural Development (EAFRD).
- Forest Europe (2015) State of Europe's Forests. FAO, EFI
- Köhl M, Rametsteiner E (2007) State of Europe's Forests 2007. The MCPFE report on sustainable forest management in Europe. In: Ministerial Conference on the Protection of Forests in Europe, Liaison Unit Warsaw.
- Lawson GJ, Brunori A, Palma J, Balaguer F (2015) Detailed comparison of PEFC Sustainable Forest Management Criteria, and those which could apply to agroforestry. <https://goo.gl/6YGK4r>.
- PEFC (2015) PEFC Convenes Experts to Explore the Way Forward for Certification of Trees Outside Forests. In: Programme for the Endorsement of Forest Certification. <http://www.pefc.org/news-a-media/general-sfm-news/2015-pefc-convenes-experts-to-explore-the-way-forward-for-certification-of-trees-outside-forests>.
- PEFC Council (2010) PEFC International Standard 1003: 2010: Requirements for certification schemes. PEFC
- UNECE (2015) Forests in the ECE Region - Trends and Challenges in Achieving the Global Objectives on Forests. UN Economic Commission for Europe.