

*5th Framework Programme Accompanying measure - IMACFORD Task B1 project - Coordinated by IEFCE
End-users research needs for the sustainable development of cultivated forests in South Atlantic Europe*

(Priority: 1 = short term priority; 2 = mid term priority; 3 = long term priority, (F) = France, (P) = Portugal, (Sp) = Spain)

Research needs	Priorities		
	France	Portugal	Spain
Forest management and modelling			
Include in forest models multiple inputs related to silvicultural practices(e.g. soil preparation techniques, planting distances, varietal choice, fertilisation, pruning, understorey), site characteristics (slopes, fertility, biodiversity), climate change, and socio-economic demands (wood quality required by the industries, recreation, carbon, etc.)	1 (F)	1 (P)	1 (Sp)
Identify the impacts of climate change on forest productivity, forest ecosystem functioning and forest pests and diseases.	1 (F)	1 (P)	1 (Sp)
Define and assess scientifically-based indicators of sustainable forest management (Methodologies? Costs? Scale of reliability?).	1 (F)	1 (P)	1 (Sp)
Generate practical outputs for model users: allocation of wood quality in accordance with an industrial classification, economic profitability for the foresters, volume and nature of carbon storage, biomass produced, ecological indicators for stand viability.	1 (F)	1 (P)	
Optimize forest management models and silvicultural practices for different forestry scenarios: develop models and propose techniques allowing at different stand development phases to re-orientate silviculture towards different alternatives (timber production, fibre production, carbon storage, fuel wood production).	1 (F)	1 (P)	1 (Sp)
Integrate in the silvicultural techniques the social, economic and ecological items raised from discussions about sustainable management and establish guidelines for "sound practices" (soils and water conservation, biodiversity, forest health, etc.).	1 (F)	1 (P)	1 (Sp)
Evaluate the efficiency of "carbon sink" forest scenarios for several forest species and forestry systems (economic and energetic balance?)	2 (F)	2 (P)	2 (Sp)
Evaluate the sustainability of silvicultural and operations practices.	1 (F)	1 (P)	1 (Sp)
Provide the forest managers with decision support tools coupled with GIS.	2 (F)	1 (P)	1 (Sp)
Elaborate profitable silvicultural scenarios for "non-industrial" tree species.	2 (F)	1 (P)	2 (Sp)
Define the objectives of production for each forest tree species.		2 (P)	
Develop forest management models for irregular and mixed forest stands: silvicultural guidelines for the production of high wood quality logs and the fulfilment of multiple forest service.	2 (F)	2 (P)	2 (Sp)
Promote the use of diverse techniques and silvicultural schemes according to juridical, micro-economic characteristics and ecological site characteristics (soil fertility, properties and humidity, biodiversity, etc.).	1 (F)		1 (Sp)
Develop forest management models for small and fragmented forest ownerships, and for forest owners associations.		1 (P)	
Develop scientific models and management models for atypical forest systems or for not exclusively silvicultural systems (agro-forestry, silvo-pastoralism, small forest stands incorporated in agricultural systems)	1 (F)	1 (P)	1 (Sp)
Characterize the limits of productivity of forest soils (chemical and physical) and provide appropriate soil management guidelines.	1 (F)	1 (P)	1 (Sp)
Improve soil preparation techniques to prevent erosion.		1 (P)	
Monitor soil fertility, especially for reforestations and for conversions purposes.	2 (F)	1 (P)	
Study the effects of P, N and the oligo-elements on tree growth.	1 (F)		
Identify good fertilization practices (What, how much, when and how).	1 (F)		1 (Sp)
Evaluate the effects of spreading forest industry residues (biosolids, ashes) on tree growth, forest health, forest biodiversity, erosion, etc.	2 (Sp)	1 (P)	2 (Sp)
Relate fertilisation practices to water balances.	1 (F)		
Identify the relations between water cycles and carbon cycles in forest.		1 (P)	
Develop inventory systems and growth models to support certification schemes	1 (F)	1 (P)	1 (Sp)

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Forest inventories			
Increase the number and kind of parameters actually noted during forest inventories, in particular to evaluate the industrial and sanitary quality of the wood, the tree mensurations, the volume and the spatial allocation of carbon, the biodiversity, the water and soil quality.	1 (F)	1 (P)	1 (Sp)
Map the forest inventory data.		1 (P)	
Update volume tables.	1 (F)		1 (Sp)
Develop new volume measures techniques closer to the reality.	1 (F)		1 (Sp)
Develop wood quality tables.	1 (F)	1 (P)	1 (Sp)
Increase the number of forest inventories turns for fast growing tree species (wood quality and its geographical localisation for the optimization of transport and industrial processes). Establishment of a network of permanent plots?			1 (Sp)
Cost for the supply of reliable forest inventory data.	1 (F)	1 (P)	1 (Sp)
Develop new ways to manage the existing information and to make its use more attractive to developers.		1 (P)	1 (Sp)
Forest operations, logistics and transport			
Evaluate the environmental impacts of forest operations, especially with regards to the soil capacity to maintain tree growth and to store carbon, and optimize the operations.	1 (F)	1 (P)	1 (Sp)
Evaluate the impacts of forest operations on landscape.		3 (P)	
Promote sustainable forest operations practices.		1 (P)	1 (Sp)
Optimize forest operations by using equipments and machineries adapted to the environmental conditions and the environmental constraints.		1 (P)	1 (Sp)
Improve the security conditions of forest workers.	1 (F)		
Quantify the energetic cost of log transportations.		2 (P)	
Develop a "stock management system" for the forestry-wood chain (information on quality and quantity of the wood resource and its geographical position, development of an information system to improve the utilisation of the wood resource)	1 (F)		
Develop a wood traceability system (certification purposes).	3 (F)		
Optimize log size in relation to the required wood products.	1 (F)		
Incorporate in the regional forest planning the logistic restraints related to the distance between the stands and the wood industries.			
Wood quality and wood products			
Understand the effects of genetics, site and climate on wood properties formation in order to develop silvicultural scenarios enhancing wood quality formation (industry-oriented silvicultural scenarios) for instance to avoid the formation of reaction woods.	1 (F)	1 (P)	1 (Sp)
Identify the relations between wood properties and industrial uses (adapt the products to the market demands)	1 (F)		
Provide forest managers and industries (wood density, log geometry, log quality, decays) with techniques for wood quality assessments.	1 (F)	1 (P)	1 (Sp)
Simplify the existing wood quality categories.	1 (F)		
Improve the environmental credibility of wood products and industrial processes (lower wood treatments and chemical leachings)	1 (F)		
Optimise the use of fuel wood (for industrial and domestic use).	2 (F)		
Normalize solid bio-combustible.			1 (Sp)

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Non-wood forest products and forest services			
Identify non-wood products of economic importance (pine seeds, bark, chestnuts)		2 (P)	
Assess the total economic value of forests (wood, environmental services, carbon storage).	2 (F)	2 (P)	2 (Sp)
Develop the commercial use of other tree products (bark, resin, etc.)	2 (F)	1 (P)	2 (Sp)
Identify means to pay for environmental services of forests (Public subsidies? Markets? Taxes?).	2 (F)	2 (P)	2 (Sp)
Quantify the possible profits generated by the future market of carbon credits (economic balance costs/benefits).	2 (F)	2 (P)	2 (Sp)
Tree breeding, biotechnologies and production of plants			
Define the tree breeding objectives in accordance with socio-economic demands.		2 (P)	1 (Sp)
Implement selection strategies based on wood properties (straightness, wood density, branchiness - number, size and angle)	1 (F)		
Conservation and improvement of adaptive traits of genetically improved trees (drought, cold, pests and diseases resistances)	1 (F)	1 (P)	
Study the genetic variability by using molecular markers (genetic maps).		1-2 (P)	2 (Sp)
Identify molecular markers related to traits of interest for selection.		2-3 (P)	
Implement new genetic improvement programmes for high value species.		2 (P)	2 (Sp)
Enlarge the genetic improvement basis with new provenance areas.			1 (Sp)
Develop cheap and non destructive tests to control the provenance areas of forest plants.	1 (F)	2 (P)	
Promote seedling mycorrhization in order to increase future stand viability.		1 (P)	1 (Sp)
Elaborate methods for the propagation of selected trees (using biotechnologies).			1 (Sp)
Develop regional technical guidelines for a qualitative production of forest plants in tree nurseries.			1 (Sp)
Improve control concerning the production of commercial seeds for nurseries		1 (P)	1 (Sp)
Certify rules for collecting commercial seeds.		1 (P)	
Quantify the increase in wood volume and the economic profit for genetically improved trees.		1 (P)	
Provide foresters with a database of the genetically improved varieties available and their gains.			1 (Sp)
Develop appropriate silvicultural scenarios in parallel with tree breeding programmes and integrate genetically improved materials into decision support systems.		2 (P)	
Evaluate the impact of the use of genetically improved trees on the environment and in particular on the mid and long-term site fertility.	1 (F)		
Biodiversity			
Inventory remarkable habitats and relevant species (Methodologies? Cost?)	1 (F)	1 (P)	
Develop biodiversity indicators, analyse the correlations between biodiversity indicators and forest management practices, map the indicators and integrate biodiversity conservation into decision support systems (best silvicultural practices to assure biodiversity).	2 (F)	1 (P)	2 (Sp)
Develop specific management tools for riparian forests.		2 (P)	
Analyse the functional role of biodiversity for forest ecosystem stability.	2 (F)		
Evaluate the impacts of fragmentation and vegetal discontinuity on biodiversity.		2 (P)	
Develop ecological diversity indexes (especially for fauna) based on simple field sampling.		1 (P)	
Evaluate the impact of invasive species (exotic trees and pests) on biodiversity and propose landscape planning guidelines for the areas surrounding natural parks.		2 (P)	

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Biotic and abiotic risks			
Set up a regional monitoring network for the evaluation of the density of forest pests and diseases populations in relation with the damages occurred.	1 (F)	1 (P)	1 (Sp)
Develop preventive silviculture - Understand the effects of site, genetics, silviculture choices and practices on sanitary conditions (e.g. impact of thinning).	2 (F)	2 (P)	1 (Sp)
Incorporate risk factors (sanitary, climatic and fire risks) into forest practices and into forest management models.	1 (F)		
Incorporate the susceptibility of genetically improved trees to forest pests and diseases into tree breeding programmes.		2 (P)	
Develop Integrated Pest Management strategies against forest pests and diseases (costs/benefits), integration into decision support systems.	1 (F)	1 (P)	1 (Sp)
Identify the role and impact of biodiversity in biological control methods.	1 (F)		
Quantify production losses due to climatic events and forest fires.		1 (P)	
Identify the role of trees and stands architecture in forest fires behaviours.	2 (F)		
Develop and promote specific preventive management of forest fires for the Atlantic forest context (landscape management, fuel management, appropriate silvicultural practices).	2 (F)	1 (P)	1 (Sp)
Develop indicators on fire risk (evapo-transpiration, humidity content).		1 (P)	1 (Sp)
Identify the more appropriate species for each situation - Favour the use of drought tolerant and fire resistant tree species in areas at risk.		1 (P)	
Identify bioremediation techniques for rehabilitation of burnt areas (identification of the ecological effects of forest fires).			3 (Sp)
Elaborate forest fires extinction plans.		1 (P)	1 (Sp)
Socio-economics of the forestry-wood chain			
Analyse wood and non-wood products markets, identify the constraints of the accession of the products to the markets (economic, sociolo, technological) and develop the commercial niches for high quality products and innovative products.	1 (F)		
Analyse the economic opportunities for the development of markets for forest services.	2 (F)		
Evaluate the profitability of the forestry-wood chain for the community and for the different part of the chain (profitability of forestry).	1 (F)		1 (Sp)
Supply tools to analyse competitiveness of forestry-wood chains (estimation of mean wood price at mill site and total production costs)	1 (F)		
Establish regional economic forestry observatories, in particular for wood prices and forestry profitability.	1 (F)		1 (Sp)
Analyse wood selling systems (felled sale, standing sale) in relation to the profitability for the forestry sector and the forestry wood-chain.	1 (F)		
Evaluate different wood supply systems (role of wood storage sites)	1 (F)		
Identify and monitor forest related employment.	1 (F)		
Identify the conditions for the development of employment in forestry	1 (F)		
Evaluate the insurability of forests in the context of climate change.	1 (F)		
Analyse society's perception of forests and forest management.	1 (F)	2 (P)	2 (Sp)
Analyse the processes influencing society's demands and attitudes towards forests and silviculture	1 (F)	2 (P)	
Identify new funding mechanisms to achieve the society demands for wood quality (profitability of thinning?) and forest services (energy, carbon, recreation, biodiversity).	1 (F)	1 (P)	1 (Sp)
Understand who the forest owners are and which factors influence their choices and motivations (economic investment, conservation of biodiversity, soils, water.	2 (F)	2 (P)	1 (Sp)
Develop simple management tools for foresters to facilitate economic decision making (production costs, management costs, selling price) and to integrate social demands (e.g. the impact of silviculture on the landscape).	1 (F)		

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Forest policy			
Evaluate the efficiency of forestry-wood chain development policies (facilitate the establishment of high value industries in the region).		2 (P)	2 (Sp)
Foment the use of wood as a renewable material.			2 (Sp)
Analyse the relationships between forestry-wood chain and rural development policies.		2 (P)	
Elaborate development plans for private forests without silvicultural management (e.g. regional fire prevention plans)		1 (P)	
Elaborate crisis operational management scenarios (forest fires, climatic events).	2 (F)		1 (Sp)
Develop a long term policy for public research funding (e.g. tree breeding).		1 (P)	
Promote the creation of forest owner associations.		1 (P)	1 (Sp)
Develop the tools to provide private forest owner associations with technical support.		1 (P)	
Develop an attractive tax system (fiscality) to promote forest activities.			1 (Sp)
Elaborate methodologies to promote dialogue between the society, the research communities and the forestry and wood sectors.	1 (F)		
Propose methodologies and tools to enhance end-users participation in the identification of research strategies and goals, in the implementation of research projects and in their evaluation.		1 (P)	
Dissemination of knowledge, Communication			
Create a network for transfers between the research community and the end-users - identification of research priorities for research, dissemination of scientific knowledge, facilitation of technological transfers. Thematic meetings to be organized.	1 (F)	1 (P)	1 (Sp)
Communicate on forest activities and forest development with the Society	1 (F)	1 (P)	1 (Sp)
Educate the professionals periodically.		1 (P)	1 (Sp)
Explain to society the differences between Genetically Modified trees (GM trees) and genetically improved varieties	1 (F)		