

The first table deals with **EXISTING INNOVATIONS** and the second one with **POTENTIAL INNOVATIONS**

Referring to the following boards (**existing innovations**), you are invited to:

- Comment the information presented
- Complement the list of technological innovations
- Detail the ecological and socio-economical impacts of technological innovations
- Propose associated research topics according to those impacts

Please be as precise as possible in your formulations.

Existing Innovations	Issues for forest management		Associated research topics
	Ecological Impacts	Socio-Economical Impacts	
INNOVATIONS REGARDING VEGETAL MATERIAL			
Introduction / Development of exotic species (Eucalyptus, American pines ...)	- Biodiversity: conservation of natural resources - Forest health: competitiveness with endemics, invasive species, new threat	- Territory planning: social acceptance - Industrial sector organisation: - New markets, new products:	
Tree breeding for wood quality (rectitude)		- Forest profitability	
Tree breeding for pest resistance	- Pest dynamics:		
Tree breeding for climatic resistance			
Biotechnologies (vegetative multiplication cuttings)		- Nursery new management:	
Clonal forestry (poplars, eucalyptus)	- Forest health: - Biodiversity: - Soil properties:	- Forest profitability: - Forest sector organisation:	
INNOVATIONS IN RELEVANCE WITH FOREST MANAGEMENT PRACTICES			

Understorey management	Nutrient cycles: Water competition: Biodiversity: Forest health: Agroforestry: Legumes understorey: Fire:	Non wood products: Fire: Agroforestry:	N cycle
Slash management	- Nutrient cycles : - Soil physical properties : - Soil biological properties :	- Energy: - Non wood products: bark	
Traditional fertilisation	- Nutrient cycle - Forest health : Natural pest dynamic - Resistance to disturbance: - Water conservation: - Understorey: biodiversity	- Tree conformation: - Forest profitability:	C balance, N balance
Waste water, Ash management	- Nutrients cycle: - Soil properties: - Water conservation: Heavy metals - Biological diversity: wildlife, pests and pathogens dynamics,	- Non wood products and human health:	
Bioremediation forestry		- Non wood products and human health: - Wood utilisation:	
Mechanical soil preparation	- Soil conservation		
Mechanisation	- Soil: structure - Water conservation: - Forest productivity:	- Forest works: - Forest profitability: - Forest owner organisation:	

INNOVATIONS IN RELEVANCE WITH FOREST MANAGEMENT REGIMES			
Shortening rotations	<ul style="list-style-type: none"> - Nutrient cycles: N, P - Frequency of forest operations: Soil structure 	<ul style="list-style-type: none"> - Wood markets: Quantitative and qualitative wood supply - Industrial sector organisation: transformation capacity 	
Short rotation coppices	<ul style="list-style-type: none"> - Nutrient cycles: - Biodiversity: 	<ul style="list-style-type: none"> - Non wood products and amenities: hunting, mushrooms, berries, landscape, etc. - Forest profitability: - Industrial sector organisation: 	
Hedgerow management, Relict woodlands, Amenity planting at landscape level (tree diversity at landscape level)	<ul style="list-style-type: none"> - Biodiversity: habitat biodiversity, habitat complexity - Forest Health: host accessibility, impact of natural enemies - Climatic disturbances 	<ul style="list-style-type: none"> - Social impact: landscape perception - Forest profitability: - New wood supply: wood markets - Non wood supply: energy, etc. - Operational skills: 	Associational susceptibility between tree species
Logistics		<ul style="list-style-type: none"> - Forest profitability: - Forest labours organisation: - Industrial competitiveness: 	GIS
Transport	<ul style="list-style-type: none"> - Forest tracks: conservation of soils - Biodiversity: wild fauna disturbances due to forest fragmentation and forest penetration, impacts on 	<ul style="list-style-type: none"> - Forest profitability: - Industrial competitiveness: 	
Modelling growth and wood quality (Incorporation into decision support tools)		<ul style="list-style-type: none"> - Optimisations: profitability or biodiversity (according to inputs), it leads to the specialisation of forestry 	

Process based models	- knowledge: biodiversity, nutrient cycle, pests dynamics, etc.	Evaluation of economic impact of global change	
INNOVATIONS IN FOREST PRODUCTS			
Wood based products	- Species introduction: - Life cycle analysis:	- Forest sector organisation:	
Non Wood products (ex: mushroom culture, Cork)			
Processes for the exploitation of non wood products (extraction of resin, cork, eucalyptus extracts, etc.)			
Slash management for energy	- Soil fertility: - Soil structure: - Carbon sequestration:		Nutrient export, carbon balance

With respect to the following table (**potential innovations**), you are invited to:

- Comment the information presented
- Complement the list of future technological innovations
- Define associated research topics in order to **develop their utilisation**
- Detail their ecological and socio-economical impacts

Please be as precise as possible in your formulations.

Potential innovations	Associated research topics (in order to develop their utilisation)	Issues for forest management	
		Ecological Impacts	Socio-Economical Impacts
INNOVATIONS REGARDING VEGETAL MATERIAL			
Introduction of new exotic tree species	Anticipating global change	- Biodiversity: invasion, wilding, habitat diversity - Forest health: shift of native pests, invasion of exotic pests	- Industrial sector organisation:
Tree breeding for wood quality (lignin rate)		- Forest health: pest dynamics	- Paper sector profitability - Forest profitability:
Biotechnologies in forests (Genetically modified trees)		- Biodiversity: - Shift natural pests: - Shift natural tree species:	- Public perception: - Forest profitability: profit/cost for the plants,
Biotechnologies in forests (Somatic embryogenesis)		- Biodiversity: - Pests dynamics:	- Forest profitability:
Biotechnologies in forests (Reproductive material tracing tools)		- Site adaptation	
INNOVATIONS IN RELEVANCE WITH FOREST MANAGEMENT PRACTICES			
Clear-cutting size, distribution in space and time	Biodiversity: Fragmentation, Connectivity, Colonisation	- Biodiversity: Spatio-temporal dynamics	- Organisation of forest operations:
Retention harvesting	Technical optimisation	- Forest health: Pest spatio-temporal dynamics	- Forest profitability: - Labour organisation:

		- Biodiversity: - Soil fertility:	
INNOVATIONS IN RELEVANCE WITH FOREST MANAGEMENT REGIMES			
Mixed stand establishment for high quality products	Self pruning interactions, sheathing modelisation	- Operational skills: - Relation with forest health and biodiversity:	- Operational skills:
Modelling forestry/landscape planning at territorial level	Evolutionary process Monitoring system on forests		- forest amenity value - methods of inventory
Modelling ecosystem functioning (process based models)	Dataset availability	- Biodiversity:	- C storage:
Modelling wood quality			- Profitability: wood industries, forest owners, forest entrepreneurs
Modelling harvesting operations, logistics and transport		- Soil properties: - wild life disturbance:	- Forest and Industrial profitability
INNOVATIONS REGARDING FOREST PRODUCTS			
Medicinal cultures			