# Final Call Topic Proposals from the Forest-based sector ETP

## Towards the ENV thematic priority (October 2011)

***F#=topic related to the forestry value chain***
***W#= topic related to the wood-working industries value chain***
***P&P#=topic related to the pulp, paper and biorefinery value chain***

## F1. Understanding water and forest interactions from the leaf to the landscape scale: towards an integrated multi-scale socio-eco-hydrological approach of forest management for optimizing water-related ecosystem services

### Justification:

Forest and water related issues are of utmost importance; forests are crucial for the sustainable management of water resources and, at the same time, water is a key factor for the sustainability of forest ecosystems and their potential to provide ecosystem services. Moreover this interrelation will become even more important in a context of global change, with increased temperatures and uncertain future rainfall patterns and important land use changes. Furthermore, the growing population in regions already characterised by water scarcity will further increase demand for water.

Despite this, water and forest management policies, strategies and plans are generally developed and implemented in a sector oriented way, without considering the interrelated implications between the ecosystem and water resources. Because of the sector orientation, the various stakeholders are often in conflict. In addition, notwithstanding a significant advance in scientific understanding of forest and water interactions based on almost a century of research in forest hydrology, uncertainties and conflicts are still present, particularly for the difficulties in translating research findings between different geographic scales and geo-climatic conditions, different forest types, species, and forest management regimes. Time has come to design new management strategies, decision-support tools and polices that effectively integrate knowledge from different scales and disciplines to ensure that forest management and planning takes into account impacts on the water cycle.

### Scope:

The project will generate new cross-disciplinary multi-scale research together with stakeholders aiming at developing new integrated knowledge for a better understanding of the impacts of forests and forestry (from the leaf to the landscape-basin scale) on the water cycle and for developing a new effective socio-eco-hydrological approach of forest management that will aim at optimizing water-related services (e.g., water quality and quantity) and minimizing water related risks (droughts, floods).

Specific research areas that need to be developed and linked **in an integrated multi-scale approach** from the stand as smallest meaningful forest management scale level to the hydrological scale of small and mid-sized basins, are:

* improved knowledge on water processes in trees and forests (water productivity, interception losses, root behaviour and water uptake complementarity, use of different water sources, how trees adapt to water stress, etc), and improved knowledge on how forest

management can make forests more water-use-efficient, more climate change adapted, and how forests influence atmospheric moisture content;

* improved knowledge on the hydrology of forest ecosystems (at small and mid-sized basins levels) in view of how the composition, density and distribution of the vegetation cover, land-use and management and disturbances affect water resources and related risks (droughts and floods) on different forest ecosystem types;

* improved understanding of the trade-offs between on-site and off-site water-related ecosystem services (green and blue water flows and water quality) and other ecosystem services at different scales (from small to mid-sized basins);

* research into adequate economic instruments involving all stakeholders (water pricing and markets, payments for environmental services, etc) and policy recommendations that look at forests and water in a integrated manner.

* improved understanding of different planning and economic instruments and policies that ensure a socially optimal provision of water and other forest related ecosystem services;

The integration of the previous research topics are the basis for developing a socio-eco-hydrological approach and new decision-support tools and to provide global and regional specific views on the complex interactions of water and forests.

**Recommended size (instrument) and duration:**

Large scale collaborative project 4 years. International cooperation.

**Expected impact:**

The research will have an impact in the development of (i) new integrated management strategies and decision-support tools that will link stand (silviculture) to mid-sized basin (land-use planning) level decisions aiming at optimising the impacts of forestry on the water cycle as well as understanding trade-offs with other ecosystem services and (ii) adequate economic instruments (water pricing and markets, payments for environmental services, etc) and policy recommendations that look at forests and water in a integrated manner. Such knowledge and tools will provide more comprehensive knowledge to policy makers on the forest/water interface in the framework of different policy initiatives (e.g. the EU Water Framework Directive and Forest Europe process).

Multiple stakeholders; forest owners, managers, public administrations, water companies, etc will benefit from the project impacts. In addition, enhanced transcontinental (Australia, California, Africa, etc) scientific cooperation in such a globally-relevant-topic will result from the project.

## (Also potential joint call KBBE & ENV?)

## F2. Building resilient forests by integrating evolutionary processes into management strategies

**Justification:**

Due to the rapid pace of current environmental changes (climate, atmospheric N, pests/disease, invasive species) the likelihood that long-lived forest trees can adapt through molecular evolution is very low, therefore tree populations must cope or adapt through phenotypic plasticity, migration or re-assortment of standing genetic variation. In addition, human modification of landscapes and forests has restricted the capacity of populations to change, often limiting regeneration, degrading potential habitat and leaving forest patches fragmented and isolated. Nevertheless, tree populations maintain high levels of genetic variation, have high capabilities for gene flow and show high heritabilities for phenotypic traits indicating a high potential for adaptation if appropriate management strategies can be devised to allow this to happen. Current and future species responses to predicted environmental changes are embedded in demographic and evolutionary processes that occurred in the past. Therefore, understanding range-wide patterns and interactions between environmental change, demography and evolution taking place in the past is essential for developing of management strategies.

Rapid advances in the development of genomic resources for forest trees and in associated fields such as landscape and community genomics mean that the forestry community has never been better placed to develop and test new adaptive strategies, based on the integration of molecular, phenotypic and environmental data to study the basis of adaptation and for selection of genotypes best adapted to given environments. The synthesis of these linked but distinct fields offers the promise of an ecosystem genomic strategy for equipping our forests to cope with environmental change.

**Scope:**

Research should focus on gathering the necessary empirical data to assess landscape-scale organisation and dynamics of genetic variation in tree populations, particularly for variation in susceptibility, resistance and resilience to pests / diseases and for responses to altered climatic regimes. Research should concentrate to the relation of genomics and resilience to drought and the role of Mycorrhizae. This should include re-evaluation of existing and establishment of new experimental trials to assess variation in phenotypic traits and to form ongoing resources for research into local adaptation, plus combined studies of natural and experimental populations. Options for fast phenotyping of adaptively important traits (cold/drought/pest resistance) should be explored. The project should take advantage of emerging genomic resources for tree species, ensuring integration with ongoing international genome sequencing efforts, and of the current state of the art in plant community genomics. Efforts to synthesise genomic, relation with mycorrhizae and empirical datasets in next-generation models should be undertaken to test strategies in broad consultation, and drawing from existing EU supported research efforts in this field. Finally, the project should be strongly connected with stakeholders at a variety of levels from managers to policy level and in a range of forest contexts to establish practicable strategies for integrating results into management and for motivating the uptake of new ideas.

The combination of population genetics and genomics, biogeography and ecology will provide an integrated view and a powerful approach to uncovering the molecular mechanisms responsible for adaptation, role of mycorrhizae, as well as the drivers of selection (both climatic and ecologic). It will also provide a basis to identify adaptive population differences that might help a species to survive future environmental changes. Ultimately, the comparison of the results across species will help uncovering the molecular basis of evolution (and its architecture) underlying adaptation in groups of forest trees.

**Recommended size (instrument) and duration:**

Large scale collaborative project – 3 to 4 years

**Expected impact:**

Improved international coordination in the development of genomic resources for European trees. Better understanding of mechanisms and patterns of intraspecific local adaptation, role of mycorrhizae, at multiple spatial scales. Improved resolution and better integration of national databases on forest cover, distribution and density of tree species and phenotypic variation. New strategies for management of forests to incorporate the potential of forest ecotems for evolutionary change. Improved capability for responses to environmental changes.

Improve estimates of habitat suitability for each species at different spatial scales. Assess the relationship between demographic processes and the current realized niche of the species. Test whether evolutionary mechanisms, particularly adaptations to regional environmental conditions, translate into ecological niche differentiation within the species concerned.

## F6 Responsive governance in globalization of forests

Relation to FTP Strategic Research Agenda: Research area 5.2 Instruments for good forest sector governance

**Justification:**

Forest policy development is presently caught between two contradictory tendencies. On the one hand forest issues are increasingly becoming globalised with concomitant calls for global governance through international conventions, regulations and programmes. On the other hand much emphasis is put on the need to enhance local participation in the management of forest resources. Emphasis is also on location-specific forest management plans on the basis of negotiated consensus of the various stakeholders concerned. This process of glocalization of forest governance is also evident in Europe. At the international level, European forest governance is shaped by both global policies (e.g. United Nations Forum on Forests, Convention on Biological Diversity..) and specific European policies (e.g. forest-related legislation of the European Union, Forestry Strategy for the European Union, FOREST EUROPE). Some of these policies include legally binding instruments, while others involve non-legally binding instruments. In addition, many efforts at policy decentralization are undertaken in the form of privatization to civil society organisations (e.g. forest certification schemes), administrative deconcentration to lower levels of bureaucracy and devolution to local groups. These contrasting tendencies have resulted in a very diverse arrangements of multi-level and multi-actor forest governance arrangements and a complex array of interfaces between global and local policies. This complexity creates questions on (a) how to manage the interactions of different policy regimes and to create synergy rather than competition at the interfaces between the global and local policy practices, and (b) how to assure that the governance constellation can be responsive to present and newly emerging concerns regarding the productive, regulative and cultural functions of forests.

**Scope:**

The research should focus on the identification of the interactions between different European forest regimes and localized arrangements for forest governance. It should examine how different European countries deal with multi-level forest governance and the interfaces between global, national and local policy practices, and assess how the related governance activities relate to the concept of responsible governance of multiple forest functions across Europe.

**Recommended size (instrument) and duration:**

Large scale collaborative project - 3 to 5 years

**Expected impact:**

The research should result in a series of recommendations how the EU and national governments can stimulate responsible governance of forests through improved interaction

management between global and local processes of decision-making and control over forests. The research offers the opportunity to theorize on the role of the EU in multi-level and multi-actor governance arrangements and to develop innovative communicative instruments for dealing with regime interaction and the principle of subsidiarity.

**Expected impact:**

Integrated full chain analyses including costs as affected by alternative policy incentives. Insights in opportunities in an integrated way including competition. Design of transition pathways, and industrial and energy company involvement differentiated for the major European regions

## F8 Integrated study of biomass energy potentials

**Justification:**

The forest based sector as well as the agricultural and the waste sector can contribute significantly to the EU aim for a smart, sustainable and inclusive economy (the green economy). Aspects in the forestry sector are the production of sustainable woody biomass, but there are many aspects to this: collection from many forest owners, smart use of the resource, competition with material use of biomass and possible conflicts with other ecosystem services due to nutrient loss, overexploitation and biodiversity decline. In the agricultural sector competition with food and indirect land use change is a mayor issue both considering crops with a potential dual use and specific energy crops. Further research is needed to address economic constraints to the mobilization of biomass potentials and to develop cost-supply curves for all kinds of biomass , for short rotation coppice, other energy crops and from alternative biomass production systems on other land categories. An integrated European study should tackle all these aspects in a coordinated way and shall contribute both for EU-Level and national level assessments that take into account as well global implications and global markets (import/export issues).

**Scope:**

The research should be of an integrated nature tackling the multiple aspects of biomass from waste , agriculture, woody biomass for bioenergy from European forests and from dedicated energy crops. Realistic implementation potentials should be evaluated that will enable a transition to an energy supply with a significant share from woody biomass from forests, specific plantations, agricultural residues and the biodegradable part of waste The evaluation should include growth and production, harvesting, economics, competition with other utilisations of the biomass, and novel (cascading) ways of using wood (incl. biorefineries etc.).

The study should look into the introduction and transition phase of introducing an increased sustainable use of biomass in the green economy, considering effectiveness of policy instruments. It should provide insights into the resources themselves, and strategic planning of land use and small to large scale biomass utilisation, and evaluate the impact on ecosystem services. Options provided by the current collection systems from the traditional forest based sector should be studied.

The study should be multi-sectoral where it involves competition aspects with other sectors, and with trade from outside Europe. Policy aspects e.g. with regards to the targets set out in the National Renewable Energy Action Plans (NREAP) are to be included.

**Recommended size (instrument) and duration:**

Large scale collaborative project – 3 to 4 years

**Expected impact:**

Integrated full chain analyses including costs as affected by alternative policy incentives. Insights in opportunities in an integrated way including competition. Design of transition pathways, and industrial and energy company involvement differentiated for the major European regions

## F12. Cultural Forest and Woodland Landscapes: Past Present and Future

**Justification:**

Understanding Europe's Cultural Forest and Woodland Landscapes (CFWL), including how they were derived, their current status and their future roles given changing societal priorities has important implications for sustainability. Rural landscapes have been shaped by people's traditional knowledge and institutions, developing their own social, economic and ecological values long before the development of contemporary ideas about sustainable development and adaptive governance. Remaining CFWL provide us with examples of traditional approaches to local place-based governance, whose adoption elsewhere could help us to avoid further loss of social capital in rural areas. Since many CFWL are based on multiple output systems and, in particular, often combine agriculture and forestry, they can also point the way to the development of new, innovative multiple land use systems

**Scope:**

Understanding the range and diversity of CFWL across Europe, will include refining what 'cultural forest and woodland landscapes' actually means and the ecological and cultural functions they provide. Having defined the range and diversity of CFWL, the next step is to describe the systems of governance and management of remnant CFWL. Lessons learned from existing and historic CFWL will be used to inform approaches to land use in the present and future given different global scenarios and to assess the economic and ecosystem services they can provide to deliver sustainable rural development.

This research project will focus on low productivity land (upland, nutrient poor, arid) in the EU. This is land that often cannot currently produce an economically viable return, regardless of land use. The results will recommend innovative systems of multi purpose land use that will allow both financial and non-financial outputs from low productivity regions of the EU to be optimised in future.

**Recommended size (instrument) and duration:**

Medium scale collaborative project - 3 to 4 years

**Expected impact:**

The social, economic and ecological specification of sustainable, multi-output systems for non-productive areas will open up new possibilities for the future use of these areas of Europe. The wider adoption of sustainable CFWL systems in non-productive areas will help to buffer Europe against the ecological, financial and social implications of future environmental change.

## P&P13. Cascade utilisation of fibre-based biomass by recycling and optimising material loops to secure material base.

**Justification:**

Cascade utilisation is a well-developed process in pulp & paper industry. Working with natural substances is always in touch with separating the raw material from fractions that cannot be used for production. This segregation is necessary to achieve stabile quality levels in technical and hygiene & safety reasons. As this fractioning processes are as good as techno-economically reasonable some valuable substances remain still in these fractions. Higher raw material costs caused by more and more insecurity of raw material supply and the EU-policy create the necessary of further developments. To use the potential of various substances in bio-based materials a raised differentiation enables the development of by-products. A future target is to receive a number of materials that are optimised for its further purpose (e.g.: every class of fibre its specific product). Cascade utilisation is the basis for biorefinery concepts as it focuses on the isolation and use of small scale materials and molecules components after pulp and paper processing.

**Scope:**

Main efforts can be done at the separation of waste material flows in the mill. Seperation technology and integration in the production process have to be studied intensively:

- Mapping of available resources regarding properties relevant for more efficient production of such products. Methods for efficient characterization of such properties
- Identification of best access point to isolate by-products
- Solutions for efficient handling/processing at the mill for supply of uniform and suitable materials for production of different types of products. Process control and information support.
- Process solutions for separation/enrichment and processing of materials and chemical compounds of particularly beneficial properties for use in different types of products
- Cooperate with others sectors to develop products based on side streams

**Recommended size (instrument) and duration:**

Collaborative large scale project, duration 4 years, incorporation of stakeholders from engineering sector could be necessary.

**Expected impact:**

Increased resource efficiency, development of new qualities by better separation, higher energy efficiency because of optimised raw material properties, reduction of costs for waste treatment

## W4. Resource efficient use of wood; responsible recycling of wood products (Suitably to merge with P&P14)

**Justification:**

Waste wood has been recycled in to other products for many years. An obstacle preventing 100 % utilisation of recovered wood is ensuring its cleanliness and sorting of qualities for use as a raw material for another solid or engineered products or bioenergy products. Currently, the cleanliness of recovered wood is reliant on:

- Disposers and recyclers efficiently sorting treated (which includes all surface finishes and chemical treatments) and non-treated wood in to appropriate categories
- Manual "hand picking" stations to remove gross contaminations, i.e. metal, glass, plastic and treated wood
- Physical sorting, i.e. sieving, air classifying, magnets, eddy-current drums, etc. to remove smaller non-wood contamination

Unfortunately, current cleaning techniques are far from 100 % effective and the separation of contaminated from clean wood or chips from wood based value chains and building and packaging stocks is currently impossible. A system that could achieve this would make it very much easier to recycle wood because wood from all sources could be processed together. The amount of contaminated recovered wood on the market is expected to increase as well the demand for wood in the bioeconomy (raw materials, energy source, biorefinery). Better cleaning and sorting techniques are needed to augment the efficient use of recovered wood to its full potential.

**Scope:**

A thorough study on the quantities of wood present in different waste streams in order to estimate the amount of wood available for recycling or energy is needed, including an investigation of types and concentrations of contaminants (i.e. non-wood) present in wood recovered from different waste streams. Analytical systems that are capable of detecting different contaminants in real time shall be developed together with material and particle sorting systems enabling the sorting of clean from contaminated wood particles and impurities.

**Recommended size (instrument) and duration:**

Collaborative project, 3 years

**Expected impact:**

More recovered wood will be used as a raw material resource thanks to the improved cleanliness and the improved separation of materials suitable and unsuitable for recycling. The maximisation of the amount of recoverable wood will further increase the resource efficiency in the sector and reduce the volume of wood that should be sent to special incineration facilities.

## W6: VOC performance of building materials and overall VOC performance of buildings

**Justification:**

People in modern societies spend most of their time indoors; at home or work, in school and in transit. In average, we spend 90% of our time indoors. Consequently, it is easy to appreciate the quality of indoor environment - the environment where we mostly spend our time. Improving the quality of indoor environment enhances both our wellbeing and our performance. Building materials constitute an important emission source of volatile organic compounds (VOC) both in buildings several dozen years old as well as in newly constructed buildings. That is why attempts are constantly made to find construction materials that emit only small quantities of VOCs or those that release compounds which are neutral to our health and to our general physical and mental condition. There is the scientific evidence that indoor air quality (IAQ) and environment pollutants originate from multitude of sources. However, the current practices focus almost solely to individual building materials and their emissions. Due to that the scope of research needs to be extended to overall performance of buildings ensure the healthy and comfort indoor air environment.

**Scope:**

The research shall define the performance of building materials and buildings to ensure the healthy and comfort indoor air environment. In this way it will provide a comprehensive basis in order to result in valuable health data and planning tools to the building industry for the assessment of health related aspects of a building. The networking between research and industry and towards authorities will increase the knowledge transfer between all actors in the building sector.

**Recommended size (instrument) and duration:**

3 years

**Expected impact:**

The results will characterize human health performance of building materials widely used in public and private buildings. The creation of new tools and methods which support the safety design and use of buildings materials, especially with regard to the impact on the indoor air climate will ensure a healthy indoor air environment in buildings. The overall analysis of the factors affecting IAQ and toxicological and psychological evaluation of correlation of in-situ existing indoor environment and human health are essential for safeguarding the well being of European Citizens.

**Proposed Programme:**

ENV

## P&P14: Towards zero waste with novel fractionation technologies in material recycling (Suitably to merge with W4)

**Justification:**

With a recycling rate of more than 70% in Europe, the pulp & paper sector has developed a most effective circular economy based on the recovery of fibres while most of the non-fibre material is still dismissed as low-value waste streams. This applies in particular to mineral pigments and fillers (increasingly used in graphic papers) which are mainly rejected during the deinking process, together with other organic materials like inks, latex, cellulose fines and chemicals, and lead to 10 to 50% solid losses, depending on the final paper product. With more than 3Mt deinking sludge and as much effluent sludge produced yearly in Europe, the development of cost effective solutions for the reuse of the valuable components of such sludge would lead to huge savings and help to restore profits in the paper sector as well as in other industrial sectors where the recovered secondary raw material could be used.

**Scope:**

A main objective is to develop new solutions for the valorisation of mineral and organic mater containing waste streams, i.e. papermaking sludge. The research should focus on new or improved separation technologies and processes in order to selectively recover and recycle the different fractions, i.e. the minerals, fibres and fine organic components and the chemicals. Research should provide new knowledge and develop innovative techniques in the relevant fields of physical-chemical extraction/separation by size (e.g. ultrasound boosted membrane filtration), density and surface properties (e.g. controlled flotation). Combined process steps like bio-and thermo-chemical pre-treatments, atomization and drying should also be considered as it is not expected to reach high separation selectivity on all valuable components in one single step.

Special attention should be devoted to the evaluation of the cost effectiveness of different process solutions, including post-treatments (e.g. bleaching) with respect to the added value to be gained through the reuse of the separated secondary materials, i.e. their recycling in the paper product, or in other sectors like paints, plastics and added value construction materials.

Moreover proposals should include a Life Cycle Assessment to evaluate the environmental and societal benefits of the new technologies, namely in terms of resource efficiency.

**Recommended size (instrument) and duration:**

Small scale collaborative projects - 3 years

**Expected impact:**

The project should demonstrate the efficiency of the new fractionation processes and their feasibility and profitability for the paper recycling industry. The environmental gains in terms of resource efficiency should be assessed in an industrial ecology approach and the potential transfer of the new technology to other sectors should also be addressed as appropriate.

# *Potential SSH-ENV joint topics*

## F7 European wide foresight exercise for the forest-based sector

**Justification:**

EU is targeting for smart, sustainable and inclusive economy (Europe 2020). The forest-based sector is in a key role – together with other natural resource sectors – for achieving the goals for a more resource efficient, greener and more competitive bioeconomy, as well as the goals for better employment in the rural areas and a variety of social benefits. At the same time there is a growing complexity of issues at stake for forests and the forest-based sector in Europe. The natural resources are under increasing pressure, and the global developments leading to this include foreseeable challenges, but also uncertainties of a new scale due to for example, climate change, social and political developments. More flexibility and anticipation are required from the decision making both in administration, business and in research and development. A European-wide foresight exercise is needed to improve coordination of forest-based sector research in Europe, and to strengthen the forest-based sector response to the grand challenges.

**Scope:**

The objective is to carry out investigations on the future of forests, changing societal demands on forests goods and services, as well as impacts of policies on goods and service provision. With respect to forests, Europe comprises a variety of landscapes and ecological basis for actions, as well as governance structures and instruments to ensure sustainability of the forest ecosystems in changing conditions and to plan a sustainable provision of forest-based products and services to the evolving needs of the society. Research is needed to focus the European-level efforts to topics where a pan-European added value is achieved across the varying needs and demands in different parts of Europe. A step-wise foresight exercise is needed to combine regional investigations in different parts of Europe – i.e. combining the national requirements and perspectives to region-specific ecological conditions – and convey these investigations to European level goals and measures.

Foresight is a systematic, participatory, future intelligence gathering and medium-to-long-term vision-building process aimed at present day decisions and mobilizing joint actions. Compared with a long tradition in futures orientation in the forest sector – for example in forest growth trends, development projections and trade outlooks – foresight builds capacity to tackle possible futures beyond extrapolation of present and foreseeable trends.

An elementary part of the investigation is methodology development – on one hand, to improve an evidence base from integrated analyses combining quantitative and qualitative investigations and synthesising of the data and results gained in different disciplines, and on the other hand to contribute to the work already carried out in the forest-based sector in scenario modeling, long-term monitoring and impact assessments. Furthermore the method development is needed to ensure a coherent foresight approach and method to the regional

exercises, and to fully utilise the work already carried in other sectors e.g. in the SCAR foresight exercise in the agricultural sector.

**Recommended size (instrument) and duration:**

Large scale collaborative project – 3 to 4 years

**Expected impact:**

The improved coordination of the forest-based sector pan-European investigations will improve efficiency in using research resources, support the bioeconomy development as well as contribute to vision building process at the European level for forests and the forest-based sector in a long term. Furthermore, foresight improves preparedness to alternative development pathways in the forest-based sector and consequently, improves agility in responding to the global challenges.

**Proposed Programme:** SSH or ENV or joint call

## F10 Long term socio-ecosystem research (LTSER) integrating social and ecological approaches towards adaptive forest systems management

**Justification:**

The current paradigm in global change and sustainability research frequently is based on deeply accepted assumptions that bio-physical experiments and computational models constitute a core technology to support policy, and that quantitative data are to be prioritised relative to qualitative evidence, information and value-laden judgement. Open knowledge systems, on the other hand, rely on a inter-disciplinary, systemic perspective to embrace complexity and a comprehensive representation of global change and sustainability issues; it includes a combination of participatory experiments and agent-based modelling approaches to examine an increasing wide range of social-environmental problems.

The building of knowledge to govern uncertainty and transition impacting on forest landscape management, under global change, requires an integrated, interdisciplinary approach to provide insights and indicators for sustainable approaches to forest C-management, biodiversity conservation and enhancement, biomass supply and climate change adaptation, in a landscape dimension.

**Scope:**

To implement a research program that supports a network of rigorously planned, long-term socio-ecosystems case-studies centered on forest environments and landscapes to analyze and, possibly, to simulate the behavior of individuals and groups within different societal structures and environmental contexts, for understanding the drivers and barriers for mitigating global change impacts (i.e. climate change effects, contrasting land-uses in forest landscapes, increasing requirements of biomass for energy vs wood industry, fires, pest outbreaks, windstorms) on forest systems and to increase their adaptive responses. These studies would also demonstrate different mechanisms of engagement and cooperation in knowledge production, learning and evaluation in tackling sustainability concerns in different places.

The research program will supports a series of infrastructures and ”laboratories” made of participation-driven field experiments, under contrasting social-environmental set ups, based on different silvicultural systems, for testing integrated methodologies and forest management options to devise robust, sustainable, societal action for global change adaptation.

Through a set of participatory-type experimental research, the program will define sustainable approaches to:

- Favor a transition to a “soft path” and towards more integrated and adaptive regimes in ecosystem management, taking into account uncertainty and complexity.
- Evaluate management effects at forest patch and landscape scales, taking into account ecological connectivity, ecosystem fragmentation and the interactions with the man-made component.

- Establish a network of forest test-sites where it will be possible to follow long-term trends of forest biodiversity and carbon cycling in response to forest management options, defined with a participatory approach.
- Develop and convey to the different groups of stakeholders, a new understanding of what is meant for "managing transitions" and innovative methods for adaptive management options of such processes of change.

**Recommended size (instrument) and duration:**

Large scale collaborative project - 3 to 5 years

**Expected impact:**

The project should lead to updated knowledge about the effectiveness of new forest management practices in meeting societal multiple objectives (production, protection, biodiversity, etc) into target European ecosystems/forest types. It will deliver data and policy relevant information about the impact of forest management on carbon cycling and biodiversity. It will lead to evaluation of management effects at forest patch and landscape scales, taking into account ecological connectivity, ecosystem fragmentation and the interactions with the man-made component. Better tools and methods for monitoring global change and for supporting anticipatory, reflexive and adaptive societal responses to global change will be produced as well together with stakeholders and SME's. Improved access to and comparability of large data sets (includes long-term support for maintenance and further development of infrastructure and better meta data).

**Proposed Programme:** SSH or ENV or joint call