

Review on Forest Sector Foresight Studies and Exercises

Päivi Pelli



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Publisher: European Forest Institute
Torikatu 34, FI-80100 Joensuu Finland
Tel. + 358 13 252 020
Fax. + 358 13 124 393
Email: publications@efi.int
<http://www.efi.int>

Editor-in-Chief: Risto Päivinen

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Foreword

Major challenges of the future, such as climate change, globalization, biodiversity conservation and meeting future biomass demand, will set significant demands for the European forest-based industries and land use. Cost competitiveness will increase the pressure on the forest sector to implement a structural renewal through adoption and commercialisation of new innovations.

Maintaining the competitiveness and vitality of the forest sector in the spirit of the Lisbon declaration calls for a multidisciplinary foresight exercise. A wide approach in identifying trends and prospects for forest sector and its value chains, acknowledging foreseeable changes in the European civil societies and environmental paradigms would be essentially needed. The main issues to be covered in analysing the driving forces regarding the future of the European forest sector include:

- Identification of changing structures and needs in the forest industry, markets, customers and services
- Identification of changing standards and practices (e.g. in forest management)
- Identification of potential sources of competitive advantages (based in particular on knowledge creation, human capital and absorbing new skills)
- Mapping greatest medium to long term risks and uncertainties in the forest sector
- Identifying relevant policies capable of supporting positive future development in the European forest sector
- Review of the interaction of forest management with other land use sectors, with special emphasis on climate change
- Identification of relevant research, monitoring and new regulation needs

This report is intended to serve as one step towards European-scale forest sector foresight studies. It clarifies the concept of ‘foresight’ and describes some recent and relevant examples of such exercises. I hope this work will pave the way towards improving ability for European Forest Sector to maintain and enhance its competitiveness and sustainability in changing world.

Risto Päivinen

Director

European Forest Institute

Summary

Foresight is a term that is used for many kinds of future-related activities, e.g. futures studies, strategic planning approaches, visioning, forecasting, scenario modelling, trend analysis, or scanning of weak signals. The vagueness of the very concept of foresight illustrates the stage of development in this field: we are talking about something still evolving, about something emerging, but not totally new or exclusive from the already existing fields.

This review provides the reader with a general idea about foresight and what kind of activities this term refers to. Foresight is defined as a systematic, participatory, future intelligence gathering and medium-to-long-term vision-building process aimed at present day decisions and mobilizing joint actions. The term “fully-fledged foresight” is used for activities that feature the following five elements:

- structured anticipation and projections of long-term social, economic and technological developments and needs,
- interactive and participative methods involving a wide variety of stakeholders,
- forging new social networks,
- elaborating a guiding strategic vision and a shared sense of commitment, and
- implications for present day decisions and actions.

The definition of foresight is discussed in relation to how the futures have been handled in the forest sector and in relation to the forest sector in Europe.

The review shows that the future-oriented studies and exercises in the forest sector are abundant. Trends and scenarios make projections on the future. In the field of science, technology and innovation foresight methodologies are in use for defining research priorities and allocating resources. Corporate foresight exercises orientate business towards the future developments. Policy and strategy formulations aim at towards preferred future. These activities are ongoing in several levels in and in relation to the forest sector. They are performed in and by different kinds of organisations and with varying geographical and thematic scopes.

Five foresight exercises are described more in detail:

- European Forest Sector Outlook Study EFSOS
- INRA Prospective Study on Forest Sector in France
- Forest-Based Sector Technology Platform FTP
- Future Forum on Forests foresight initiative in Finland, and
- Standing Committee on Agricultural Research SCAR Foresight Initiative.

Though the forest sector studies and exercises already use the palette of foresight methodologies, foresight is a relatively new instrument in the forest sector. Studies and exercises are scattered around Europe, but no comprehensive exercise for the forest sector in Europe has been carried out. Foresight is not a project, even though it can be performed as a project. Foresight is an art of knowledge, a way of creating and accumulating strategic intelligence.

This review is a basis for inviting the forest sector to discuss about its future orientations and the means of looking into, debating on and shaping the future.

Glossary

Anticipation is used in this review parallel to **forecasting** i.e. an estimate or prediction of the future or a future condition.

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.

Future-oriented studies refer to any kind of study focusing on what the future might be like.

Futures research or **futures studies** refers to a multi- and interdisciplinary field that aims at postulating possible, probable and preferable futures by studying yesterday's and today's changes and analyzing the sources, patterns, and causes of change and stability.

Outlook studies depict future developments, usually highlighting the relationship and interactions between key driving forces and their possible implications.

Projection is a potential future evolution of a quality or set of quantities, often computed with the aid of a model.

Prospective studies refer to French tradition and methodology of futures studies and foresight (la prospective).

Roadmap is a collaborative process that produces a broad set of plans and strategies to reach a future goal.

Scenarios are special stories that portray plausible futures. They illustrate the range of possible futures that could develop from the influence of key drivers, events and issues.

Trend extrapolation refers to continuation of development into the future by assuming that the phenomenon being studied changes along the same lines seen in earlier observations.

Weak signals (often synonym for **emerging issues**) is a phenomenon or incident which does not necessarily seem important as it happens nor is it at large, but which might have an important or even decisive role in the future development process.

1. Foresight – art of knowledge

1.1 Foresight and the evolutions of foreseeing

Looking into the future has intrigued human mind throughout time. Possessing information on future developments prior to others has been a way to gain profits and power. In a world that has become more complex and interlinked, understanding possible futures has become more and more crucial.

The term foresight in its present connotation became known in the 1980s, though it is used to describe future-oriented activities linked with science, technology and innovation also prior to that.

Initially, there was no clear distinction made between forecasting and foresight (European Commission 2006b). Forecasting tools, such as Delphi method and systems analysis, and scenario planning, RAND Corporation, date back to the 1950s US defence sector. Companies were interested in these methods for business purposes already in the 1960s, e.g. the Shell scenarios, but the demand for forecasting and anticipation escalated after the oil crisis in the 1970s (Cuhls and Johnston 2006). National exercises on anticipating the technological development took place in Japan from the end of 1960s onwards (UNIDO 2005). In Europe, France started with foresight initiatives in the early 1980s. Later that decade, also Australia, Canada and Sweden began to experiment with technology foresight, but it was not before the 1990s that the technology foresight became much more widespread. This development has continued and several countries have carried out foresight exercises, though there has been no one common way of structuring or performing these activities.

From the 1960s up until today, the very concept of foresight has evolved (Georghiou 2007). In the beginning, the technological forecasting was carried out by *experts*. Next, *industry and the market* were brought in, and the technology developments were targeted to match existing needs by the cooperation between industry and technology experts and researchers. When adding a *social and user-oriented* view, foresight started to take a wider socio-economic perspective: complicated social issues and structural failures were to be amended in cooperation of industries, research and technology development units together with the representatives of social actors. Evolvement of foresight has led to a broadening of scope and participation, and more recently, to a shift to a *distributed mode of activity* and engagement with a *broader policy focus*. Foresight has no longer one sole policy sponsor but it has become co-ordinated with other parallel activities. A mix of programmes and exercises are carried out across sectors and with varying geographical scopes

Technology foresight is developing into *innovation foresight*. It has evolved from a tool for informing and supporting decision making to an instrument of implementing changes (Georghiou 2003 and 2007). These developments are described in the studies on foresight e.g. by following directions: from closed to open approaches; from linear to complex system views; from managed to coordinated processes, and; from supply to demand orientation. Also the aim of building up *foresight culture* is articulated, not only by those with the longest experience in foresight, but also in countries, sectors and organisations initiating their first efforts in this field.

In addition to individual foresight exercises, there have also been international actions supporting foresight. On one hand, these actions have aimed at developing methodology and a harmonized use of terminology for foresight, as well as accumulating the knowledge and experiences from foresight experts and practitioners. On the other hand, the aim has been to promote the utilization of the foresight methods in different sectors and levels of action.

The European Union has adopted foresight for realizing the Lisbon strategy aims and emergence of the European Research Area ERA, but also supporting the enlargement of the EU (European Commission 2002). Foresight has been promoted in several ways with the community resources e.g. by Research Framework Programme resources for research, integration and networking, and by Structural Funds in the regional foresight exercises. High-level expert groups are called in to define the EU level directions, e.g. on the sectoral development priorities, innovation policy orientations or the perspectives for Europe in 2020–2030.

Foresight is high on the agendas of governments, businesses and research organisations. Today foresight is utilized in many sectors, not just in technology and innovation, but also in handling social questions related to e.g. employment and demographic developments, in environmental sector related to both local and global issues, as well as in dealing with questions of political, cultural and other character.

As the foresight experts say: foresight is not an art of science, it is an art of knowledge.

1.2 Concept of foresight and its fully-fledged use

Foresight as a term is used in various future-related activities. It is often used together with – and in the everyday language also equivalent to – activities like futures studies, strategic planning approaches, visioning, forecasting, scenario modelling, trend analysis, or e.g. scanning of the weak signals. A deeper analysis shows that foresight is all that and still something else. Foresight can be a study, but it is not only a study. It is more of an exercise that makes foresight what it is – even though the initiator of a foresight activity can emphasize either the products or the process.

Foresight is about the future. However, it is not only about **looking into** the future, but it is also about **debating on** – in general, on *many alternative futures* – and **shaping the future** (CORDIS Science and Technology Foresight homepage). Foresight is a way to build a bridge illustrating the linkage of present-day decisions and actions to what is wanted, expected or possible to happen in the future.

In this respect, foresight is closely related to evolvment of *strategic planning* processes. While the environment where organizations operate has become more complex to harness, also the rationale between the vision and steps towards it have become more vague: “what if” questions have become more apparent not only in long-term but also in medium-term planning and the linkages to and interconnections between other organizations need to be mapped out when envisaging the future. Similar overlapping can be found between the concept of foresight and the trends in *futures studies* and *policy analysis*, where on one hand the futures researchers have involved the users in the process of futures study and, on the other hand, broader and more participatory processes are called for in the policy-making arena (Gavigan et al. 2001).

Even if we cannot predict the future or make it happen as we want, foresight provides us with tools and knowledge on how to act in a meaningful and efficient way in the future settings – including also the possible but unlikely and/or unwanted events.

“Foresight can be defined as a systematic, participatory, future intelligence gathering and medium-to-long-term vision-building process aimed at present day decisions and mobilizing joint actions.” (Gavigan et al. 2001)

From the European (or EU) point of view, promotion of the futures perspective at all levels is understandable. Increasing complexity of the future due to the global challenges of e.g. climate change, demographic changes and sustainable development demands increase expectations that *science, technology and innovation development* can, if not directly solve, then at least have an impact on these developments. But it is understandable also from the viewpoint of increasing the *competitiveness* of Europe in the global market, making the European (administration) machinery more *efficient* as well as creating and communicating a *shared sense* of the European vision. All these aspects are found in the concept of foresight.

In the description of foresight activities, a distinction is usually made between “foresight” and “fully-fledged foresight”. For example, the Handbook of Knowledge Society Foresight (European Foundation...2003) defines the fully-fledged foresight as approach that goes beyond the more narrow approaches such as technology watch, environmental scanning or forecasting. Characteristics for fully-fledged approach are: involvement of a wide variety of stakeholders, interactive and participative methods, shared sense of commitment to the strategic vision, and creation of new (knowledge) communities that share and understand each other’s orientation towards longer-term perspectives. Also difference to technology forecasting is made by the emphases of foresight taking account of a broad range of social dynamics.

Fully-fledged foresight involves five essential elements:
 - *structured anticipation and projections of long-term social, economic and technological developments and needs,*
 - *interactive and participative methods involving a wide variety of stakeholders,*
 - *forging new social networks,*
 - *elaborating a guiding strategic vision and a shared sense of commitment, and*
 - *implications for present day decisions and actions* (Gavigan et al. 2001).

1.3 Methods of foreseeing: there is no one way of exploring the futures

Foresight exercises differ e.g. in their scope, target audiences, objectives and methods. A variety of methods, typically a mixed set, are used in foresight. There are many ways of grouping these methods, as foresight manuals show (e.g. Gavigan et al. 2001; UNIDO 2005; FOR-LEARN...).

Exploratory methods are “outward bound”, thus, they begin with the present as a starting point and move forward to the future (e.g. trend extrapolation and causal dynamics) whereas *normative* methods start with a view of possible futures asking what trends and events would lead to it (e.g. scenario workshops and roadmap exercises). *Quantitative* methods put weight on examining rates and scales of changes, whereas *qualitative* methods are used when data is hard to collect or not available. The *top-down* exercises place less stress on interaction and

involve highly formal methods (e.g. the Delphi method, expert panels), whereas the *bottom-up* exercises are more interactive aiming at taking into account a greater number of views (e.g. futures workshops). *Expert-based* techniques seek to draw out informed opinion and the evidence that underlies expert judgements, whereas *assumption-based techniques* elaborate visions and priorities on the basis of knowledge that is usually already public in available statistics or published analyses.

In addition to the above, the European Foresight Monitoring Network EFMN Mapping Report 2007 groups the foresight methods in two additional dimensions. The *expertise – interaction* dimension refers to emphases on either skills and knowledge of individuals in a particular area or interaction between different kind of expertise and participation of a variety of stakeholder groups. The *creativity – evidence* dimension illustrates the emphases on either imaginative thinking of e.g. “gurus” or support from a reliable documentation and analyses of e.g. statistical data.

In the 485 European foresight exercises reviewed in EFMN Mapping Report 2007:

The most commonly used foresight methods are literature reviews, expert panels, scenarios, futures workshops, brainstorming, trend extrapolation, Delphi, SWOT analyses and interviews.

In addition to these, foresight exercises utilize also questionnaires, surveys, key technologies, megatrend analyses, technology roadmapping, environmental scanning, modelling and simulation, essays, and backcasting, but also stakeholder mapping, citizen panels, structural analyses, cross-impact analyses, multi-criteria analyses, bibliometrics, gaming, morphological analyses and relevance trees.

1.4 Expected outcomes of foresight

Foresight exercises are initiated in response to the need to harness complex questions that require a wide angle and new thinking. These challenges are found when exploring the future potentials and e.g. avoiding or solving the future problems.

According to the FOR-LEARN Online Foresight Guide, a typical objective for foresight exercises is to **inform the policy makers** about the longer-term impacts of the present decisions and choices. This can involve gathering intelligence on possible longer-term developments and how these may interact with the policy decisions made today, or providing early warning systems for major future risks and opportunities. Foresight exercises can also be motivated by the need to **take a particular decision** or start a joint action requiring a wide involvement or to some extent also change in the prevailing attitudes and perceptions. **Building of networks** can be articulated as such an objective for foresight: bringing together people from different sectors and institutions, making them aware of their role in shaping the future of a particular topic, and helping them to understand collectively the challenges and opportunities that they are liable to confront, as well as the strategies and objectives that others might pursue. This is closely related to the aim of **building strategic visions** and creating a shared sense of commitment to these visions among the participants. The foresight exercises often also mention “foresight culture” as one of the aims, thus, **developing of capabilities** widely throughout a region or the organizations involved and, successively, encouraging the use of these capabilities outside the specific exercise they were created.

The above mentioned objectives illustrate expected *informal or intangible results* from foresight exercises. Setting measures for these goals or assessing success in achieving them is not necessarily an easy task. The initiator of a foresight process usually sets targets for more *formal and tangible results*.

According to the EFMN Mapping Report 2007:

Typical outputs from the foresight are:

- *policy recommendations,*
- *analysis of trends and drivers,*
- *scenarios,*
- *research and other priorities,*
- *forecasts,*
- *key technologies and*
- *technology roadmaps.*

Among the more intangible outcomes from foresight are mentioned: fostering cooperation and networking, triggering actions and promoting public debate, encouraging strategic and futures thinking and, helping to cope with Grand Challenges.

As setting the task, the initiator(s) of a foresight exercise may emphasise either the process or the concrete results of the exercise. An elementary part of foresight is that it cannot be wholly encapsulated in a report or bare conclusions from the process. Whether it is literally stated or not in the task, foresight accumulates and increases the capabilities and capacity of its participants: insight and understanding gained during the exercise remain in the possession of those involved. An outsider cannot fully grasp the results of foresight by just reading the final report or description of the exercise.

Likewise, it is not easy to trace the impact of foresight *per se* to policies or decision making. The impact from the exercise may – or may not – come apparent in the long-term developments and in the direction of activities. In spite of this, foresight *can* improve decision-making, implementation and the ability to cope with future challenges (FOR-LEARN).

Because the radar of a fully-fledged foresight exercise, especially the exercises involving various stakeholders, is set on wide perspective, it is likely that though something new will emerge to the consciousness of the participants, in the end, nothing very new is perceived to come up: all views and perceptions of the futures already exist somewhere. What foresight does is that it enables a systematic collection and documentation of these views and an organized way of debating on the futures. The fact that this does not necessarily lead to a breakthrough can be frustrating, but it is also characteristic for foresight: the next steps are to be taken by the participants in their own evolving vision statements, initiation of new strategic processes and mobilization and allocation of resources for new joint efforts.

The foresight exercise keeps on looking forward when in the linear time space one expects that the project has come to its end.

1.5 Scope and design of foresight are decided upon case by case

The previous chapters form a picture of foresight being something quite extensive and wide in its perspectives. However, this is not necessarily the case, but foresights come in many shapes and sizes and can be conducted over a long or short period of time.

In addition to the deepness or extensiveness of the exercise, the methods used or the objectives targeted, the foresight exercises can also be grouped by such questions as: who are the sponsors; who are the initiators; who are to be invited to participate and to what extent they are approached i.e. as a small targeted group or a large number of participants; who are the target audience(s); what issues and questions are targeted and; what are the thematic scope and the time horizon set for the foresight.

These questions are to be answered in the stage of *scoping* (or: framing) the exercise, which results in a scoping document covering e.g. the focus, objectives, users, outcomes, scope, approach, time horizon, and the expected duration of the exercise. The idea is to provide a reference point throughout the exercise, still leaving flexibility in carrying out the task. During the design stage, also the resources consistent with the focus, objectives and scope are sought. The resources needed for the process are not only financial for which it will be necessary to find and convince sponsors, but also human i.e. skills and competencies. Both thematic and foresight expertise is needed for the task (see Figure 1 on the roadmap for foresight).

Part of the design are also the organizational structures e.g. a project team, a steering committee, and working groups of experts and stakeholders, as well as the communication strategy, as communication is vital to the success of the exercise. Implementation plan lists all the major milestones such as events, deliverables and decision points. Methodology utilized in the exercise will, in turn, be designed according to the objectives and the desired outcomes of the exercises. Sometimes a particular method is chosen because it is interesting for the sponsors or the coordinator of the task. Before fixing the method set, it is useful to learn more about the tools available and, if possible, about experiences of combining them for a particular task.

The studies on foresight pay attention to the stakeholder involvement that can vary considerable from case to case. In the fully-fledged foresight concept one of the key elements is involvement of a wide variety of stakeholders and utilisation of interactive and participative methods. Three levels of involvement have been observed in the foresight exercises (Tait and Williams 2003): inviting the stakeholders to discuss about the foresight outcomes; involving the stakeholders in defining the issues to be addressed and; involving the stakeholders throughout the whole foresight process, thus, in initiation and design, in carrying out the exercise, distributing the results and putting them into action. Stakeholder involvement is a scoping question that needs to be discussed in the beginning of the exercise. Variety of stakeholders and consequent divergent views create also a challenge for foresight. Though foresight can help to avoid future conflicts, it is not designed as a conflict resolution tool.

It is important that there is a clear objective for the foresight exercise as well as a common understanding of the possibilities in foresight – and its limitations – among the sponsor(s), coordinator, team, main stakeholders and possibly already a number of other groups. Political support sought in this early phase can raise the profile and increase credibility of the exercise.

The foresight exercise is left in thin air, if there are no resources for actually acting upon the results from the process (e.g. recommendations or prioritisations) or if the timing of the foresight activity is not considered in relation with on-going policy and strategic processes. No foresight exercise exists in a vacuum, but in the context of activities already undertaken.

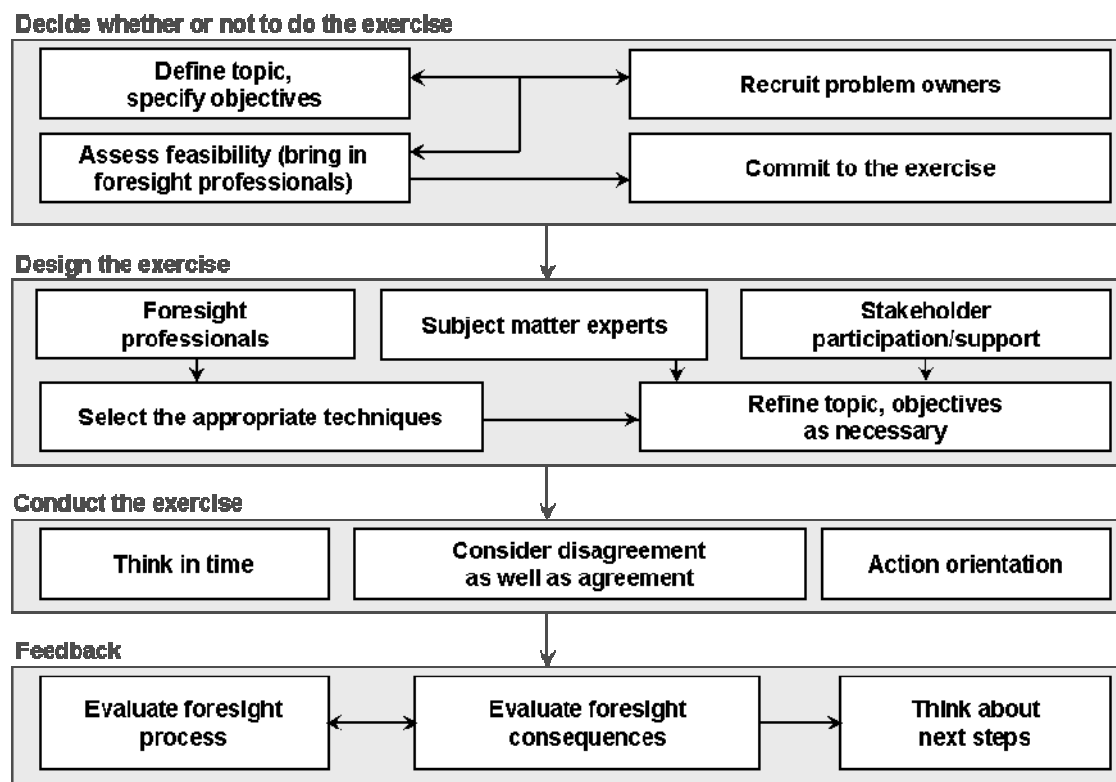


Figure 1. A roadmap for foresight. (European Commission 2006b, p. 17).

There are several foresight manuals available. They have been prepared with slightly varying emphases on e.g. technology or regional development, science and innovation or knowledge society themes. This review has used the following sources, and they provide further information on foresight: *FOREN Guide – Foresight for Regional Development Network – A Practical Guide to Regional Foresight* (Gavigan et al. 2001); *Handbook of Knowledge Society Foresight* (European Foundation... 2003); *UNIDO Technology foresight manual* (UNIDO 2005); *Using Foresight to Improve the Science-Policy Relationship* (European Commission 2006b) and the *FOR-LEARN Online Foresight Guide*. A comprehensive presentation of the futures research tools and methods can be obtained from the *Futures Research Methodology* published by the Millennium Project of the World Federation of UN Associations.

2. How the futures have been dealt with in the forest sector and in relation to the forest sector

The realization of foresight exercise, as described in the previous chapter as a fully-fledged foresight, is rare in the forest sector. But the futures orientation itself is nothing new: forest growth analyses, trade analyses, etc. base on extensive data sources and follow-up of the developments, and these data have been utilized in forming views about the future, in developing the sector and, in directing policy and decision making towards preferred state of affairs. There are many studies on futures of the forest sector and this chapter will introduce the most recent ones with a European perspective. Also references to other than purely forest sector-related activities are made.

As a starting point for the review was the “FFRAF report: foresighting food, rural and agri-futures“ of the Standing Committee of Agricultural Research SCAR foresight exercise (2007) which refers to 14 foresight studies that had been carried out with the focus on forestry. No list of these 14 studies was available, but at least the same number of results could be found from the source of the data. Setting ”forestry” as the search word for the European Foresight Monitoring Network EFMN database and the description of foresight initiatives results 14 hits:

- The Technology Roadmap for plant/crop-based renewable resources 2020 (USA);
- Education Intelligence Project, second stage (FI);
- BALTIC+;
- 8th Japanese Foresight;
- Plant-Crop based renewable resources 2020 (USA);
- Rural Ireland 2025 – Foresight Perspectives;
- World Agriculture – Towards 2015 / 2030;
- African Forests A View to 2020;
- European Forest Sector Outlook Study 1960–2000–2020;
- European Timber Trends and Prospects into the 21st Century;
- Energy: Biomass Task Force (UK);
- Barents 2010;
- Charting the CGIAR’s – A New Vision for 2010, and;
- Vision for Bioenergy & Biobased Products in the United States.

In December 2007 the EFMN database covered a total of 1216 foresight initiatives all over the world, though mainly in Europe.

However, a closer look showed that this is not all that there is to be found about foresight studies and exercises in the forest sector. A quick web search resulted in more references to studies, and a library database search revealed numerous studies, surveys and reports on the theme. For example, a review published in Finland in 1995 lists 108 references to future-oriented research studies in the forest sector bibliography (Hartikainen 1995). After that more future-oriented studies and exercises have been organized e.g. by the organizations of forest industries, research institutes and ministries or in cooperation between these – not to forget that also a foresight exercise, the *Future Forum on Forests*, was carried out in Finland during 2003–08. Similar activities can be found also in other countries. Some of them are called foresight – though not all fulfilling the description of foresight – and some of them are called something else – but still have the characteristics of foresight. There is no one way of

categorising all these activities in a straightforward way. However, the number of these studies and exercises shows that the theme of futures is important for the forest sector and, at least in those countries that this sector provides a notable share of employment and income, for the society as a whole.

The following chapters attempt to group the future-oriented studies and activities in a manner that they would give a background for going in detail five foresight exercises that have been carried out in the forest sector or closely related to it. The broader view in this chapter includes both studies which involve forest sector directly and studies where forest sector is referred to either as a specific issue in the activity or just a remark among other sectors. The main source of information has been the internet, and it should be noted that the description is not exhaustible.

2.1 Trends and scenarios – making projections on future

A traditional way of looking into the futures in the forest sector is gathering and analysing statistical data, and utilising the data on past developments in making projections towards the possible, probable and preferred futures. For decades, these futures have been illustrated in e.g. forest growth potentials, trade flow and consumption developments that have been compiled by public sector actors, private consultancies as well as by forestry and other federations. The projections have evolved from merely statistical exercises to more and more extensive and complicated ways of combining both the qualitative and quantitative data sources as well as involving various stakeholders in the process. The stakeholder approach is today emphasised also in developing and testing the tools that help to make these projections, as well as in utilising them e.g. for the support of decision making.

Outlook studies aim at highlighting long-term trends in a sector and identifying emerging opportunities and challenges. They examine the impact of key internal and external forces acting on the sector and support policy reviews and strategic planning. Outlook studies – as defined for the Food and Agriculture Organization of the United Nations FAO forest sector outlook studies – portray the range of choices available to policy makers and describe the alternative scenarios that might arise as a result of these choices.

Assessing and analyzing the status, trends and outlook for forestry is an integral component of FAO's forestry strategy. FAO produces both global and regional forest sector outlook studies. *Global studies* examine trends in the production, trade and consumption of forest products and in specific thematic areas that are common to many countries, e.g. fibre supply, forest products, wood supply from plantations and woodfuel. Regional studies examine a wider range of issues in more detail, including issues that are of particular concern to specific regions or groups of countries:

- *European Forest Sector Outlook Study EFSOS 1960-2000-2020* published in 2005 succeeds in a series of studies started in 1953 (ECE/FAO 2005);
- *Asia-Pacific forestry – towards 2010 APFSOS* was completed in 1998 (FAO 1998), and a revision of this study with projections towards 2020 has begun;
- *Forestry Outlook Study for Africa FOSA* completed in 2002, outlines prospects for forestry development at the regional and subregional levels to the year 2020 (FAO 2003);
- *Latin American Forestry Sector Outlook Study LAFSOS* completed in 2005 has 2020 horizon (FAO 2006), and;

- *Forestry Outlook Study for West and Central Asia FOWECA* completed in 2006 covers 23 countries with probable scenarios and their implications to the year 2020 (FAO 2007).

FAO has implemented the Programme Entity “Forestry Sector Outlook Studies” since 1996. There is no one set of outlook methodology used for these studies, as they have been implemented adopting a mix of quantitative and qualitative analyses, largely determined by the issues addressed and factors like availability of reliable data. In some of the global outlook studies substantial efforts have been made to use econometric models for projections, whereas in some of the regional outlooks qualitative approaches have been more relevant. This does not make one approach better than another, since readers of the regional outlook studies are interested in understanding the broad prospects and how various driving forces are impacting the development of the sector, not just getting precise figures on a limited number of indicators (FAO Forestry Department 2005).

The process of preparing an outlook study is a multi-year exercise which involves key stakeholders, especially country experts and other key players including e.g. regional organizations, development banks, international donor agencies etc. FAO emphasises the development of national-level expertise on outlook study methodology to improve knowledge management in countries and ensure wide ownership of the outputs. The main beneficiaries of these studies are forestry policy makers and other stakeholders, especially those concerned with developing forest policies. In addition, investors, owners and managers in the forestry sector will benefit, especially through having better information about future trends in the sector to base their decisions accordingly. According to evaluation of outlooks (FAO Forestry Department 2005), the main clients of the outlook studies seem to be, however, largely academic and research institutions and to a lesser extent government and other public sector organizations as well as, non-governmental organizations and consulting companies.

FAO’s regional and global forestry outlook studies are closely linked with other FAO initiatives, both in forestry and in other sectors. E.g. the Global Forest Resources Assessment provides an assessment of past trends in forest resources, and the State of the World’s Forests describes trends and issues in the sector over a shorter time horizon. The seventh biennial State of the World’s Forests was issued in 2007 (FAO Forestry Department 2007). Also the FAO periodical perspective studies on agriculture include references to forest sector, i.e. the *World Agriculture – Towards 2015 / 2030* issued in 2003 includes a chapter on forestry (FAO 2003). Its earlier editions were published in 1970, 1981, 1998 and 1995.

Naturally, in addition to the outlook studies with direct focus on the forest sector itself, references to the forest sector are made also e.g. in the environmental and economic outlook studies series.

The *European Environment Outlook* report (European Environment Agency 2005) assesses the environmental consequences of key socio-economic developments in Europe, particularly with regard to climate change, air quality, water stress and water quality. The report includes also information on a number of comprehensive global/European-scale environmental scenarios. In addition to this, the European Environment Agency *Information Portal for Environmental Scenarios* reports on scenarios published by the agency, as well as links to global, European, national and regional environmental outlook reports, and to institutions, organisations and networks, key literature and other useful resources in the field of environmental scenario analysis.

The United Nations Environmental Programme UNEP *Global Environment Outlook GEO* reports published in 1997, 1999, 2002 and 2007 review the state of the environment through a worldwide environmental assessment process. The GEO-3 report in 2002 used a scenario approach to look ahead at the next 30 years and, the report of UNEP and the National Institute of Public Health and the Environment RIVM in the Netherlands presents the pan-European elaboration of these four scenarios (UNEP/RIVM 2003). Though the report focuses on the scenarios and their impacts in environmental terms, the analyses and narratives provide snapshots on the forest sector, too. The *Global Biodiversity Outlook GBO* reports published in 2001 and 2006 review the progress made by the Convention on Biological Diversity toward its objectives. The biodiversity targets for 2010 and scenarios with 2050 horizon including references to the forest sector have been discussed in a report by Netherlands Environmental Assessment Agency MNP (Brink et al. 2007).

Under the aegis of the UNEP, the Regional Activity Centre of Mediterranean Action Plan has compiled of environmental prospective with the horizon of 2025, i.e. *A Sustainable Future for the Mediterranean: The Blue Plan's Environment & Development Outlook* (UNEP Blue Plan). The study published in 2005 succeeds the prospective report on *Futures for the Mediterranean Basin – The Blue Plan* published in 1989, and discusses also the forestry and forestry related issues in this region.

Economic trends and outlooks are made by several international institutions, investment banks, research organisations etc. For example, Organisation for Economic Co-operation and Development OECD and the World Economic Forum produce outlooks and scenarios. The *OECD Economic Outlook* analyses twice a year the major trends and examines the economic policies required to foster high and sustainable growth in its member countries. The *OECD Environmental Outlook* published in 2008 provides analyses of economic and environmental trends to 2030, and simulations of policy actions to address the key challenges. It is an update of the outlook 2020 published in 2001. In addition to these, the *OECD International Futures Programme* provides an early warning of emerging issues, pinpoints major developments and analyses key long-term concerns. The programme areas (2004–2007) with the 2030 horizon are Bioeconomy, Infrastructure, Risk Management and Space. The World Economic Forum produces e.g. *global competitiveness reports* and *global risk reports*. Global Competitiveness Network identifies impediments to growth and thereby aims at stimulating the development of relevant strategies to achieve sustained economic progress. Global Risk Network promotes a better understanding of global risks, and seeks to facilitate mitigation. In addition to these, the *World Economic Forum scenarios* are produced on selected countries and sectors i.e. in 2006 scenarios for the Gulf Cooperation Council countries, Russia, India, China with 2025 horizon, and the sectors of construction and financial services with 2020 horizon. Though such indications are not directly made, the country scenarios can be read with reflections to the forest sector developments too.

As already mentioned above, the outlook studies base on extensive statistical data and trend extrapolation, and utilise computerised **scenario models**.

The *Intergovernmental Panel on Climate Change SRES scenarios* (IPCC 2000) integrate demographic, economic, societal, and technological knowledge with the understanding of ecological systems to evaluate sources and sinks of greenhouse gas GHG emissions. Horizons of scenarios are 2020, 2050 and 2100. The scenario work is ongoing, and the fourth assessment report *Climate Change 2007* presents latest update on the projections. The SRES scenarios have been utilised e.g. in the *International Institute for Applied Systems Analysis*

IIASA scenario analyses regarding the future impacts of ongoing globalisation processes to the EU forest sector, a study commissioned by the EC DG Agriculture in 2007 (Rametsteiner et al. 2007).

Scenario models are well in use in the forest sector analyses. A review made in 1996 included 29 large-scale forest scenario models in Europe and indicated a total of 66 models around the world (Nabuurs and Päivinen 1996). The analysis of future developments in forest resources presented in the ECE/FAO European Forestry sector outlook report base on the European Forest Information Scenario Model EFISCEN. Same model is used e.g. in making projections on the future wood supply from European forests for the pulp and paper industry 2005–2060 in a study commissioned by the Confederation of European Paper Industries CEPI (Nabuurs et al. 2003).

A slightly different example of using scenario models can be found in Norway, where the scenarios produced in national foresight exercises *Horisont 21* and *Norge 2030* were elaborated with their impacts on the forest sector in Norway (ECON/Skogbrand 2002; Solberg and Bolkesjø 2003).

With the experience the forest sector has in using econometric models, it can also count the developments that these models have not been able to foresee. Models are based on defined variables and they are weak in anticipating and describing e.g. structural changes. This has been perceivable, for example, in the long-term projections for paper demand and consumption in relation to the development of the information and communication technologies sector (Brummer et al. 2006a).

Though not expected to give precise predictions on future developments, scenarios are utilised in illustrating policy implications. An example of this is the *Scenar 2020* project which was carried out in the agrifood sector in 2006 (Nowicki et al. 2006). An international expert group was contracted by the EU Commission DG Agriculture and Rural Development with the objective to identify major future trends and driving factors, as well as the resulting perspectives and challenges for European agriculture and rural regions until 2020. The reference scenario (baseline) was built on an analysis of trends from 1990 to 2005 and projections forward to 2020. Two other scenarios were established to highlight the impact of different policy frameworks that differ in the degree of support for the agricultural sector. The simulation and SWOT analysis resulted in a description on how each scenario is expressed in spatial terms across the EU-27, and in some cases extended to the candidate countries for accession. Rather than aiming at forecasts, recommendations or solutions, the *Scenar 2020* project aimed at helping to think about the future by identifying issues and providing a systematic review of the primary variables that rural and agricultural policies have to take into account. Forestry is included in the land-use maps illustrating the three scenarios.

Scenarios are used in foresight exercises, but an equation mark should not be put between scenario models and foresight. This is discussed in relation to the *Scenar 2020* project and the more or less parallel SCAR foresight initiative by the Standing Committee on Agricultural Research. Compared with the scenario models that focus on probabilities, foresight exercises are more open for alternative possibilities; they are looking more openly to the future than the quantitative scenario models that have their starting point in the past. Foresight is also more open in inventing future setups, whereas the models tend to build on existing e.g. social and policy structures (Nowicki 2007). However, these two approaches can well complement each other, since the scenario models produce data and information that can be utilised in the

different stages of a foresight exercise. On the other hand, foresight can provide input in understanding the systems that the models aim at presenting, the linkages between their different components and the interaction with wider social and policy frameworks, incl. institutional aspects and the reality over a longer period of time. Foresight can bring new questions to the development of models as well as new ways of utilising the results attainable by models.

An interesting reflection in this respect can also be made to the Impact Assessment (IA) processes that aim at improving the policy design by considering the effects of policy proposals in their economic, social and environmental dimensions. Tools for utilising scenario models in illustrating the impacts of activities and decisions taken today are prepared e.g. under the themes of *Sustainability Impact Assessment (SIA)* and *Integrated Sustainability Assessment (ISA)*. These tools are developed also for the forest sector in the EU framework programme FP6 projects: the *Eforwood project* develops methodologies and tools for Sustainability Impact Assessment of the European Forestry-Wood Chain, while agriculture, forestry and land use form one of the four themes in the *Matisse project* developing Integrated Sustainability Assessment modelling tools in relation to ISA-participatory methods and a step-wise advance in the science and application of ISA of the EU policies.

Trend analyses and scenario models, outlook studies and projections provide foresight with a vast information pool. Tools and methods developed in relation to scenario models as well as e.g. to impact assessment can be utilised in foresight exercises. Foresight does not replace these activities. Rather, the questions are: Can foresight provide added value for the existing processes? What questions have been raised as a result from these studies and exercises already carried out? Does the European forest sector use the existing future-oriented forums, methods and tools as well as the data and information available in an optimal way?

2.2 Science, technology and innovation

Foresight in science, technology and innovation provides a tool for setting priorities within several potential fields, and targeting the resources in an efficient and effective way. There are exercises ongoing for defining research priorities, critical or key technologies, strategic research agendas or technology roadmaps. These prioritising and strategic choices are made both in sector-wise and in wider national and international exercises. Foresight is not necessarily mentioned as a specific tool or methodology for making the forest sector research priorities or informing the decision and policy makers about the needs in the sector. Nevertheless some examples can be found of foresights either directly focused on the forest sector RTD or of foresights where the forest sector is one of the sectors in the science, technology and innovation development.

National foresight exercises were carried out in the 1990s in several countries in Europe. Though varying in their scopes, processes and methodologies used, they usually took a comprehensive view on science and technology development in the country. References to these national and sector-wise exercises can be found from research councils (e.g. Forskningsrådet in Norway), academies of science (e.g. Institute of Technology Assessment at the ÖAW in Austria), innovation funds and innovation programmes (e.g. SITRA in Finland), research foundations (e.g. Fondazione Rosselli in Italy, and the Observatory for Industrial Technology Foresight OPTI under the auspices of the Ministry of Industry, Tourism and Trade in Spain), and ministries (e.g. Technology Foresight and Technology

Observation at the Federal Ministry of Education and Research BMBF in Germany and Green Technology Foresight at Danish Environmental Protection Agency, Ministry of the Environment). Though direct reference to forest sector is not necessarily made, the examples are numerous.

In France, the foresight (or: *La Prospective*) has developed its own approach, and taken a more social and economic orientation in its foresight activities, inclusive major effort in methodology development in this respect (UNIDO 2005; Gonod and Gurtler 2002). E.g. the *Délégation permanente à l'agriculture, au développement et à la prospective DADP* permanent delegation of the French National Institute for Agricultural Research INRA has carried out several foresight studies related to the agricultural sector but also about and for the regional development. The method of future study SYSPAHMM (SYStem, Processes, Clusters of Hypotheses, Micro-scenarios, Macro-scenarios) has been developed in INRA during the 1990's (Sebillotte and Sebillotte 2002). One of the studies provided input for discussing the forest research themes and orientations in INRA.

Forest sector has been included in the national technology foresight exercises, e.g. in the *UK Foresight Programme* (1994–99), the *Technology Foresight Ireland 2015* (1998–99), and the *Swedish Technology Foresight* (1999–2000) where the work was organised in sector-wise panels: forestry (together with wood products in the UK and Ireland) was included in the natural resources or agri-food sector themes. The scope of these national foresights was 10–20 years and they aimed at developing visions of the future, building bridges between business, science and government, and increasing national wealth and quality of life. After the first phase foresight the processes have been continued and developed, but also conclusions on the effect of the exercise have been made. The main impact of the 1994–1999 exercise in the UK has been seen on the public sector, thus, the Government Departments and Research Councils are using the foresight findings in their development of policy and to inform the research spending. In Ireland the technology foresight exercise has been seen as important tool for identifying key areas for national investment during the following years and led to allocation of the National Development Plan 2000–2006 funds for R&D and for a new foundation for research excellence, Science Foundation Ireland. (UK foresight...; Irish Council for Science Technology and Innovation 1999; Forfás 2004)

The *Swedish Technology Foresight* project (Teknisk Framsyn) was updated in 2003–2004. Forest sector prospects within the following 15–20 years were discussed e.g. in the panels of Biological Nature Resources, and Materials and Material Flows. The synthesis report of the technology foresight takes a broad, societally oriented approach and attention is given also for the traditional success sectors in Sweden, such as forest industry, in the changing conditions. A subproject of the technology foresight entitled “Inspiration for Innovation” highlights eleven technology groups in which Sweden is expected to have especially good growth potential toward 2020 – emphases are in possible future technology and knowledge areas, and the forest biotech is one of the hundred areas mentioned in total.

In Finland the *FinnSight2015 – The outlook for science, technology and society* carried out in 2005–2006 was a joint foresight project of the Academy of Finland and the Finnish Funding Agency for Technology and Innovation TEKES. The work was organised in expert panels, which identified altogether some 80 areas of expertise that Finland should focus in order to reach scientific and technological breakthroughs and new innovations. Foresight was expected to reinforce strategy work at the Academy and TEKES, and it was also utilised in defining the Strategic Centres for Science, Technology and Innovation in Finland. First of the Strategic

Centres was launched in 2007 i.e. the *Forestcluster* which is an innovation company owned by major companies together with the Technical Research Centre of Finland, the Finnish Forest Research Institute and four Finnish universities. The Forestcluster Ltd. is responsible for the operation of the cluster's strategic centre for science, technology and innovation. Its task is to initiate research and innovation programmes and to channel research funds to selected focus areas.

These cases are just a few examples, but they illustrate that foresight has been utilized in the national research agendas, including also the forest sector, in several ways.

Foresight has also been utilised in the **research organisations** defining their strategic choices and aiming at convincing the financiers to allocate necessary resources for realising them. It is likely that not all of these organisational exercises are publicly available even if foresight was utilised as a specific tool in the task. However, some examples can be found.

The French National Institute for Agricultural Research INRA has utilised foresight (or: prospective) as a method for defining its future orientations e.g. in the *INRA 2020* exercise during 2001–2003. This exercise was formed around four key questions: what is the nature of INRA's mission (e.g. production of knowledge, contribution to innovation, provision of expertise, science-society dialogue); what is the position of the institution (e.g. locally/regionally, nationally, and in the European Research Area); what are the institute's scope, skills and scientific strategy, and; what are the linkages of the institute in its socio-economic setting (INRA 2020; FOR-LEARN). A three-phase approach was adopted including discussion and debates, scenario building and strategy formation. A large consultation was organized utilising the 21 regional centres of the institute. The process involved some 1800 representatives of the institute and its main partners, e.g. local bodies, research agencies, agricultural sector, industries and NGOs. Two different types of scenarios were produced: on the one hand, four "context scenarios" which describe possible futures against which the research at INRA will have to be conducted (e.g. world regime, climate and natural resources, relationships between science and society, scientific dynamics, organisation of public sector research); and on the other hand, five "INRA scenarios" based on the institute's internal dynamics and possible changes towards the year 2020. In this exercise, foresight is considered an open-ended effort exploring the range of possible options for the future. It is a tool to help the decision-making process by identifying major tendencies – and also the weak signals indicating future changes – that there is a room for manoeuvre and space for choice in e.g. resource allocation. The initiative also contributed to the general discussion about the role of public sector research and how it ought to be organised (FOR-LEARN).

At the European Environment Agency EEA a literature review has been carried out on EU foresight studies and networks and megatrends of research foresight drivers under the project heading of *Research Foresight for Environment and Sustainability* (Sheate et al. 2007). The work conducted by Collingwood Environmental Planning CEP and Mileu Ltd. utilized a preceding EEA project on future-related studies for the pan-European environment that had identified about 300 studies at global, European and national levels covering environment, energy, agriculture and other topics. The foresight literature was analysed on the Social, Technological, Environmental, Economic and Political/Policy i.e. the STEEP drivers. The aim of the exercise is to produce long-term vision to support the formulation of Research Agendas for Environmental Sustainability and to help in understanding the future research needs in order to inform policy making, and set the scene for future EEA strategy for 2009.

The EU promotes **European collaboration** in innovative policy, but the research organisations have also taken their own initiative for discussing the future perspectives. E.g. the European Forest Institute, EFI, coordinated the *Improving and Advancing Co-ordination of Forest Research and Development in Europe* IMACFOR project (2002–2003) that discussed joint research priorities inclusive comments from the forest industry, NGOs and forest policy points of views. EFI has also compiled research strategy in forest sector in Europe “*Future Forest Research Strategy for a Knowledge-based Forest cluster*”. The report published in 2005 reviews the national research capacities and agendas and concludes recommendations for the future forest research agenda (Houllier et al. 2005). An important researchers’ forum is the COST European Cooperation in the Field of Scientific and Technical Research and its domain *FPS Forests, their Products and Services*. One of the network’s objectives is the co-ordination of nationally funded research activities. The Forests and Forestry Products, Sector Group Pulp and Paper report on Inventory of Scientific and Technical Research Capabilities at Institutes and Universities in the Pulp and Paper Field within COST Countries included foresight studies in its survey 2003. Though no more specific definition was given on what kind of research this term referred to in the survey, from the total of 2231 man years in research in the pulp and paper field in all COST countries, 6.7 man years were allocated to foresight studies. The countries that reported work for foresight studies were: Finland, France, Germany, the Netherlands, Romania, Slovakia, Sweden and the UK (Eriksson and Förster 2005).

At the European level, the co-ordination of national research processes and resources has been emphasized. One tool for the **EU open coordination method** has been the *ERA-NET scheme*, which was launched in 2002. The initiative was financed from the Sixth Framework Programme for Research and Technological Development (FP6) and is to be continued with FP7 programme. The objective of the ERA-NET scheme was to step up the cooperation and coordination of research activities carried out at national or regional level in the Member States and Associated States through the networking of research activities conducted at national or regional level, and the mutual opening of national and regional research programmes. According to the ERA-NET Review 2006, almost seventy ERA-NET projects were running at the end of FP6 in 2006. Many of these have launched joint calls and some have also targeted for launching joint programmes. There are several forest sector related or interlinked ERA-NETs, e.g. in the fields of materials, building, bioenergy, chemistry, biotechnology, and plant genomics.

The *WoodWisdom-Net* project i.e. “*Networking and integration of national programmes in the area of wood material science and engineering*” (2004–2007) took the highest ambition level, and aimed at preparing and launching a joint European RTD programme with common funding and administration. In doing so, the WoodWisdom-Net project, like other ERA-NETs, demonstrate the objectives of foresight as: vision-building for clarifying shared interests and joint benefits of international collaboration; networking for mobilising the RTD communities in different countries, and; priority setting for formulating promising research themes and corresponding resource allocations (Brummer et al. 2006b). The WoodWisdom-Net project included 18 funding organisations in eight countries and involved over 400 stakeholders in defining the common funding programme, i.e. leading researchers at universities, research institutes and industrial research organisations on wood material science and related sciences, as well as R&D and business managers in the forestry-related industry. Consultation with a wide geographical coverage and a large number of participants from several countries was assisted with internet-based decision tools. The project ideas were proposed, assessed and worked through a series of internet questionnaires and workshops of

researchers and representatives of industries. Data supporting the process was created by multi-criteria analyses based on Robust Portfolio Modelling (RPM). The results were discussed at the funding organisations' workshop which concluded to the formation of three working groups with shared interest.* From the programme first call for proposals a total of 17 projects were funded, and they were introduced in the programme kick-off seminar in February 2008.

Another tool for the open coordination for EU innovation processes have been the *European Technology Platforms*, industry-led processes that have defined sector-wise roadmaps as a Strategic Research Agenda in the European level and National Research Agendas in several participating countries. These research agendas do not have direct funding function, but the funding sources for projects and programmes are sought from national and international sources. Several funding programmes have already been launched and others are in the pipeline to follow. From the forest sector foresight point of view, an interesting opening is to be found in Sweden, where the Foundation for Strategic Environmental Research MISTRA invited in November 2007 pre-proposals for a new research programme on the theme "*Future Forests – Sustainable Strategies under Uncertainty and Risk*". The call focused on the forest landscape and forestry and expected the applications which could look beyond the immediate future and consider how forests should be prepared to meet long-term requirements, 50 to 100 years from now.

The open coordination method, bottom-up approach and demand orientation of research and technology development are key words in the European innovation policy. Research priorities are defined in triple-helix cooperation between public funding organisations, research institutions and private businesses. Funding is allocated through programmes that are already rooted in the organisations funding, implementing or using the research, technologies and innovations. This approach can be a challenge for those organisations and sectors that are accustomed to "closed doors" or fixed sectoral borderlines. New perspective is called for also – or perhaps, especially – in the old, traditional success sectors.

Foresight is a way to face these challenges, though it does not offer remedy for problems. It aims not to propose one single tool for all situations, but rather, it provides a systemacy for handling the evolving perceptions of possible, probable and preferred futures. Foresight does not replace the existing networks or activities in the forest sector science, technology and innovation. More relevant questions in this respect could be e.g.: Are there processes that could be learnt from either one country to another or from one sector to another? Is the wider socio-economic perspective already in use in the forest sector innovation processes? Are all relevant sectoral interfaces for the forest sector already explored or are there fields that should still be opened for the radar?

2.3 Business perspectives, forest industries and the corporate foresight

Foresight is utilised both in and for business, and the term "corporate foresight" refers to both cases (Cuhls and Johnston 2006). Foresight *in business* means foresight studies and exercises by companies themselves either by commissioning the services from external expertise or by carrying them out with own personnel in project team or a specific department dedicated for the task within the company. Foresight *for business* refers to foresight exercises carried

* The Internet-based method and multi-criteria analyses based on Robust Portfolio Modelling (RPM) were utilised also in defining the national research agenda for the forest-based sector in Finland (Könnölä et al. 2006)

elsewhere than on a single company level, thus, e.g. national foresight studies making data available for businesses, ministries producing data and studies, foresights by industry federations, and so-called multiclient studies that build on involvement of businesses, public administration and other stakeholders.

The studies and surveys made on foresight in enterprises (e.g. Becker 2002; Daheim and Uerz 2006), do not include references to forest sector companies, but cover large companies mainly in the petroleum, motor vehicles, energy, telecommunications and information technologies sectors. According to these studies, company R&D budgets are used for foresight with a focus on technology trends, or market trends, or both, because the company's business operation inherently demands such a long-term orientation (long product cycles), or because the futures orientation is a proactive step to better cope with uncertainties in the business environment in general. Corporate foresight is expected to support strategic decision-making in general, improve long-term planning, enable of an early warning system, a tool for issue management and to improve innovation process and environmental reaction speed. The outside-in perspective, thus, focusing on the environmental analysis and information gathering, predominates, and trend analysis ranks top amongst the methods used. Other methods are media/publication analysis, scenarios, roadmapping and participatory/creative methods.

Many of the **corporate foresight exercises** and practices remain hidden, because they are integrally linked with the company's competitive advantage. In turn, the exercises that are related to marketing or placing the company in a wider social context are publicised. The business foresight carried out by UPM has been presented for the public (e.g. in Haarla and Paavolainen 2006). Also student work and reports related to corporate futures or e.g. methods of forecasting and foresight that have been produced in cooperation with companies can be accessed to a certain extent. Whether literally foresight-related or not, an interesting viewpoint to futures orientation of companies can also be found in the cooperation alliances they are involved in, e.g. the opening of Centre for Nanocellulosic Technologies in March 2008 in cooperation of Technical Research Centre of Finland VTT, Helsinki University of Technology TKK and UPM (Technical Research... 2008).

Though only few references to forest sector company cases can be found, several **foresight activities and studies for companies** have been carried out e.g. by the forest industry federations.

For example, in Finland the forest industries have recently been involved in several future oriented studies: e.g. the study on forest industry development scenarios and their impacts for the wood production strategies commissioned by the Finnish Ministry of Agriculture and Forestry, the Central Union of Agricultural Producers and Forest Owners (MTK) and the Finnish Forest Industries Federation (Jaakko Pöyry Consulting 2005); the report on the state-of-the-play and future challenges of paper industry in Finland by the Futures working group the Finnish Forest Industries Federation, and the Finnish Paper Workers' Union (Metsäteollisuus ry / Paperiliitto ry 2006), and; with a wider than just forest sector scope, the *Education Intelligence Project* carried out by the Confederation of Finnish Industries EK in 2001–2006 with the aim of influencing education policies and planning to ensure that companies will have access to qualified labour in sufficient quantities with the 2015 horizon (Confederation of... 2006).

Roadmaps and strategy formulations are concrete outcomes from the industry-related exercises. *Roadmap 2010 for the European Woodworking Industries* exercise was begun in

2003 as part of a major strategy and policy formulation for the European Confederation of Woodworking Industries CEI-Bois and its members. It succeeded a study carried out in 1999 on the competitiveness of the EU woodworking industry, including recommendations on the future prospects for the industry. In the first phase several studies were conducted in order to define the needs, attitudes, possibilities and threats of the woodworking industries. An updated analysis was produced on key factors and challenges affecting the sector, identifying the opportunities and describing the ideal position for the sector. The conclusions, key findings and recommendations, were used as a basis for the Roadmap 2010 Action Plan. The action plan contributes to the CEI-Bois Vision, i.e. making wood Europe's leading material in building system solutions and high-quality home and office furnishing by the year 2010. The Roadmap 2010 is described as "a first ever strategic project of the European woodworking and furniture industries, aiming at increasing the use of wood products in Europe in order to secure the future of the industry".

The Roadmap²¹ for the woodworking industries was carried out in cooperation and with co-funding of the European Commission. In addition to the woodworking industries, the EC DG Enterprise and Industry has supported also studies related to other sectors e.g. with Intergraf representing the federations of printing industries (Ernst&Young 2007). Similar projects have been carried out also by the national federations of forest industries on their own or with cooperation of research, by the research institutions, and on the initiative of and support from the national governments. There are several examples of these forest-industry related processes, e.g. *Holzwege 2020* and *2020plus* in Germany working for establishment of sustainable future markets for building with wood; *Scenario and strategy for the Finnish wood products industry 2020* (Metsäteollisuus ry 2006), and; the *US Forest Products Industry Technology Roadmap / Agenda 2020 Technology Alliance* (American Forest & Paper Association 2006). The *NANOFOREST – A nanotechnology roadmap for the forest products industry* was compiled by the research organisations' contributions from both Sweden and Finland, and supported financially by the European Community within the framework of the specific research and technological development programme Integrating and strengthening the ERA (STFI-Packforsk 2005).

A large effort mobilising forces for development of the forest sector in Europe is the *Forest-based sector Technology Platform* (FTP). It is one of the European technology platforms that have been initiated from 2004 onwards. It is an industry-driven process – though supported by a wide range of stakeholders – and its aim is to define and implement the sector's R&D roadmap for the future. FTP has followed the rationale of technology platforms (European Commission 2004): it was launched in 2005 with *Innovation and Sustainable Use of Forest Resources Vision 2030*, the *Strategic Research Agenda* SRA was prepared in 2006 as a large international effort, and followed with the *National Research Agendas* NRA adopted and developed in several European countries.

Following the definition, the European Technology Platforms (ETPs) "provide a framework for stakeholders, led by industry, to define research and development priorities, timeframes and action plans on a number of strategically important issues where achieving Europe's future growth, competitiveness and sustainability objectives are dependent upon major research and technological advances in the medium to long term." The ETPs contribute to the development of European research policy, and in particular, in orienting the 7th RTD Framework Programme to better meet the needs of industry.

In the beginning of 2008 there are a total of 34 Technology Platforms. In addition to the FTP, other platforms related to the forest sector are:

- *ECTP European Construction Technology Platform*
- *MANUFUTURE Platform on Future Manufacturing Technologies*
- *Plants for the Future*
- *SusChem – Technology Platform on Sustainable Chemistry*
- *WSSTP Water Supply and Sanitation Technology Platform*, and
- *European Biofuels Technology Platform* on renewable energy sources.

Roadmapping is a foresight instrument aiming at learning processes and building of consensus. It is, however, not the same thing as foresight. If the national and regional technology foresights are seen to inform the agenda setting in research and development programme, technology roadmapping is one of the Technology Foresight activities and a useful tool to identify the business opportunities through normative approach for desirable futures (Park 2007).

Knowing the future would be worth big money. Ability to read the signs of changing conditions, for example, changing consumer attitudes and behaviour is of survival value in the global competition. It is also worth bearing in mind that the global challenges we have at stake today have also survival value with a more literal meaning. The problem with these challenges is that the future does not lend itself to being read as such. Foresight can help to understand this dilemma. It is something integrally related to corporate strategic processes, but its viewpoint is wider and enabling much longer horizons than the strategic planning and decision making.

Foresight is evolving from exercises behind the closed doors towards open processes. It is evolving from the technology focused exercises towards a wider innovation approach. Also forest sector companies are participating in several future-oriented activities that aim at forming policies, defining priorities and directing resources for realising the shared visions in local, regional, national and international levels. These companies are working together with the structures and institutions regulating them, with customers and with various other stakeholder groups, as well sources for external expertise. Foresight builds up competencies and capacities for strategic intelligence that can be obtained only by participating in these processes.

Foresight does not replace the existing methods of gathering and analysing information for future orientations in and for companies. More relevant questions in this respect related to the corporate futures could be e.g.: What are the questions and challenges that the forest sector needs to face within different ranges of future horizons? What are the forums handling these long-term questions? How do the alternative futures possible in a long range link with the present-day information gathering and knowledge building?

2.4 Policy and strategy formulation – towards the preferred futures

One way of looking into the future is to join the forces in efforts of shaping the future. This reference could be made to the policy and strategy formation processes which target sharing a vision on the wanted future and then, setting the goals and working towards the common objectives. Foresight complements to this arena with its aims of informing the decision-

makers, developing the decision making processes as well as providing tools for initiating and implementing change in a long-term perspective.

The **forest policy forums** discuss and promote the futures orientations in the sector. The work on forest policy and strategy formulation is ongoing in global, European and national forums. E.g. the *United Nations Forum on Forests* UNFF was established by the United Nations Economic and Social Council in 2000, and the *UN National Forest Programme Facility* hosted by FAO was established in 2002. The *Ministerial Conference on the Protection of Forest in Europe* MCPFE was established in 1990 and the fifth Ministerial Conference was held in 2007.

In Europe the growing concern about the coherence between the forest policies of the Member States and forest-related activities at the EU level, as well as the rising profile of forests in international policy debates and initiatives on sustainable development, gave motivation for EU level coordination. The European Council adopted a *Resolution on a Forestry Strategy for the European Union* in 1998 (1999/C 56/01) and received a report on its implementation in 2005. The *EU Forest Action Plan* (EC COM(2006)302 final, 15.6.2006) was adopted in 2006 and it aims at coordinating the Community actions and the forest policies of the Member States. The five-year implementation of the Action Plan will be reviewed in 2009 (mid-term evaluation) and a final evaluation will be carried out in 2012.

National forest programmes (NFP) are approaches to the process of planning, programming and implementing of forest activities in a country based on a common set of guiding principles. These programmes, or processes equivalent to NFPs, are being formulated, implemented and evaluated in several European countries. In foresight terms, the national forest programmes are guidelines for implementing forest activities that lead to a better future. The foresight exercises, in turn, aim at bringing together various stakeholders and cross-sectoral knowledge in order to develop strategic visions on the future which could then be used in present-day decision making and actions. These alternative futures and the interaction and networks can be seen as strength of the foresight approach: it provides more dynamic view on the future. Instead of setting the target to the most wanted future – the vision – the alternative futures could bring into the programme more flexibility in facing the future as it emerges (Niskanen and Suoheimo 2004).

Naturally the forest sector relevant discussions are ongoing in several forums. Futures of the forest sector are defined also in other than forest or forestry titled policy and strategy formulations in e.g. in the energy, environment, industrial development and innovation policies, agriculture and rural strategies, education and training sectors. The need for coordination and cooperation has been recognized also by the forest sector: the *COST Action E51 Integrating Innovation and Development Policies for the Forest Sector* aims at developing knowledge for a more effective and sustainable development of the forest sector.

In the regional, national and international policy processes also the contributions from the research and business as well as the NGOs are called for. The questions of how to facilitate this process and how the interaction between different actors could be improved are of concern for all parties. Foresight tools have already been utilised in this respect in several ways.

In Finland foresight has been utilised with the aim of supporting the development of national **forest policy** and providing new impulse, information and tools for the futures thinking in the

sector. The National Forest Programme 2010 was approved by the Government in 1999 and its revision started in 2005. The update of the programme with horizon to 2015 and an action programme for the protection of biodiversity of Finland's forests (METSO) has been prepared as an open process between the stakeholders in forest issues. The process has been supported with foresight exercise *Future Forum on Forests* during 2003–2008. Also several studies on the futures of the forest sector have been produced, e.g. the report by *Finnish Forest Research Institute* on contribution of Finland's forests to national prosperity and wellbeing in 2015 (Hetemäki et al. 2006) which was, in turn, also a background study for the Ministry of Agriculture and Forestry in preparing the *Future Review for the Forest Sector* in 2006. In addition to these, futures issues of the forest sector have also been dealt in the sessions of *Forest Academy for Decision-Makers*.

In Ireland foresight was utilised in assessing the **rural policy** (2003–2004). Six thematic papers were produced with a common structure of: identification of the drivers of change; current trends and issues; description of a baseline perspective to 2025 that assumes no major changes in the current trajectory; an alternative and attainable scenario to 2025, as well as; key initiatives required to achieve a better future by 2025. The exercise concluded recommendations for constructing an effective institutional framework which is required for re-positioning of the rural Ireland in the knowledge economy and ensuring its future competitiveness. The synthesis report *Rural Ireland 2025* includes also a *Foresight Report on the Forestry Sector in Ireland* (NUI Maynooth / University College Dublin / Teagasc 2005).

As an international foresight exercise the *Foresight Initiative of the Standing Committee on Agricultural Research SCAR* in 2006 was commissioned for the task of an expert team with the aim of providing scenarios for **agricultural sector** and related research needs in Europe to 2015–2020.

An example of **industrial development** programmes related to forest sector is the *Forest Industry Strategy 2015* that was adopted by the Government of Russian Federation in 2002. The Forest Industry Strategy sets out goals and objectives of the sector in respect to meet the demand of the domestic market in timber and paper products, to increase exports of these products, and to ensure sustainable and efficient development of the domestic forest industry sector. The Government strategy is to be incorporated by the federal authorities when preparing strategies for social and economic development of Russian Federation and by the regions when developing regional development programs. The Russian forest industry strategy is to be updated in 2008 with the horizon of 2030. Contacts to parallel processes in other countries e.g. that of forest based sector technology platform in Europe, are sought and encouraged.

In the **energy sector** (incl. bioenergy) there are several examples where foresight has been utilised in illustrating the alternative scenarios and in defining the vision statements and strategies. An interesting example of carrying out an international foresight exercise – though outside the forest sector scope – is the *Nordic Hydrogen Energy Foresight project* in 2003–2005 (Eerola et al. 2006; Dannemand Andersen et al. 2007).

Also **regional development** requires informing of policymaking, building of networks, and enhancing of local capabilities for tackling long-term issues of a region. There are several examples of regional foresights in Europe (Gavigan et al. 2001). They tend to have multiple orientations, thus including e.g. social, science and technology, business dynamics and territorial vision. In defining the target geographical coverage for a regional exercise, it is

important that there is at least a certain degree of local identity and political leverage available for the exercise. These requirements are fulfilled also in international cooperation, and the transnational and interregional cooperation areas have gathered stakeholders for defining their long-range future perspectives. Typical outcomes of this type of exercises are vision statements and future perspectives for the region including also the sectoral programmes. E.g. the strategy and action plan for the *Barents Region 2010* (2006) included sector programme for forestry; the *2020 Vision for the Future for the interregional cooperation area Saarland, Lorraine, Luxembourg, Rhineland-Palatinate, Wallonia, French Community and German-speaking Community of Belgium* (2003) included spatial planning issues, and; the *BALTIC+* (2004) project handled also the agriculture and forestry sector themes.

These exercises illustrate just a few examples how foresight has been utilised related to policy and decision making processes. These processes obviously take place also at a level of a *single organisation*, a *network* or other *cooperation structures*. Foresight seems to open much potential for taking a longer horizon to development questions in all these arenas.

Foresight is related to policy formulation, strategy and vision statements, but its point of view is wider on alternative futures. Foresight can be utilised in directing policies, in producing recommendations or prioritisations, creating a shared sense of commitment, and triggering joint actions – but it is not a tool that as such guarantees success in any of these tasks. Participative and interactive approaches are already in use in policy formulation and decision-making arena. Foresight does not replace the existing policy forums and processes. Rather the question goes: How could the policy making related to the forest sector in Europe be improved? What are the forums where forest sector related futures are discussed? Who could benefit from insight on alternative forest sector futures in Europe?

3. Forest sector foresight studies and exercises

This chapter describes five foresight exercises related to the forest sector. They vary on several aspects on their thematic and geographic scope as well as the time horizon. All of the studies illustrate different aspects of foresight exercises, different needs that the future oriented activities have been launched, and different ways of implementing foresight methods for and in the forest sector. Each of the studies are described on their general characteristics, activities as well as results – more detailed information is to be found in the exercise reports and materials listed in the end of the case descriptions.

UNECE/FAO Forest sector outlook study 1960–2000–2020 published in 2005 is the sixth in the series of outlook studies presenting forest products (in the beginning, timber trade) trends and projections since 1953 in Europe. Bases are in statistical analyses, trend extrapolation and scenario modelling, but the scope of the study has been extended especially in the latest study towards more holistic view on the forest sector in Europe.

INRA prospective study is a French foresight exercise that was initiated in order to make projections on the future developments of the forest sector in France and the research needs connected with the alternative future scenarios. This exercise building on in-depth system analysis was carried out already in late 1990s.

The European Forest-Based Sector Technology Platform (FTP) is led by the industry in order to define the roadmap towards a competitive and sustainable forest based sector in Europe. Like other European technology platforms started since 2004, it is connected with the mission for establishing the European Research and Innovation Area ERA.

The Future Forum on Forests was a five-year project providing a new input for the update of national forest programme in Finland. It is a national exercise that has involved a wide participation of stakeholders both in the forest sector and other sectors discussing the alternative futures of the forest sector in Finland and related policy implications.

The Standing Committee of Agricultural Research SCAR foresight exercise was initiated in order to give input to the discussion of research needs in the agricultural sector in Europe. The exercise reviews existing foresight studies and utilises them for providing input for larger policy formulations for agri-futures in Europe.

A short summary of the five studies is given in Table 1.

Table 1. Summary of the foresight exercises described in this chapter.

	EFSOS outlook study	INRA prospective study for the forest cluster in France	Forest based sector technology platform FTP Vision 2030 and SRA 2005-2006– (ongoing)	Future Forum of Forests foresight initiative in Finland	Standing Committee on Agricultural Research SCAR Foresight Initiative 2006 (1 yr.)
	Since 1953 (ongoing)	1998 (2 yr.)	2005-2006– (ongoing)	2003-2008 (5 yr.)	2006 (1 yr.)
Scope	Trends of the forest products and services and projections for the sector in Europe to 2020	Scenarios for the forest cluster development in France and related research needs to 2020	Roadmap for forest based sector in Europe towards 2030	Stimuli for foreseeing scenarios in the forest-based livelihoods in Finland towards 2020	Scenarios for agricultural sector and related research needs in Europe to 2015-2020
Process that foresight is foremost expected to contribute	Forest policy forums	Research agenda for forest sector themes in agricultural research at INRA	Corporate, national and European innovation systems	National Forest Programme 2015 update in Finland	EU agricultural research directions
Initiator / coordination	UNECE/FAO	INRA and the French Ministry of Agriculture	Industry federations CEI-Bois, CEPF, CEPI	Finnish Ministry of Agriculture and Forestry (Forest Council)	SCAR (EC DG research and governments)
Participants	UNECE Timber Committee / FAO European Forestry Commission; permanent group for outlook studies, national correspondents (research and administration)	INRA App. 100 participants in France representing research, industries, administration and decision-makers	Industries, forest sector organizations, research and science, administration; SRA mobilised app. 1000 forest-based sector representatives in some 20 European countries	University of Joensuu, Ministry of Agriculture and Forestry, Ministry of Trade and Industry, and wide stakeholder participation of several sectors in and related to forest cluster	SCAR +EC DG Research Expert group of agricultural research and foresight experts, followed with wider discussion forums involving the agricultural and related sectors in Europe
Activities	Statistical analyses, trend extrapolation, scenario modelling and simulation	System analysis, micro and macro scenarios, workshops	Collection and synthesis of research themes, networks (incl. national support groups), seminars	Variety of foresight tools incl. scenario techniques, Delphi survey, analysis of weak signals, trend extrapolation, expert opinions, systems analysis	Expert group reports on driving forces and possible scenarios, synthesis report, workshops
Results (outcomes)	1960-2005-2020 report: trends of forest products (incl. non-wood products), scenarios and recommendations	Report (incl. workshop discussions), alternative scenarios and research needs related to them	European Strategic Research Agenda for forest based sector and communication for launching it (+NRAs)	Several reports, studies, workshops, seminars and conferences	Expert reports and synthesis report, workshop, conference contributing to the EU policy forum

3.1 European Forest Sector Outlook Study (EFSOS) 1960–2000–2020

(former: European Timber Trends and Prospects I-V during 1953–1996)

Since the early 1950s, the United Nations Economic Commission for Europe (UNECE) and Food and Agriculture Organization of the United Nations (FAO) have been working with countries to produce outlook studies for the European forest sector. During 1953–1996 these studies were called “*European Timber Trends Studies*” (ETTS) and they focused on the supply and demand of wood products and the implications of market developments for roundwood supply. However, since the 1980s, the scope of these studies has been widened to cover all of the main products and services supplied by forests. Although the analysis of non-wood forest products and services has never been of the same depth and focus as that for wood (due to the limited availability of data and methodologies), the more recent outlook studies have attempted to provide a more holistic outlook for the sector. The sixth major study in the European outlook study series was re-named the “*European Forest Sector Outlook Study*” (EFSOS) to reflect this change.

Scope

The aim of the European Forest Sector Outlook Study is to provide policy and decision makers in the forest sector with information and analysis about long-term trends in the sector and projections of future developments. In particular, the sixth outlook study published in 2005 focuses on the interactions between the forest sector and society and attempts to describe how these are changing over time. A broader aim is to help all stakeholders to enhance the contribution of the forest sector to society. For the private-sector, this means helping to improve investment, planning and marketing decisions, to increase profitability and wealth creation. For the public-sector this means helping governments to translate non-market demands and other considerations into well designed and efficiently implemented policies.

The study covers 38 countries, including all of the major European countries and seven of the countries from the former-USSR (Estonia, Latvia and Lithuania, and Belarus, Republic of Moldova, Russian Federation and Ukraine). For the purpose of sub-regional analysis, countries are grouped into Western Europe, Eastern Europe and CIS sub-regions.

The forest sector has been defined to cover forest resources and the production, trade and consumption of forest products and services. Time horizon is from statistical analyses of 1960–2000 to projections of forest sector developments towards 2020.

Organisation

The EFSOS study is based on a major collaborative effort by experts in the countries covered by the study under the auspices of the UNECE Timber Committee and the FAO European Forestry Commission. After the completion of the fifth European outlook study, “*European Timber Trends and Prospects: into the 21st century*” in 1996, a new permanent program of European forest sector outlook studies was launched in 1999.

In order to support the EFSOS work, the countries were invited to nominate their national correspondents with the task of reviewing and commenting the outlooks as well as providing information to it. Together with the outlook study experts, the national correspondents were also involved in the design, implementation and peer review of different sub-components of

the analysis. Scope and proceeding of the study as well as annual work plans for it were discussed in the UNECE Timber Bureau / European Forestry Commission meetings.

Activities

The preparation of outlook study is a multi-year exercise in cooperation with the countries covered in it. Work for the sixth European outlook study started in 2000, and the draft regional report was presented to the UNECE Timber Bureau / European Forestry Commission meeting in October 2004. After the revisions the final version of the main report was published in early 2005.

The trends and forecasts for developments in forest resources and forest products markets for Europe as a whole and at the sub-regional level base on an analysis of European forestry statistics at the country level. The statistics and information used in the study come from FAO and ECE databases, supplemented with additional information supplied by national correspondents.

The study led also to the preparation of a series of discussion papers involving a number of experts and institutions in Europe. Supporting studies and analyses were produced on the following topics: historical trends in forest resources; historical trends in forest product markets; the outlook for forest sector employment; the outlook for the Russian forest sector; policies affecting the forest sector; projections of economic growth in Europe; projections of forest product supply, demand and trade, and; the outlook for forest resources.

Results

The EFSOS report presents long term trends for supply and demand of forest products (roundwood, sawnwood, panels, pulp, paper, non-wood products) and services and outlook to 2020 in Western and Eastern Europe and four major CIS countries, including Russia. It reviews trends for the forest resource, trade, markets and recycling. It stresses the future shift in the balance of the sector to the east, and the importance of cross-sectoral issues, notably consequences for the forest sector of energy, environment and trade policies, which are examined in some detail. The study identifies a number of major policy issues and proposes some policy recommendations, as a basis for future debate. Below a short summary of the main findings – for further information, see the full descriptions in the outlook study report (2005).

Analyses

The outlook report basis on analysis of historical trends in the European forest sector (forest resources and management, market trends for forest products and trends in some of the linkages between the forest sector and society), identification of driving forces and presentation of qualitative and quantitative statements about likely future changes in many of these variables. The driving forces that will shape the European forest sector in the future are divided into two groups: the exogenous factors i.e. socio-economic and environmental trends, and the changes in policies and market frameworks in an attempt to steer the sector in a particular direction.

Scenarios	<p>Scenarios analysed in the study were drawn up from the perspective of economic driving forces:</p> <ul style="list-style-type: none"> - Baseline scenario assumes that the long-term historical relationships in forest products markets will remain the same in the future. In terms of forest resources, the future developments in the bio-physical characteristics of Europe's forests will be largely determined by the existing status of forest resources. Forest product market forecasts under this scenario were produced basing on constant prices and the baseline economic growth projections. - Conservation scenario assumes that there will be an accelerated shift towards environmental enhancement and conservation of forest resources in the future. This will be driven by an increase in public awareness of and demand for environmental benefits and will be supported by policies that will move society in this direction. Under this scenario, it is assumed that forest products prices may increase slightly, and economic growth will be slightly slower in the future. - Integration scenario assumes that there will be more rapid economic integration and market liberalisation across all of Europe. This will result in higher economic growth, thus, higher economic growth projections were used to produce the forest product market projections. These will tend to exert downward pressure on forest prices, so an assumption of a small decline in forest product prices has also been used to produce the market projections.
Outlook projections	<p>With regard to the forestry sector outlook for the next 20 years the main policy-relevant forecasts are summarized as:</p> <ul style="list-style-type: none"> - recycling and residue use will continue to expand; - renewable energy policies will increase the demand for wood; - Europe's forest resource will continue to expand; - fellings will remain below annual increment in Europe; - forest products trade will intensify further; - economic viability of forest management will remain threatened, and - forest sector institutions will continue to evolve rapidly.
Policy recommendations	<p>The policy recommendations concluded in the study are grouped under four headings:</p> <p>General policy development:</p> <ul style="list-style-type: none"> - necessity of a cross-sectoral approach and intensified policy dialogue (sustainable forest management as one component of the overall sustainable development of the society) - proactive analyses in climate change policy consequences with regard to forestry - monitoring environmental and social benefits from forests and forestry - Governments working together for forest law enforcement and governance.

Market policies:

- need for policies to stimulate the sound use of wood
- balanced implementation of wood energy policies
- developing the region's comparative advantages in the forest/timber field in stakeholder cooperation led by Governments.

Sustainable forest management:

- improve the economic viability of forest management in Europe
- securing employment and the work force in the sector
- need to control forest fires and to intensify international cooperation in this area.

International cooperation:

- urgent need to address threats to sustainability in south-eastern Europe and the CIS sub-region (e.g. forest fires, increasing wood demand, notably for fuel wood, overgrazing, illegal logging, shortages of forest products, erosion and deforestation)
- need to devote policy attention to the consequences of the dynamic developments in Eastern Europe and the CIS sub-region, thus, with significant impact on forest products trade and production (also in Western Europe and Asian markets)
- institutional change in countries in transition with mechanism to share experiences gained in more advanced reform countries
- European forest sector in the global context, and its contribution to responding to the changing global environment, e.g. the European experiences in sustainable forest management promoting more actively on a global level.

It is hoped that EFSOS will help draw further attention to emerging policy issues and stimulate debate on the region's response to challenges identified. Sector outlook studies, its analysis and follow-up, is one of the major work areas in the UNECE Timber Committee and the FAO European Forestry Commission integrated programme of work on forests and timber in 2005-2008.

Follow-up workshop on the policy consequences of EFSOS was held in Budapest in 2005. The workshop was addressed to forest sector policy makers and stakeholders. The objective was to stimulate discussion of implications for policy formulation of the EFSOS conclusions and recommendations, to provide a critical review of policy recommendations of EFSOS, and to formulate recommendations for follow-up action at the national and pan-European level, including possible input for MCPFE Warsaw Ministerial Conference (2007) and suggestions for follow-up by UNECE and FAO.

One of the follow up activities was an assessment of developments from 2000 to 2005 in comparison to EFSOS projections. The Discussion Paper published in 2006 "*European Forest Sector Outlook Study: Trends 2000-2005 Compared to the EFSOS Scenarios*" concludes that EFSOS scenarios, with the significant exception of those for wood energy, are mostly in line with real trends and may continue to be used a basis for policy discussion.

In 2007 themes for international seminars and policy forums were e.g. wood supply in Europe (can Europe's forests satisfy the increasing demand for raw material and energy under

sustainable forest management) and bioenergy policies (Opportunities and impacts of bioenergy policies and targets on the forest and other sectors: what is the future contribution of wood to meeting UNECE region's energy needs). Target audiences for the policy forums are the experts and decision makers of different stakeholders and countries, i.e. Governments and EU institutions, international organizations, forest services, forest owners, contractors, forest based industries, pulp & paper industries and related associations, energy industry and related associations, environmental and other NGOs, as well as research organizations and universities.

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<http://www.unece.org/trade/timber>

Contact:

UNECE Timber Committee and the FAO European Forestry Commission: Secretariat in Geneva, Switzerland

Other parallel and/or interlinked processes to EFSOS, e.g.:

- FAO global outlook studies and other regional forest sector outlooks
- Ministerial Conferences on the Protection of Forest in Europe MCPFE (the Fourth Ministerial Conference in Vienna 2003 and fifth in Warsaw 2007)
- EU Forest Policy and Action Plan

3.2 INRA Prospective Study on Forest Sector in France

The futures study was initiated and coordinated by permanent delegation for prospective in the French National Institute for Agricultural Research INRA (*Délégation à l'agriculture, au développement et à la prospective DADP*) and the Ministry of Agriculture (*Ministère de l'Agriculture, Direction de l'espace rural et de la forêt*). The DADP was founded in 1992–1993 by INRA in order to comprehend the future of the French agriculture, translate this analysis into main objectives of the research and propose modes of organization of the scientific work. The DADP took as one of its missions to lead the prospective work. This was targeted with two tasks: by carrying out prospective studies and by developing a new adapted methodology for the studies. The method SYSPAHMM (i.e. *SYStème-Processus-Agrégats d'Hypothèses-Micro et Macrosécénarios*) has been tested and developed in several sectoral studies e.g. in oilseed, forest and wood sector, proteins, water and aquatic environments, and grapevine and wine. Also a series of regional studies about and for regional development in France have been carried out by the delegation in 1994–1999, 2001–2005 and 2006–2010.

Scope

Objective of the prospective study on the forest sector is to provide points of reflection for orientating the forest research at the INRA, but also for the actors in the forest-wood sector, environmental sector and spatial planning in general.

According to the definition in the project, foresight (i.e. la prospective) is not a forecasting or consensus exercise, but rather, it aims to prepare the decision-makers for a variety of possibilities. The method focuses on socio-economic issues and assumptions on their evolution, and elaboration of contrasting scenarios providing caricature views of future in order to evoke discussion. Number of scenarios was limited in order to facilitate stakeholder discussions on the crucial key questions. The scenarios for forest-wood sector were targeted to the development hypotheses in a medium term (horizon 2020), and instead of the external factors, the focus of the study was put on the internal factors in the field, which the forest wood chain can act upon.

Exercise aimed at developing:

- a) a conceptual framework relevant for all stakeholders and policymakers related to the forest cluster in France, and
- b) rationale for future research orientations for INRA (or any institution).

Organisation

The exercise was a joint initiative of INRA and the Ministry of Agriculture. It mobilised approximately hundred participants, i.e. representatives of all sectors in the forest cluster, administration, politicians, local groups, experts etc. For co-ordination there was a Steering Committee with 30 members representing the activity sectors of the forest cluster and a Core Group that was responsible for overall coordination and e.g. drafting on synthesis of the exercise results.

Consultations with a large number of actors in the forest cluster were arranged in a structured manner by dividing the exercise into three tasks:

- Task 1: one working group for preparing the context descriptions, facts and figures
 Task 2: the foresight study in four working groups, i.e. Industries and markets; Institutions; Wood and timber, and; Other functions
 Task 3: one working group on research identifying technological breakthroughs and priority topics arising from the foresight study

Activities

Duration of the exercise for the forest sector in France was two years, and the final report “*Prospective: la forêt, sa filière et leurs liens au territoire*” was published in 1998.

Basically the process included three levels: first, identification of issues, then, formulation of two axes of development, and basing on these analyses, description of four scenarios.

Results

Exercise is described in the final report in that was published in 1998 in two parts: INRA-DADP, 1998. *Prospective: la forêt, sa filière et leurs liens au territoire*. Tome 1. Synthèse et scénarios. Répercussions pour la recherche (257 p.); Tome 2. Rapport des ateliers (130 p.). Sous la direction de M. Sebillotte. Rapporteurs: B. Cristofini, J.F. Lacaze, A. Messéan, D. Normandin.

The main findings can be summarised as follows.

- | | |
|---------------------|--|
| Issues | Identification of issues at stake at national level: <ul style="list-style-type: none"> - increasing forest resources in area and standing volume - a recurrent deficit of the forest cluster resulting from import of pulp and conifer sawn timber, and high added value products (furniture) is not balanced by exports of other products. - a lack of competitiveness: competition from other materials, competition from other regions, high exploitation and transaction costs, scattered supply, as well as lack of homogeneity/quantity, regularity and security of wood supply - diversification of expectations regarding forest functions - increasing weight of environmental issues: ecocertification, biodiversity, Natura2000, protected forest areas, Kyoto protocol, conflicting uses, environmental constraints on wood-based products - in the European context i.e. EU15 = 15% of world industrial wood, first consumption market, increasing forest resources, a EU Forest strategy (no common policy), the driving role of Scandinavia, the case of countries in transition and Russia. |
| Axes of development | For defining key trends and evolutions in the forest sector, two structuring questions were identified as synthesis from the four working groups (task 2): <ul style="list-style-type: none"> - Will wood be remaining the main production from the forest? - Will the French forest resources and their mobilisation be compatible with industrial requirements in particular the second transformation? These two questions led to propose two axes as bases for formulating the scenarios: |

Axis 1: wood / non-wood policy orientation for forest and forest areas utilization

This axis focuses on what the policy makers, society, and stakeholders want regarding the forest and its use:

- wood option: wood production remains the main organizing and orientating function for the forest sector, together with other secondary functions
- non-wood option: environment, land-use planning, and recreation become primary objectives, though not necessarily stopping wood harvest.

The axis wood/non-wood has a policy connotation: i.e. *what is the target for forest and forest areas* (without taking a stand on whether this target is met or not). Although wood is almost the only income source which pays for the rest, the non-wood option has to be seriously considered as becoming increasingly supported.

Axis 2: no integration / no x no integration economic relationships between forest and industries

This axis focuses on the functioning and organization of the wood chain, and its economic and technical evolutions. The non-integration is illustrative for the French forest sector as a baseline situation of the study:

- No integration: industrial requirements (price, quality, quantity, homogeneity, regularity) are not satisfied and this leads to a risk of increased import or industry relocation. The question is whether the French forest can find demand and markets for its wood and non-wood products (including tourism). The “no integration” situation is assessed from the angle of *industry’s needs*, i.e. there is no integration, if industry lacks adequate raw material supply.
- No x No integration: industrial requirements are met, industry will remain in France (with jobs and added value). This target can be reached through a pro-active and concerted approach of stakeholders in the forest/wood chain.

Scenarios

These two axes are concluded in a grid illustrating four scenarios.

Scenario 1: Today’s trend, but instable situation

Forests are developed for wood production and multiple uses, but forestry and domestic forest industries’ realities live more and more separately.

- extensive and intensive silviculture
- forests grow for timber production, noble hardwoods are exported
- industry imports cheap and adequate wood
- contradiction between wood/no integration creates instability, risks for the industrial wood markets and leads to relocation of industries

Scenario 2: Industries and multifunction

The starting point in this scenario is the fulfilment of forest industry needs in France, and realization of this scenario requires efficient counteracting of the “non-integration” situation

- most forests are targeted to wood production while fulfilling also other functions
- increase in planting of fast growing species for timber, and use of small logs for pulp and particleboard production
- multipurpose forest management is possible with adapted regulations, if objectives are not too much conflicting
- prospects for job maintenance or development.

Scenario 3: The local context

In this scenario the orientation to non-wood production strengthens the non-integration between forestry and forest industries in France.

- significant regression of industries
- tourism, amenities, and quality of life enhanced
- difficulty to finance “non-tradable” goods and services leads to risk of landscape degradation and wildfires
- no more plantations
- forest tending becomes difficult without public funding.

Scenario 4. Specialised forests

In this scenario the different forest uses (wood for industry needs and non-wood products) are reflected in specialization of forest areas.

- integration of forest supply and demand for industries (high yielding zones) and ligniculture orientated towards industry needs
- majority of forest areas is left to other functions i.e. biodiversity, water, recreation, etc.
- proper regulations still allow forest tending

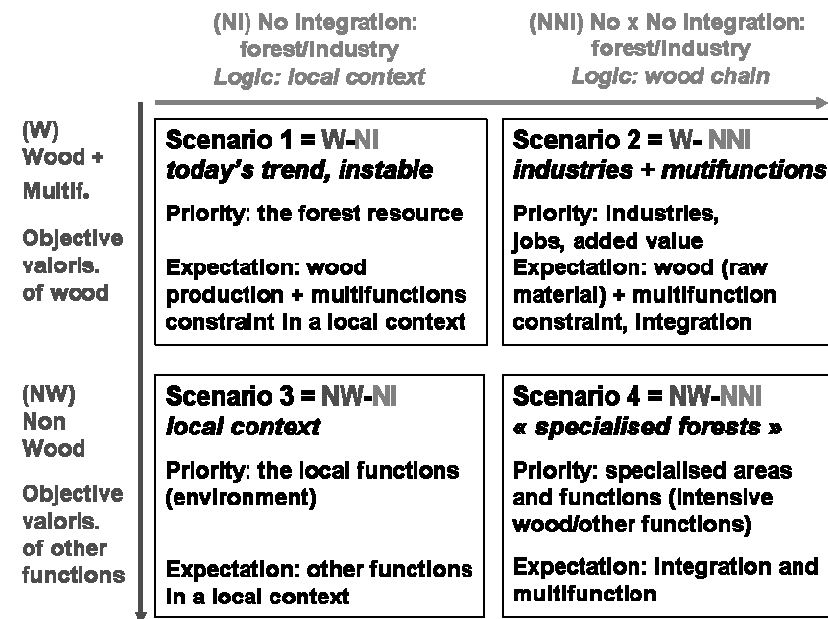


Figure 2. Four scenarios (from Birot 2003).

Conclusions and
recommendations

The scenarios were analysed for their consequences for public research needs. Both scenario-specific research needs as well as common for all four scenarios were identified. Common research needs include:

- ecosystems functioning (basis of ecosystem management), process-based models
- genetic resources: knowledge on diversity, management and conservation
- silviculture (decision support modelling) dynamics of heterogeneous stands (uneven-aged and mixed), risk management
- wood science and technology: wood cell formation, wood chemistry, wood processing
- environment and wood-chain economics, and
- forest externalities.

The aim of the exercise was not to make forecasts, but to stir up discussion on future research needs in the sector, as well as to network the stakeholders and create a common language for the various stakeholders. The study was concretely applied, in particular its conclusion on research (what should be the priorities for research in relation with the scenarios), a few years after the publication. INRA increased its resources on forest research (20% increase in number of scientists), and the scenario 4 was favoured for identifying the profile of new researchers to be hired. In addition to this, the exercise contributed to developing the methodology of prospective studies in INRA.

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Contact:

INRA Département Ecologie des Forêts, Prairies et milieux Aquatiques, Nancy, France
 Délégation permanente à l'agriculture, au développement et à la prospective (DADP), INRA, Paris, France

Other parallel and/or interlinked processes to INRA, e.g.:

- Update for the research priorities at the French National Institute for Agricultural Research 2020 has been carried out in 2001-03: “*INRA 2020 – Alimentation, Agriculture, Environnement: une prospective pour la recherche*”
- National prospective studies in France: DATAR (Délégation à l'Aménagement du Territoire et à l'Action Régionale) and La Prospective France 2100

3.3 Forest-Based Sector Technology Platform FTP

Vision 2030 (2005) and the Strategic Research Agenda (2006)

As one of the European Technology Platforms initiated since 2004, the Forest based Sector Technology Platform is contributing to the establishment of the European Research Area ERA. The key objective of the Technology Platforms is to define RTD priorities, timeframes and budgets on a number of strategically important issues with high societal relevance where achieving Europe's future growth, competitiveness and sustainable development objectives is dependent upon major research and technological advances in the medium to long-term. The platforms are uniting stakeholders around a common vision and approach for the development of the technologies concerned, with specific focus on the definition of a Strategic Research Agenda and the mobilisation of the necessary critical mass of research and innovation effort.

Scope

The Forest-Based Sector Technology Platform is an industry-driven process, embedded in industry reality, and supporting the sector's strategy. It aims at defining and implementing the forest based sector's R&D roadmap for the future and is supported by a wide range of stakeholders.

The forest-based sector includes all stakeholders with major interests in forestry, forest-based materials and products. The Vision statement describes the preferred future of the forest based sector in Europe in 2030. The aim is to drive the industry toward the continued sustainable development and innovation needed to nurture growth in the sector over the next 25 years.

Organisation

In 2004, the European Confederation of Woodworking Industries (CEI-Bois), the Confederation of European Forest Owners (CEPF) and the Confederation of European Paper Industries (CEPI) took the initiative to set up a Technology Platform for the forest-based sector. Important financial support to the FTP Secretariat is also provided by the EU FP6, Holzabsatzfonds (German Timber Promotion Fund), Verband Deutscher Papierfabriken e.V. and the European Forest Institute.

Wide stakeholder groups have been involved through national networks (National Support Groups) and forest sector organizations, research and science etc.

Activities

FTP stages proceed following the European Technology Platform guidance:

Stage 1: Emergence and setting-up of technology platforms i.e. stakeholders get together

After the initiative of the industry federations, views of different stakeholders were collected by workshops and analyses. The European-wide consultation provided inputs from e.g. companies, universities, research institutes, associations and authorities at different levels and European Commission services. As a result the Vision 2030 document was presented at the launching seminar of the FTP in February 2005.

Stage 2: Technology platform activities and deliverables i.e. stakeholders define a Strategic Research Agenda

This process took 12 months in 2005-2006 and the work was structured in four steps:

1. The National Support Groups (NSG), relevant European confederations, research bodies of European dimension were invited to provide a bottom-up input on the research theme level.
2. Inputs from Step 1 were merged and prioritized into research themes on the EU level by the respective value-chain working groups.
3. Based on Step 2, the strategic objectives of the SRA were decided upon and the most important European research themes selected.
4. In the course of Step 4, the draft SRA was made available on the web, thereby inviting comments in an open and transparent way.

Development of the SRA was organized in five horizontal value chain working groups (Forestry; Pulp and paper; Wood products; Bioenergy and; Specialities/New businesses), experts for the vertical dimensions (i.e. "Impact coordinators": Society, Energy, Environment, Competitiveness, Consumers), IT task force and the SRA writing team.

The SRA process has involved more than thousand forest-based sector representatives in some 20 European countries and generated a pool of more than 700 proposals. Evaluation criteria for prioritization of research themes during SRA process were:

- European objectives (e.g. growth, competitiveness, sustainable development);
- Vision document (e.g. impact dimensions, strategic objectives, challenges);
- business value (industrial relevance);
- feasibility (e.g. level of risk in terms of success and time and effort needed to commercial effects, probability of success) and;
- progress beyond state-of-the-art.

Along with the European level Strategic Research Agenda, also National Research Agendas (NRA) have been developed by the National Support Groups.

Stage 3: Stakeholders implement the Strategic Research Agenda

In the end of 2007 eleven National Support Groups had developed and adopted NRA. First financing programmes were launched, and information support systems (connected with FTP internet tools) are open providing information on national, international programmes and projects.

Results

The FTP compiled a Strategic Research Agenda (SRA) as a roadmap for the development of the sector. The Agenda is aimed at increasing the competitiveness of Europe by developing innovative products and services. Main outcomes describing the platform results are: Vision Document 2030 "*Innovative and Sustainable Use of Forest Resources*"; the Strategic Research Agenda with extended descriptions of research areas as an annex; Guidelines document for producing research theme/programme proposals and the National Research Agendas. Below short sum-ups of these documents.

Vision 2030

Vision 2030 is the starting point for the FTP: The European forest-based sector plays a key role in a sustainable society. It comprises a competitive, knowledge-based industry that fosters the extended use of renewable forest resources. It strives to ensure its societal contribution in the context of a bio-based, customer-driven and globally competitive European economy.

In the Vision document the future challenges and opportunities are grouped under four headings: Society, consumer needs and competitiveness; Sustainability; Energy; Technology and knowledge.

The strategic objectives that must be reached in order to realize the vision are defined as:

- Meeting the multifunctional demands on forest resources and their sustainable management.
- Enhancing availability and use of forest biomass for products and energy.
- Development of intelligent and efficient manufacturing processes, including reduced energy consumption.
- Development of innovative products for changing markets and customer needs.
- Establishing a more efficient innovation system, including a better-structured research community with higher efficiency.
- Deepening the sector's scientific basis, including taking advantage of emerging sciences.
- Establishing education and training schemes that meet high requirements.
- Improving communication with the public and policy makers.

The aim of the platform is defined as to allow coordination of research activities and assist in structuring the European research community serving the sector, incl. stimulation of investments in research.

Strategic Research Agenda (SRA)

The SRA is designed to help create a more efficient, competitive and sustainable sector. It describes the forest industry-led perception of the vision for the forest based sector in Europe and the means for attaining it together with the overall competitiveness and sustainability goals. In achieving these goals the research community is called for to respond to the needs of the sector; governments to create good framework and conditions for the sector, and; the sector to fulfil the consumer needs and to communicate better the competitiveness and sustainability achievements to the wider audiences.

The research priorities are concluded in a table that shows their relevance to the strategic objectives and relationships in the forest-based value chains. SRA Annex provides a more detailed description of each Research Area including information on rationale, expected achievements, examples of activities and research approaches, and characteristics.

Strategic Objectives	Forest-Based Value Chains				
	Forestry	Wood Products	Pulp & Paper products	Bio-energy	Specialities
1. Development of innovative products for changing markets and customer needs	1-6: Commercialising soft forest values	1-1: A new generation of functional packaging 1-4: Living with wood 1-5: Building with wood 1-10: <i>New generation of composites</i>	1-1: A new generation of functional packaging 1-2: Paper as a partner in communication, education and learning 1-3: Advancing hygiene and health care 1-8: <i>Pulp, energy and chemicals from wood bio-refinery</i> 1-10: <i>New generation of composites</i>	1-7: Moving Europe with the help of bio-fuels 1-8: <i>Pulp, energy and chemicals from wood bio-refinery</i>	1-8: <i>Pulp, energy and chemicals from wood bio-refinery</i> 1-9: <i>"Green" specialty Chemicals</i> 1-10: <i>New generation of composites</i>
2. Development of intelligent and efficient manufacturing processes, including reduced energy consumption		2-4: Advanced technologies for primary wood processing 2-6: New manufacturing technologies for wood products	2-1: Reengineering the fibre-based value chain 2-2: More performance from less inputs in paper products 2-3: <i>Reducing energy consumption in pulp and paper mills</i>	2-3: <i>Reducing energy consumption in pulp and paper mills</i> 2-6: Technologies to boost heat and power output	
3. Enhancing availability and use of forest biomass for products and energy	3-1: Trees for the future 3-2: <i>"Tailor-made" wood supply</i>	3-2: <i>"Tailor-made" wood supply</i> 3-4: Recycling wood products - a new material resource	3-2: <i>"Tailor-made" wood supply</i> 3-3: Streamlined paper recycling	3-2: <i>"Tailor-made" wood supply</i>	3-2: <i>"Tailor-made" wood supply</i>
4. Meeting the multifunctional demands on forest resources and their sustainable management	4-1: Forests for multiple needs 4-2: Advancing knowledge on forest ecosystems 4-3: Adapting forestry to climate change				
5. The sector in a societal perspective		5-1: Assessing the overall performance of the sector 5-2: Instruments for good forest-sector governance 5-3: Citizens' perceptions			

Italic = addressing more than one Value Chain

Table 2. Forest-Based Technology Platform strategic objectives and research areas (from FTP A Strategic Research Agenda 2006, p.11).

For implementation of the agenda, also an effective and significantly improved *innovation system* is called for, e.g.:

- broader contacts to wider scientific community (incl. other than directly forest based sector themes);
- communication with the public;
- stronger interaction with the public, education and training sectors at all levels, and;
- cooperation with other technology platforms in order to find synergies, e.g. in the form of joint projects and programmes.

National
Research
Agendas (NRA)

Processes of developing the National Research Agendas vary from country to country. The work has been led by the national groups with support groups including the aim of identifying and mobilising the financial sources needed for realizing the research priorities.

The Technology Platform does not provide financing for implementing the research priorities, but the implementation of the SRA will generate a continuously changing portfolio of programmes and projects with different funding, researchers and beneficiaries. The main

source of finance will be from industry and forest owners, complemented by a variety of public financing mechanisms at national and European levels. The latter will involve utilising channels such as ERA-NET, COST Actions, Eureka and Framework Programme collaborative projects.

According to the EC Guidance for technology platforms, the research agendas should be implemented through the use of *existing instruments*. However, a limited number of research agendas will require a much wider European level response, thus through the launching of large-scale “*Joint Technological Initiatives*” (Article 171: “The Community may set up joint undertakings or any other structure necessary for the efficient execution of Community research, technological development and demonstration programmes.”).

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Contact

FTP Office: Forest-Based Sector Technology Platform (FTP), The European Forestry House, Brussels, Belgium

Other parallel and/or interlinked processes with FTP, e.g.:

- EU innovation policy and activities supporting establishment of the European Research and Innovation Area: other European Technology Platforms, ERA-NET and other FP6 funded projects, COST Actions etc.
- Several sector-wise studies and roadmaps have been drawn up e.g. by the industry federations both in national and international levels (such as CEI-Bois RoadMap 2010), by research and development organisations, by governments and the international organisations, incl. EU Commission (e.g. DG Enterprise and EC DG Research)

3.4 Future Forum on Forests – A Foresight Initiative to Study the Future of Forest Sector in Finland

The Finnish Ministry of Agriculture and Forestry established the Future Forum on Forests of Finland in 2003 to foresee long-term changes affecting forest-based livelihoods for the forthcoming decades. The aim was to support decision making in forest-related policies, forest sector organizations, enterprises and institutions. One of the aims was to contribute to the update of the National Forest Programme (NFP) of Finland which started in 2005.

Scope

The Future Forum on Forests of Finland is a multisectoral and multidisciplinary work aiming to provide information on the issues affecting the forest-based livelihoods in the future. The multidisciplinary approach is emphasized in the second project phase as fundamental for finding innovative ideas for the evolving forest-based livelihoods.

The purpose of the Forum is to identify and analyse expected changes in the forest sector environment in the next 10–20 years (until 2020). By exploring the developments affecting livelihoods in the forest sector, the Forum aims to:

- support the development of the national forest policy and other policies relevant to the future of the forest sector; and
- offer new stimuli, material and tools for the strategy work in different forest sector organisations.

The Forum focuses on forest sector and forest-based livelihoods. The “forest sector” in this context can be defined broadly as including forestry, the forest industry as well as other existing or future livelihoods that are based on the use of forest resources.

Organisation

The Ministry of Agriculture and Forestry commissioned the University of Joensuu to carry out the project. The responsible organisation was selected after tendering.

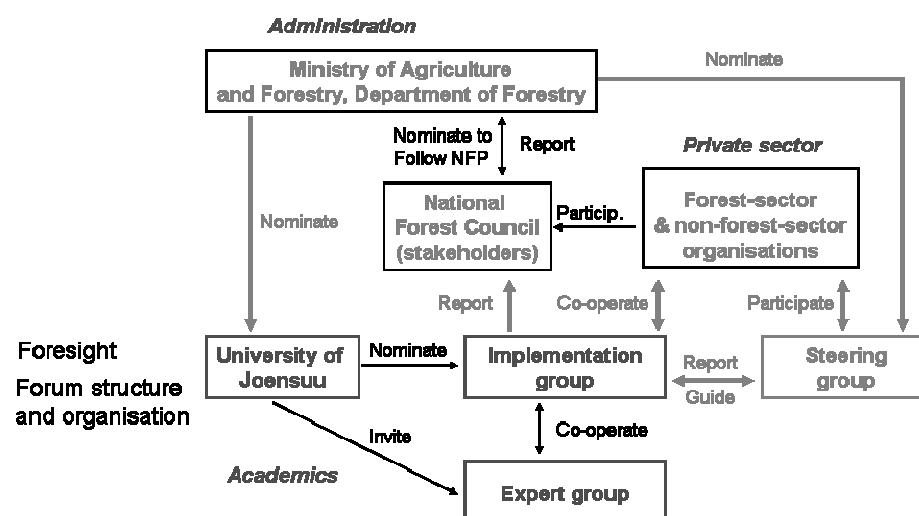


Figure 3. Future Forum on Forest organisational structure and its relation to the National Forest Programme (NFP).

The Future Forum on Forests *implementation team* consists of representatives of the University, SciTech Service Oy Ltd, Finnish Environment Centre, Ministry of Trade and Industry, Finnish Forest Research Institute, and the Director of the Forum. The expertise of the implementation team will be supplemented by the group of *invited experts* from different stakeholder groups. The task of the *supplementary expert group* is to comment and build the content of the studies and seminars, as well as to suggest new ideas for the detached studies. The Forum is guided by the *steering group* of nine members appointed by the financier of the work, the Ministry of Agriculture and Forestry in Finland.

Activities

The project was implemented in two phases. The first phase based on participation of the forest sector experts, and in the second phase emphases have been on the multidisciplinary approach inviting a multidisciplinary team from universities, research institutes and private organizations to conduct the forum's work. Decision of this direction of the project was made during the implementation.

The foresight exercise utilized a wide spectrum of methods to analyse long-term changes and developments. The methods applied were: scenario techniques, delphi-analysis, analysis of weak signals, trend extrapolation, expert opinions and systems analysis. Large future seminars as well as specific thematic seminars were arranged. The activities were grouped into four pillars:

- | | |
|-------------------|---|
| Foresight network | The basic pillar of the Forum is the foresight network formed of Finnish experts from different disciplines who are connected to the international development of science and technology. The foresight network focused on the factors affecting the future of forest sector and its livelihood. It analysed the future business opportunities in different forest-based value chains, and the future development of globalisation, as well as collected weak signals of changes affecting the forest sector. |
| Studies | The second pillar is the group of detached studies that the Forum had made in different organisations on relevant issues of policies or strategic decision making. The topics of the studies included the policy means to support labour availability, primary success factors of the Finnish forest sector in the future, the policy means to improve the availability of wood to the markets, the possibilities of energy businesses based on forestry and forest industry. |
| Seminars | The third pillar is a series of seminars focusing on central issues affecting the forest sector in the future. These “future seminars” were the principal meeting point for those interested in trends and views on the development of the forest sector in the future. In the second phase of the forum, specific thematic seminars were organised in addition to the large “future seminars”. |

Internet service The fourth pillar is the Internet service – or the so-called home base for future information in the forest sector. In addition to the activities and results of the Forum, the web page offered also information on other future studies and events. The Forum Newsletter was published in this internet service four times a year in Finnish and in English.

Results

The Future Forum on Forests has conducted 15 studies, organized 7 seminars and published 12 reports on the forest sector's future. The first part of the work (2003-05) included a futures analysis of important and internal parts of the forest sector. The work was organised in five working groups:

- forest industry,
- forest technology,
- silviculture,
- environment,
- social sustainability and
- nature-based tourism.

Also a study on the policy means to support labour availability was conducted.

The second part (2005–2008) focused more on the future trends external to but fundamentally important for the forest sector and its future. The multidisciplinary studies include analyses of future development of globalization, primary success factors of the Finnish forest sector in the future, and the future business opportunities in different forest-based value chains. The final report will be published in the spring 2008.

Below a short sum-up of the study on direction of the globalisation and the forest sector prospects published in 2007 (Häyrynen et al. 2007). The report is available in Finnish.

Study on global scenarios Direction of globalization was analysed in the light of six driving forces:

- International economy
- International policy
- Environmental policy
- Energy developments
- Technological development
- Cultural aspects.

Basing on these developments four alternative global scenarios for 2020–2025 were drawn up that could be characterised in short:

- “Homebase scenario” foresees a culturally diversified world where the global economy is affected with protectionist national policies.
- “World Parliament scenario” builds on global agreements, political system that defines international regulations in all sectors, incl. environment and mitigation of climate change.
- “McWorld scenario” emphasises market-led control and a global economy characterised with short-term goals and profits.
- “Zapatista scenario” opens a world of discontinuities where the global economy is divided into several changing groupings.

The global scenarios were utilized in analyzing the forest sector development and illustrating its future prospects.

Delphi survey	A two-round internet-based Delphi survey was carried out in 2006–2007 with 42–45 respondents of different stakeholders (e.g. representatives of industries, research and development, public authorities, forest consultancies, media, financing sector etc.). Survey themes were perceptions of change factors related to the global operational environment for the forest sector; forest sector development and the global competition, and renewal and acceptance of the forest sector – forest sector understood here as a field covering both the existing and the future, new forest-based livelihoods. The report summarises the perceptions of globalisation and its effects on forest sector in Finland, and analyses the success factors as well as the hindrances for renewal of the sector.
Perceptions of global and forest sector developments	<p>As a conclusion of the Delphi study, four different ways of thinking about global and forest sector developments were defined:</p> <ul style="list-style-type: none"> - “Existing structures” assumes that global developments continue in accordance with the present trends, and the forest sector renewal can proceed on the existing path and there is no need for abrupt changes. Success of the forest sector is secured by making it more efficient and improving cooperation within the sector. - “New businesses” emphasizes the increasing risks and opportunities in the future that require quick adjustments from the forest sector. Success in the new business requires breaking up the old structures. - “National interest” emphasises the risks related to the global and international business that direct forest sector development in Finland to low-risk activities and increase in domestic wood supply. Success bases on securing stable conditions for the sector in Finland. - “Biosociety” foresees increasing ecological and social sustainability demands that require the forest sector in Finland to improve its competitive advantage by investing in sustainable development solutions throughout its activities. Success requires developing of the production structure towards more efficient solutions in the use of energy and raw materials, and the forest policy genuinely adopting pluralistic values.
Conclusions for forest policy and strategy processes	In the concluding chapter the report discusses how the global scenarios and the different ways of thinking about the forest sector development can be utilised in defining the forest policy and forest strategies. The key element is that the differing views exist, and there is no way of forecasting realization of one or another futures scenario. But the process of realising these alternative development paths and different ways of perceiving them can contribute to preparing the sector for the

future, incl. the unexpected to happen. From this perspective the wider, more open strategy formulation secures flexibility in facing the possible futures.

The Forestry Council of Finland has used the foresight exercise and studies in outlining a strategic background document for updating the current NFP until 2015. The aim of the document is to make forest-related policies more proactive and future oriented.

The establishment of the Future Forum on Forests has been an important milestone in increasing the use of foresight in forest-related policy planning in Finland and it has strengthened science-policy cooperation.

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Contact

Implementation team of the Future Forum on Forests: Chairman Rector Perttu Vartiainen, Vice-chairman Prof. Paavo Pelkonen, Director Anssi Niskanen and Planning Officer Saija Miina. University of Joensuu, Finland.

Other parallel and/or interlinked processes to the Future Forum on Forests in Finland, e.g.:

- Finland's National Forest Programme 2010 and update NFP 2015 as well as studies and analyses related to it, e.g.: *“The Contribution of Finland's Forests to National Prosperity and Wellbeing in 2015 – a Report on Finnish Forest Sector Development and Future Scenarios”* by the Finnish Forest research Institute (2006) and *“Future Review for the Forest Sector – Outline of the Forest Council concerning focuses and aims for the forest sector”* Ministry of Agriculture and Forestry (2006)
- The forest sector futures have also been discussed in the *Forest Academy for Decision-Makers* (Päättäjien metsäakatemia) sessions
- In addition to these above mentioned, there have been several studies ongoing in Finland parallel to the Future Forum of Forests. These studies and exercises that handle forest sector either directly or as a part of a wider framework have been carried out by e.g. companies and the industry federations, research and development organisations, public administration and private consultancies.

3.5 Standing Committee on Agricultural Research SCAR Foresight Initiative

The Standing Committee on Agricultural Research (SCAR) was established by Council Regulation (EEC) in 1974. SCAR advises the EU Commission in the field of the coordination of research in agriculture. In the Commission, DG Agriculture was originally responsible for providing the secretariat support and management of the committee (now the SCAR committee is supported by a Secretariat with staff from the DG Research). The SCAR mandate was revived in 2004 with a wider and up-to-date definition of the term agricultural research. SCAR will look beyond the narrow aspects of research relating to production and encompass the so called “fork-to-farm” concept, emphasising research for sustainable agriculture, and including biodiversity and rural development. Adopting a holistic approach SCAR will address major sectors within a concept of a knowledge-based bio-economy, incl. also issues related to developments in non-traditional and non-food areas of agriculture activity including forestry. The SCAR meeting in February 2005 discussed on the activities it needs to carry out to support the Commission and Member States for better coordination of agricultural research across the European Research Area. Foresight process together with common research agenda and mapping EU capacities were the priority initiatives agreed to be addressed in the future.

Scope

To enable agriculture to cope with a range of complex and interlinked challenges, such as rapidly increasing globalisation, climate change and unsustainable consumption of natural resources, the development of clear futures scenarios are important in ensuring that the right questions are asked. In that perspective, the SCAR launched a wide foresight process aiming at identifying possible scenarios for European agriculture in a 20-year perspective, to be used in the identification of priority research needs for the medium and long term. The aim is to assess the trends and their implications in considering the prospects for agriculture for 2015 – 2020 and to enable the necessary political answers to be found.

Organisation

Initiator of the exercise was the SCAR Standing Committee on Agricultural Research. The initiative on foresight was discussed in the SCAR meetings and it was encouraged also by the informal meeting of the EU Council.

There was a SCAR-Working Group for the exercise. Foresight Expert Group was contracted by the EU Commission DG Research. It consisted of ten members: experts of agri-research and foresight from ten countries.

Activities

SCAR foresight initiative was initiated during 2005-2006. The Foresight Expert Group worked in June-December 2006, and their work including the foresight papers and a synthesis report were discussed in a workshop in March 2007. The reports and conclusions from the workshop contributed to the EU Conference on agri-research in June 2007.

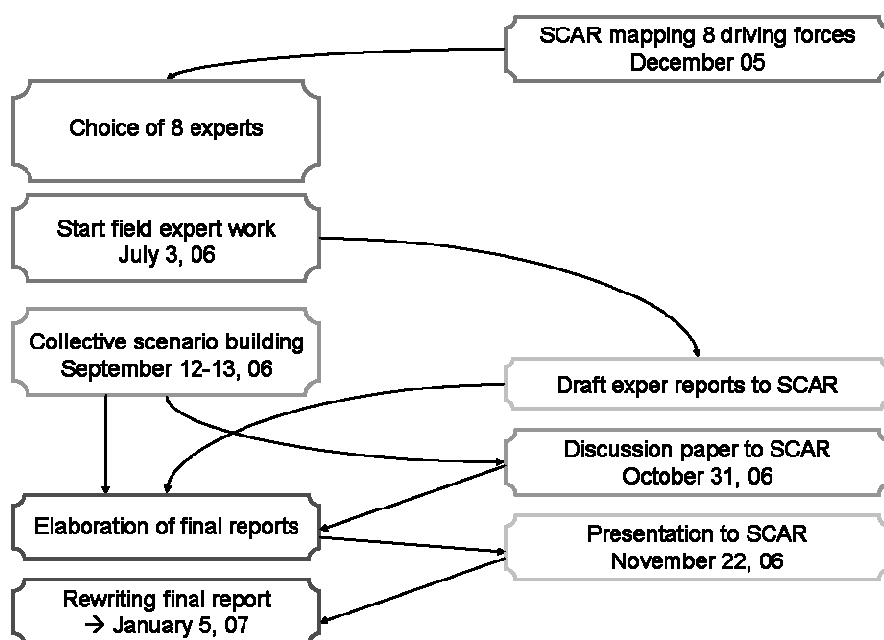


Figure 4. Working process for the foresight report (ref. SCAR)

The foresight started with the framing exercise defining the background factors (i.e. choice of drivers; system definition and boundary setting; time frame and setting of expert group).

The Foresight Expert Group's task was to gather and analyse existing foresight material on eight major drivers and to use this information to formulate on a minimum of three possible futures scenarios for European agriculture in a 20-year perspective together with the implications for evidence and innovation needs in the medium to long-term. The eight driving forces identified by SCAR gave rise to the nomination of eight experts. Reviewing of the expert reports pointed out that the future will not look like the past. This *disruption* element view was taken as a basis for scenario building that led, in the end, illustration four scenarios. A synthesis report was compiled by the expert group and disseminated among relevant stakeholders. The foresight reports were discussed in a Workshop on "*Foresight to Set Long-Term European Agricultural Research Priorities*" in Stockholm, March 2007. Workshop gathered around 60 participants, and its goal was to interpret the foresight results with a widening debate, and to identify key issues for long-term agenda setting. The workshop results were concluded in a discussion paper that was utilised as a background material for a wider audience in the conference "*Towards Future Challenges of Agricultural Research in Europe*" organised by the EC DG Research in Brussels, June 2007. The conference report, in turn, will be utilised in the preparation of Commission Report to the Council and the European Parliament expected for in 2008.

Results

The foresight expert group prepared eight foresight papers synthesizing the existing analytical and foresight material on major driving forces for agriculture in Europe, i.e.:

- Climate change;
- Environment;
- Economy and trade;
- Energy;
- Societal changes;
- Health;
- Rural economy and;
- Science and Technology.

The analysis and four futures scenarios are illustrated in the synthesis paper: “*Report on foresighting food, rural and agri-futures*” (February 2007). Below a short summary of main findings:

Scenarios Four disruption scenarios were defined to be accompanied with the fifth i.e. business-as-usual scenario:

Climate Shock scenario takes the climate change and the acceleration of related environmental impacts as the driving disruption factor. This scenario starts with a primary business-as-usual scenario in which with differing geographical climate impacts, no European level action is taken, and a crisis situation ensues. A success scenario is built on positive action that is taken on a national level. It underlines a fundamental challenge that Europe will increasingly face with the onset of climate change impacts on agriculture, namely how to coordinate European policy responses to diverse regional and local impacts of climate change bearing in mind different regional contexts and framework conditions.

Energy Crisis scenario focuses on the energy supply vulnerability of Europe as the key disruption factor and the acceleration of related economic and societal impacts as the key drivers. This scenario also combines a business as usual scenario, in this case a crisis engineered by the energy global players, with a success scenario developing at the end as a result of internet-based community empowerment and action. It implies a strategic research emphasis in the short-term at European level in support of improved networking of farmers and researchers. This is with a view to addressing urgent knowledge needs, instituting faster mutual learning processes and supporting communities of practice.

Food crisis scenario focuses on food connected to health and society as a source of disruption jointly determining a more community and consumer-oriented research agenda. This scenario combines an initial crisis situation with a success scenario approach with clear guidelines for an effective European research agenda. It highlights the advantages of citizen-oriented research where science and technology are effectively harnessed to address the real needs and concerns of citizens.

The main priorities relate to quality, safe and functional foods for a range of emerging lifestyles and technologies to produce primarily citizen-oriented enabling environments for knowledge production and exchange together with socially-driven, environmentally effective products, processes and services.

Cooperation with nature focuses on society and science and technology as key joint drivers evolving in a beneficially symbiotic relationship. This primarily Utopian scenario projects an ideal situation where science and technology have been effectively deployed to ensure sustainable development at all levels. The key to addressing these needs is the transition to local small-scale production and a shortened and more transparent food supply chain and use of Internet, open learning, ambient systems, creating more globally aware, sustainability conscious consumers.

Conclusions and recommendations

The main recommendation in the conclusion of the report can be defined as a shift “*from global warming to global warning*” i.e. in order to go from a subsidy-driven agro-food system to a knowledge-driven agro-food system, there is need to build a knowledge-transfer system that can reach all decision-makers. There are tools, such as, satellite, image-processing, maritime and ground measurements, already available to develop an ecosystem revolution – but there are no channels how this can reach the needs of the basic decision-makers in farming and agro-food systems.

The expert group recommendations (suggestions) were discussed in a workshop and concluded as:

1. There is need for coordinated EU, national and regional policy responses to a range of challenges, affecting the world rural agri-economy, as a result of the growing inter-related impacts of climate change, environment, energy and food supply concerns, and the shift to a knowledge-based biosociety.
2. The overview of emerging global trends, policy developments, challenges and prospects for European agri-futures, point to the need for a new strategic framework for the planning and delivery of research.
3. This requires re-designing the institutional framework for research and putting in place a two-track approach for agri-futures research:
 - 1) a Transition research agenda to address the more immediate sustainability and safety/security concerns and the radical transformation arising from the reform of the CAP, combined with,
 - 2) a more long-term High-Tech research agenda to ensure that appropriate high tech research investments are put in place so that Europe’s agri-food industries and rural economies retain their competitive position in global markets.
4. To raise the capacity of rural regions to generate, absorb and integrate research developments into economic growth, a regionally-focused, demand-driven approach to research and innovation needs to be developed.

5. Even if the present developments (competitiveness challenge, declining demographic profile of rural communities and reduced global financial support to agriculture) may lead the EU to adopt a temporary protectionist strategy, long-term, strategic and institutional capacities in knowledge transfer, public early warning on ecosystems evolution and decentralised creation are of more central importance in making the transition from a subsidies-driven to a knowledge-driven bio-society.
6. Continued, active engagement in foresight is critical for enhancing the strategic and institutional capacities of Europe's agri policy-making and research and knowledge-transfer organisations.

The scenarios as a result from the foresight process should be used, both at the European and national level, to define better policies and to build a medium to long-term research agenda for European agriculture that is sufficiently robust and evidence-based.

A proposal for establishing of an *early warning system* based on regular surveying of ongoing foresights is put forward for the decision-makers. As a first step, an ad hoc "consultancy expert group" will conduct under the supervision of the European Commission a scanning and monitoring exercise building on the Foresight Expert Group findings, to provide assessment and analysis, to alert on critical developments and to suggest actions on specific issues to be addressed by research in the long-term.

The results of the whole foresight process undertaken by SCAR is also expected to provide inputs to a report on the coordination of agricultural research in Europe that the Commission wishes to transmit to the European Parliament and the Council by the end of 2008.

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Contact

SCAR Secretariat / European Commission DG Research

Other parallel and/or interlinked processes with the SCAR Foresight, e.g.:

- CAP reform and studies related to the agricultural policy, incl. Scenar2020 project
- activities supporting establishment of the European Research and Innovation Area: the European Technology Platforms, ERA-NETs and other FP6 funded projects.

4. Towards the foreseeable futures of the forest sector in Europe

The previous chapters show that the future-oriented studies and exercises in the forest sector and for the forest sector are abundant. The activities are ongoing in several levels in and in relation to the forest sector. They are performed in and by different kinds of organisations and with varying geographical and thematic scopes.

Some of these activities are called foresight – though not all fulfilling the description of foresight. Some of them are called something else – but still with characteristics of foresight. The review is not aiming to be an exhaustive presentation of all studies relevant for the forest sector foresight. However, an overview of the activities is given by categorising them under four headings:

- Trends and scenarios – making projections on future
- Science, technology and innovation
- Business perspectives, forest industries and the corporate foresight
- Policy and strategy formulation – towards the preferred futures.

These headings are not exclusive with each other, but the studies could have been placed under several headings at the same time.

The review took consciously a wide perspective when approaching the foresight studies in and related to the forest sector. No limitation was made for either the concept of foresight or the focus on the forest sector: futures orientations were first sought from different kinds of studies and activities that focused either directly or indirectly the forest sector as such. This is both a weakness and strength for the review. Weakness, because the study could be continued, and there would still be numerous studies and exercises, as well as actors and groups of actors to be found with relevance to the futures of the forest sector in Europe. Strength, because the study points out that forest sector futures is discussed in several forums, not only within the forest sector but also parallel to it – and vice versa, the forest sector futures has an impact on discussion on several other sectors.

The studies and exercises indicated in this review show that the very concept of foresight differs from case to case. There can be no strict limitation made for calling an outlook study or scenario models and simulations as foresight neither can this line be drawn for foresight and roadmapping or policy impact analyses. However, foresight as it is understood in the fully-fledged meaning of the concept is a relatively new instrument in the forest sector.

The review identifies five foresight exercises that were described more in detail:

- European Forest Sector Outlook Study EFSOS
- INRA Prospective Study on Forest Sector in France
- Forest-Based Sector Technology Platform FTP
- Future Forum on Forests foresight initiative in Finland, and
- Standing Committee on Agricultural Research SCAR Foresight Initiative.

They illustrate the above categorisation made in the review, thus, showing how the future projections are defined with extensive statistical analyses as an international joint effort, how alternative futures can contribute to the discussion on research priorities, how roadmapping targets to long-term vision building and efficient mobilisation of resources, how alternative futures and long-term perspective can provide new impulse to the forest policy formulation in

national level, and how a European foresight exercise has been carried out parallel to the forest sector, thus for the agricultural research.

If we compare these five examples with the characteristics of fully-fledged foresight, we can say that in a way or another they all correspond to the features of five essential elements in a fully-fledged foresight:

- structured anticipation and projections of long-term social, economic and technological developments and needs,
- interactive and participative methods involving a wide variety of stakeholders,
- forging new social networks,
- elaborating a guiding strategic vision and a shared sense of commitment, and
- implications for present day decisions and actions.

Nevertheless, the five foresight cases all feature these aspects in a different manner. This is due to the differing scope they have. There is, for sure, systemacy in the anticipations in all five examples. However, difference can be found how much the exercise has opened its scope to include wider e.g. long-term social, economic and technological developments into the foresight exercise. Also the viewpoint towards the future differs, whether it is one (preferred) future or several alternative (possible or probable) futures that is the target of the exercise. All exercises involve several stakeholders, though the involvement differs e.g. how interactive the process has been, to what extent and which stakeholder groups have been invited to participate, and at what stage the stakeholders have been brought in. All exercises include the idea of networking, but again difference is to be found in how actively the foresight exercise has aimed at new social networks, and how open the exercise has been to bring in also views outside the traditional sector borderlines. Vision and shared sense of commitment has been an objective in the foresight exercises, but there are differences, how much uncertainty and open ends they have been ready to seek for. The foresight exercises have been combined to decision-making and strategy processes – some of them directly as a term of reference in the task, some of them more loosely and as ongoing bases feeding in information for policy and decision making processes.

From the review we can conclude that what comes to the future-oriented studies and exercises in the forest sector, many things are happening in many levels. Foresight is a relatively new instrument in the forest sector, and the activities, as well as experience and expertise in future-oriented studies are scattered around Europe and dispersed in various levels. No comprehensive exercise for the forest sector in Europe has been carried out so far.

There is need to discuss how the forest sector could utilise, on one hand, the work already done in and for the forest sector, and on the other hand, the tools and methods developed for futures orientations under the heading of foresight.

Foresights are performed as projects, but foresight is not a project as long as there is tomorrow another tomorrow. Foresight is an art of knowledge, a way of gathering, analysing and utilising information in orientating towards the tomorrow. It is about creating and accumulating strategic intelligence. Foresight improves tomorrow's governance by allowing us to build up the future settings already today, and by allowing us to act in a purposeful manner also if they do not realise. In this respect, also new initiatives could be brought for discussion about the futures in the forest sector in Europe: e.g. how foresight can help defining priorities in science and innovation and directing the resources for future needs and research; how the corporate foresight can adjust the radar of the forest-based sector

development to a longer range, and how the alternative futures can be utilised in the policy formulation.

The concept of foresight needs clarifying and sharing of knowledge. The inner logic of foresight as well as the benefits (and limitations) of a fully-fledged foresight exercise require dialogue between the forest sector experts and the foresight experts and practitioners: though *the future* can not be predicted, there are systematic ways how to look towards *the alternative futures*.

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