



UNECE



**Food and Agriculture
Organization of the
United Nations**

Brainstorming Workshop for the next ECE/FAO Forest Sector Outlook Study

Geneva, January 23 and 24, 2018

MEETING REPORT

The Brainstorming Workshop for the next ECE/FAO Forest Sector Outlook Study took place on 23-24 January 2018 in Geneva. The meeting was hosted by the UNECE/FAO Forestry and Timber Section. Participants included representatives from ministries, forest agencies, research institutes, the private sector and international organizations. (See list below)

Full name	Organization
Mr. Diego Benedetti	European Organization of the Sawmill Industry
Dr. Mats Nordberg	FAO
Dr. Martin Moravcik	FOREST EUROPE - Liaison Unit Bratislava
Mr. Michal Synek	Forest Management Institute, Czech Republic
Ms. Jeanette Ulfshög Martinie	IKEA
Ms. Dominika Kacaba	IKEA
Mr. Christopher Prins	Independent Expert
Prof. Udo Mantau	INFRO e.K. Information Services for Resources
Mr. Christian Blanke	INFRO e.K. Information Systems for Resources
Mr. Naci Gungor	Kastamonu Entegre A.S.
Mr. Heikki Granholm	Ministry of Agriculture and Forestry
Dr. Maarit Kallio	Natural Resources Institute Finland
Prof. Tuula Packalen	Natural Resources Institute Finland
Dr. Kari T. Korhonen	Natural Resources Institute Finland
Dr. Stein Michael Tomter	Norwegian Institute of Bioeconomy Research
Mr. Albertas Kasperavičius	State Forest Service, Lithuania
Mr. James Griffiths	Sustainable Forestry Initiative (SFI) Inc
Mr. Andreas Eriksson	Swedish Forest Agency
Mr. Paolo Camin	Swiss Federal Office for the Environment
M. Pierre Hermans	SYLVA NOVA
Mr. Florian Steierer	UNECE/FAO Forestry and Timber Section
Mr. Roman Michalak	UNECE/FAO Forestry and Timber Section
Mr. Ekrem Yazici	UNECE/FAO Forestry and Timber Section
Ms. Birgit Lia Altmann	UNECE/FAO Forestry and Timber Section
Dr. Jeffrey Prestemon (via Webex)	USDA Forest Service
Dr. Mart-Jan Schelhaas	Wageningen Environmental Research

Item 1: Welcome

Mr. Ekrem Yazici, Deputy Chief of the UNECE/FAO Forestry and Timber Section, opened the meeting, welcomed participants and thanked them for coming to Geneva.

The participants introduced themselves through a short interactive exercise indicating the country and type of institution they are working in, as well as their background either being technical/modelling or policy making/user of information.

Ms. Birgit Lia Altmann, UNECE/FAO Forestry and Timber Section, who facilitated the two-day workshop introduced the agenda for the day.

Item 2: Presentation to set the scene.

Ms. Altmann presented possible global socio-economic developments until the year 2050 including population growth, urbanization, economic growth, energy issues and technology. The presentation slides can be found at <https://www.unece.org/forests/outlookjan2018>.

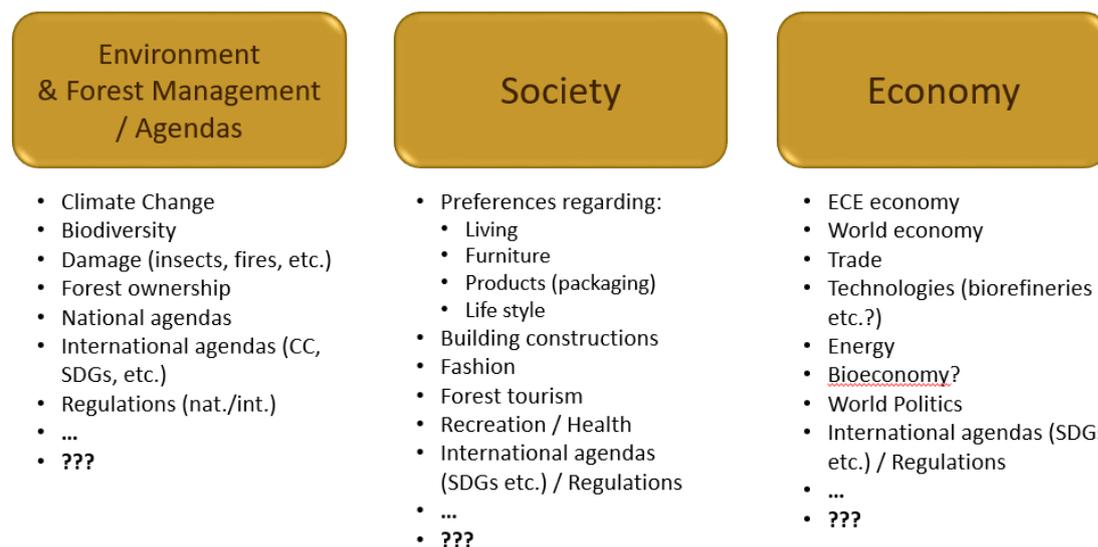
Item 3: Brainstorming on forests in the year 2050 – Group work



The participants were divided into three groups, with each group focusing on a different aspect of development: environment, society and economy. Each group discussed the following question: **What could be significantly different with respect to forests and their products in 2050 (in the three different areas)? What are the related (policy) questions?** Each group had a group leader to facilitate the discussion.

For each specific area, groups received some ideas for possible issues to discuss:

What could be significantly different with respect to forests and their products in 2050?



Groups rotated after 30 minutes, while the group leaders remained with the initial topic and briefed the new group on what the previous one had discussed. The second round took 20 minutes, after which participants rotated to the last topic, they had to address, where they again were briefed and then discussed an additional 15 minutes building on the ideas of the two previous groups.

The group leaders took notes on flip charts. The results of these discussions can be found in Annex I.

After two rotations, i.e. each group having discussed every topic, the groups remained with the third and last topic; they were asked to choose a maximum of ten aspects, which they considered the most important ones, and write them down on cards together with what they thought were related policy questions. Each group presented their cards to the plenary. A short discussion followed in which participants mentioned missing aspects and added them on cards to the results.

Item 4: Comparison with previously discussed policy questions

The participants read through the outlook policy questions developed for the COFFI meeting in Kazan 2014 and discussed in the Outlook ToS Meetings in Arona and Brussels 2015 (attached in Annex II). Aspects that were not mentioned in the group work before were added on cards.

Item 5: Ranking of brainstorming results

Participants ranked the aspects and their related policy questions with respect to impact, likelihood and interest for policy makers using the categories high, medium and low. The results of the selection process (under item 3 and 4) together with the ranking can be found in Annex III.

Item 6: Detailed discussion about selected aspects

On the second day, the group work on aspects and policy questions for the next FSOS continued. Based on the ratings and incorporating some written suggestions from participants, who were not present on the previous day, the following 22 aspects were discussed in detail.

Aspect	Related policy questions
Sustainable Production and Consumption	Contribution of the ECE Region Forest Sector SPC (esp. in China, India, Africa)
Climate change	Forests as a contributor to tackle climate change (carbon sinks)? How could we increase resilience by adaptive management? What would be the productive capacity of different ECE region under changing climate?
Renewable Energy?	What is the potential contribution of forests in the ECE Region to increase the share and quantity of renewable energy?
The extent of natural disasters will increase	What are the consequences? What can be done to increase resilience and regenerate damaged forests?
The pressure to protect more forest will continue	How to maximize the benefit of forest protection, at the same time taking other ecological services into account? How to arrange for compensation to forest owners?
Wood production in ECE will be strongly affected by non-ECE demand	What would be the effect of the increased demand on forest management? What will be the effect of increased plantation forestry outside the ECE?
The demand for certified products will increase?	Will the market accept the cost of the certification process?
Consumer attitude change towards environmentally friendly products	What would be the consequence?
Strong biorefinery industry	What would it mean for the use of hardwood species? Competition with pulpwood? Residues or more synergy?
A variety of use of wood fibres increase, increased demand	Wood market would integrate into others (fashion, chemical, nutrition...) What would be the consequence on wood supply and prices?
Land-use change	What would be the consequence?
Employment	How will the forest sector contribute to employment outside of large cities? Is there a shortage of labour supply? What will be the consequence?
Emergence of new energy sources	Would wood remain a competitive energy source? What would be the impact on profitability?
Lack of stability in the regulatory framework – at all levels	How would this impact investment? How to avoid the damaging impact on competitiveness in particular due to different regional regulations?
Payment of Ecosystem Services will become more widespread	Who will be paying? What will be the impact on costs? What will be the impact on forest management practices? What will be the impact on supply?
Environmental costs are more fully taken into account including with the help of life-cycle considerations	How will this affect perceptions of competitiveness? How will non-financial reporting at the sector level support comparability? How will this affect decision by forest owners?
The circular economy becomes more dominant as a policy framework (e.g.	How to deal with transparency issues in this framework? How to address conflict? What would be the consequence?

EU's circular economy package (re-use, recycling, etc.)	
Disruptive events (e.g. significant economic collapse) including events linked to climate change	What would be the impacts on the supply and demand sides? In the presence of long horizon investment cycles?
Wider development of biotechnology?	What new material / possibilities will emerge? How will competition shape within and between sectors? How will competition be affected by reliable and transparent information?
GDP development	What will be the consequences for the forest sector?
Wood species for industry demand 2050	How can a fitting forestry structure be set up today?
Policy-induced significant reductions in wood products trade volume shifts countries to greater self-sufficiency?	What would be the consequence for ECE countries that import and export wood products?

Participants were divided into four groups and considered the following aspects:

- What exactly could and should be measured to capture the aspect/questions?
- What model(s) could possibly fit / alternative way of assessment?
- (if applicable) what limitations/gaps would exist with this/these model(s)
- Desirable Geographic Aggregation
- Data needed
- Data available
- Data gaps
- Comments (challenges/alternative ideas/time horizon)

Each group presented their results to the plenary. The outcome of this group work can be found in the table in Annex IV. Given the complexity of some of the aspects as well as the short amount of time available (half a day) the groups were not able to finish the discussion on all of the aspects. The table of Annex IV was shared with participants after the meeting to receive further input.

The plenary discussion after the group presentations included the following aspects and arguments:

- A lot of interest exists for the potential storage of carbon in wood products, especially in the context of the circular economy. It is possible to calculate the carbon stock, however it is more difficult to rightfully capture the substitution effect. The ClimWood2030 project was mentioned in this context as it focusses on these issues.
- Related to the aspect of carbon storage, participants mentioned the difficulty to measure the wood content in end-use sectors. Decent statistics exist for paper and sawmill, however for sectors such as construction or furniture this information is difficult to obtain.
- The possible inclusion of scenarios for disastrous events / economic downturns or collapses would be quite different to what has been done in past outlook studies. It could be interesting to do so, if a rationale can be developed on why these events are somewhat likely.
- For some issues, the ECE or sub-regional perspective is meaningful. For others, it could be better to look at the national level. In this context, countries should be supported to

develop their national capacities in modelling. The outputs of national work can then be incorporated in the regional outlook.

- It would be beneficial to link the outlook to the Sustainable Development Goals (SDGs), e.g. by exploring how the ECE forests and forest products could contribute to the SDGs. The advantage of the SDGs is that they provide a common language for different type of stakeholders.
- Sustainable Consumption and Production (SCP), as one of the SDGs, is also an interesting framework for the outlook study. The question arose on how to translate this framework to scenarios or models. Answers to this question included the aspects of circular economy (especially with prolonging products' life span and thus the carbon stock in products), the aspect of bioeconomy (replacing non-renewable materials with renewable materials) as well as recycling and reuse.

Item 7: Update on current work by the ToS leaders

Mr. Jeffrey Prestemon, vice leader of the Team of Specialists (ToS) on Forest Sector Outlook, presented the current work in the USDA Forest Service on the next North American Forest Sector Outlook Study (NAFSOS). He informed that they plan to model the five IIASA Shared Socioeconomic Pathways (SSPs), with a special focus on SSP 1, 3 and 5; they also plan to develop a plantation growth model. In addition, they are currently working on the inclusion of climate change aspects, in particular its effect on forest productivity; however, they are not sure they will be able to incorporate it in the next NAFSOS. Beyond the five SSPs, they are considering scenarios that would evaluate the net effects on the forest sector of (1) global implementation of policies on forest sector related greenhouse gas emissions mitigation, consistent with the Paris Agreement; (2) implementation of policies favouring wood use in construction; (3) the effects of increased trade barriers between the United States, Canada, and potentially globally; and (4) the possible impacts of broader implementation of policies and programs favouring improved forest governance, including those directed at reducing the flow of illegal wood fibre. He informed that the global model (GFPM, updated with UNECE country correspondent assistance and with a plantation module) is working for all five SSPs, with work still needed on the plantation module and any climate-forest productivity module. With respect to the time line for the NAFSOS, the first draft is planned for the end of the year (2018) and the outlook year will be at least 2040.

Mr. Paolo Camin, ToS vice leader, informed about past and current projects by the Swiss Federal Office for the Environment related to the outlook work. In 2010, they completed a project on wood supply in Switzerland, for which they used a growth model to calculate different scenarios. In 2017, they adapted the growth model and developed a climate sensitive model with which they demonstrated the relationship between forests and climate change. At present, they are working on two projects. Firstly, a project on Forest Management Reference Level with an additional scenario on the demand side. Secondly, a project on the CO₂ effect of forest and wood industry. More specifically, they are investigating the CO₂ storage in wood products as well as the substitution effect. It is a challenging project for which they use a variety of models.

Mr. Mart-Jan Schelhaas, ToS leader, presented on recent research and publications he was involved in at Wageningen Environmental Research. This included work on wood supply, which was published in the study “Forest Inventory-based Projection Systems for Wood and Biomass Availability”. Another publication, “Nature Outlook Study”, took a bit of an unconventional approach to investigate how people see nature. Based on the multiple visions that people described, they elaborated four different perspectives on nature in the EU by 2050 and explored the synergies between them. Current activities include work on Netherland’s National Forest Inventory, the LULUCF accounting system, new inventory techniques such as Lidar, and the development of the EFISCEN space resource model. In the final part of his presentation, he informed about his work on wood supply within the SIMWOOD project. With the leading question “how much wood can we expect from European forests”, they looked at 14 model regions to investigate how much wood can actually be mobilised. They found that less wood than expected is available for harvest due to a variety of reasons depending on the region, such as age of forests, distance to road or nature protection.

In addition to the ToS leader, **Ms. Tuula Packalen** from the Natural Resources Institute Finland presented on possibilities for outlook work with ENFIN and the DIABOLO project. She explained that many of the discussed policy questions could be modelled with a Global Trade Model (GTM) such as the EFI-GTM linked with relevant wood supply and product demand scenarios. Within the ENFIN project they build national capacity on wood supply modelling, whose outputs could be used as an input for the next European outlook study.

All presentation slides can be found on the meeting web page: (<https://www.unece.org/forests/outlookjan2018>).

Item 8: Financial aspects

Regarding the financial resources needed for the next FSOS, the discussion started with a look back on how much resources were used for the last European FSOS. Including the contributions in kind for the work of various authors, this amounted to roughly 400.000 USD. The current ToS leader, Mr. Schelhaas estimated that the next European FSOS would also require a similar amount, i.e. 400.000 – 500.000 USD. The UNECE/FAO Forestry and Timber Section informed that the majority of these funds are not yet secured. So far, the Section has received funds from Switzerland as well as from Russia. The Russian funds are intended specifically for capacity building in outlook modelling for Russia and CIS countries. Furthermore, the Netherlands, Sweden and Finland have mentioned their interest in supporting the next outlook study. The representatives from Sweden and Finland confirmed this interest in the meeting and both mentioned that they would like to receive a more detailed work plan including before taking a decision on possible contributions.

The IKEA representatives mentioned that they could look into the possibility of contributing to the next FSOS. However, they also explained that given the size of the two organizations, UNECE and IKEA, the transfer of funds might face bureaucratic difficulties. Thus, other forms of cooperation could be explored.

Item 9: Discussion on other related aspects

The final discussion in the plenary on outlook related topics included the following aspects:

- Two further possible inputs to the outlook study were mentioned.
 - The Sustainable Forestry Initiative (SFI) conducts an annual survey that could provide interesting data for the FSOS.
 - Mr. Udo Mantau informed about a German outlook study that he developed together with partners from the Thünen Institute. They focused on the consumer side and investigated how high the future wood demand could be for different industries. Their results could also feed into the FSOS.
- Regarding the time horizon for the next FSOS, it was mentioned that the decision for the outlook year is always difficult. For instance, the year 2040 is too far away for markets or the private sector, but at the same time too close for forest management. For the NAFSOS, 2040 had been suggested, but the decision has not been taken.
- With respect to the question “one ECE study or several studies, i.e. North America, Europe and Russia?”, it was mentioned that there are some difficulties regarding data availability and comparability between the various sub-regions. On the other hand, global trade models can, in general, cover a wide variety of countries. It was suggested that outlook studies should be aligned as far as possible, should they be published separately for the respective regions.
- Regarding the need for workshops in the area of outlook studies, participants did not see a specific need for a workshop in 2018, but rather a workshop once the first modelling results are obtained. It was mentioned that the ToS has in the past served as a platform for exchange of experiences and this should be continued in the future.
- Regarding the hosting of a possible capacity building workshop in outlook modelling for Russia and CIS countries, Ms. Packalen stated that Natural Resources Institute Finland could host such an event. It was agreed to explore this option.
- The question arose if outlook activities in other regions than the ECE could be supported as this might yield interesting results for ECE members as well. The FAO representative informed that FAO was looking into the possibility of conducting such a study for South East Asia.

Item 10: Next steps

The UNECE/FAO Forestry and Timber Section gave a short outline of planned next steps:

- The results of the workshop will be shared with participants and posted on the meeting's web page.
- The next ToS meeting is planned for the 21st of March, just before the meeting of the Working Party.
- A proposal will be developed for the next FSOS based on the outcomes of the workshop and in consultations with the ToS. This proposal is to be presented at the Working Party.
- During the Working Party a specific session will be devoted to the discussion on the next FSOS.

- The possibility of a capacity building workshop in 2018 for Russia and CIS countries will be explored in the upcoming weeks.

Item 11: Closing of the workshop

Mr. Yazici thanked all participants for their active participation during the previous two days and closed the workshop.

Annex

Annex I:

Results of the brainstorming discussions on the question: What could be significantly different with respect to forests and their products in 2050 (in the three different areas)? What are the related (policy) questions?¹

ENVIRONMENT	
Climate will be different	What could/should be done to address CC
Different countries/sub-regions will be affected in a different way/scale	What regional/local solutions are optimal for them?
Wood production in ECE is driven by changes / impacts from the outside (Africa / Asia)	Should Forest Management follow or resist?
Multiple use of forest (share) will decrease on expense of protected forests/plantations	What ground rules are needed?
Increased competition for land	How to improve forestry position in competing for land?
Demand for agriculture land will increase (or decrease?)	How should the sector react?
Growing discrepancy between growing and utilization of wood (species)	What strategies Forest sector development in terms of: Species composition Management methods Optimization process and its flexibility
Climate change adaptation / mitigation and biodiversity conservation demand increases	
ECE Region covers demand of wood material (doesn't cover)	What economic options are to cover demand?
ECE Region helps to satisfy global (growing) demand	What policy / legal, financial changes should be introduced to support the sector?
Demand for wood energy increases (or decreases)	What is the sector's answer?
Demand for wood to satisfy green economy increases	
Lack of wood material to satisfy demand	What could be done to satisfy demand?
Changes in tree species composition	How to adjust tree species composition to 2050 demand?

¹ Results from flipcharts were typed up as written down with only very minor corrections to spelling, grammar or sentence structure.

SOCIETY	
Furniture	<ul style="list-style-type: none"> - Demand will boom - Consumer choices depend on income per capita - Informed consumers, manufacturers, retailers - Product leasing, refurbishing, second hand - Deliveries - Smart furniture (out of wood?) - Impacts of Africa and Asia on our preferences
Buildings	<ul style="list-style-type: none"> - If cheaper, greener, easy → more wooden buildings, single houses, and multistore buildings - Hybrid constructions, consumption in total for construction - Architects need to be able to work with wood, seismic construction
Fibers	<ul style="list-style-type: none"> - Bio plastics, bio fibers - Packaging, food packaging increasing “eating on the go” - Paper consumption decreasing, diaper consumption increasing - Fashion – huge potential market, power of the designer
Home	<ul style="list-style-type: none"> - Heating/better use of wood from burning - Gets smaller - Boundaries of “home” change; common space is home as well - Consumers become more aware and willing to buy these products - People might request more “non-wood” products, because people loose connection with forests; consumer nature amnesia
Recreation	<ul style="list-style-type: none"> - If flying becomes unacceptable → decrease in mass tourism - Asian influence - Will forest tourism be significant? - Greener cities, urban forests (only recreational) - Ecotourism might increase NWFP demand
Jobs	<ul style="list-style-type: none"> - Decent work, huge need, lack of workforce - Mechanization will increase - Lack of attractiveness of the sector - Old fashioned approach, lack of loyalty - Expensive equipment
Other issues	<ul style="list-style-type: none"> - Pressure on the forest increases (land use conflicts, FLR, SFM) → Policy framework needed - Governmental (and EU etc.) regulations open the market for sustainable, renewable, recycled materials - Valuation of Ecosystem services, monetarization necessary - Contradiction: use of wood ↔ protection of the resource <ul style="list-style-type: none"> ○ Point for communication and education ○ Awareness raising that cutting trees is not bad ○ Marketing in the sector is too little - Tax issue: tax resource instead of labor - Basic income - Is the forest sector a secure one for investment? - NIMB, harvest yes but not close to home - Food: land-use conflicts

ECONOMY	
What?	Implications?
Disruptive events (shocks), non-linearities	
New energy sources	More competition on wood as energy source – less on materials
Emerging economies boost technological change (adoption)	
Changing economic weights (region)	Growing importance of China / Asia with respect to demand
Erosion multilateralism (Growth regionalism)	Global chains and ownership resources (security supplies/trade agreements)
Circular Economy as policy driver	Different demand for forest products
Generational change	New policy demands
Resource scarcity	Circular economy driver
More use of wood as construction materials	Pressure on normative and regulatory frameworks
Optimization / Improved knowledge Forest products + technological dissemination (social and technical aspects) Increased attention to design aspects (chain-like)	Better use of different types of wood to maximize value
Regulatory framework changes (carbon taxes, etc.)	Better recognition of the value of forests
Demographic change	Little implication for labor (supply side) Changing demand centers globally (value and types of demand, example packaging) Plantations increase (<i>linked to the next</i>)
Changing geography of investment	Emerging markets as growing supply centers
Accelerated technological innovation (scarcity as a driver)	
Integrated forest use models ECE region	Comparative advantage
Environmental considerations more fully taken into account	Relative prices/costs are going to change
Green economy as a more used policy framework	Forest management up in policy making / sustainability considerations (example carbon accounts)
Different regulations at the regional level	

Annex II.

Policy issues for the next round of outlook studies [[ECE/TIM/2014/INF.5](#)]

- (a) Can ECE region forest industries remain competitive relative to other industries, and to forest industries in other regions? Where are the regions strong and weak points with regard to competitively costs, scale of operations, marketing, trade in raw materials, innovation? What would be the consequences for the sector as whole of a failure to do so?
- (b) What are the consequences for the ECE region forest sector of major structural changes in markets and industries outside the region: rise in Asian demand for forest products, success of China and other countries as intermediate processing countries, fast growing commercial plantations inside the region (US South) and elsewhere (Latin America) etc.
- (c) Can forest products remain competitive in key end-use markets: communication, packaging/transport, construction, furniture? What policies and strategies can help them, and which are a waste of public funds?
- (d) What are the consequences for the forest sector of policies for renewable energies all over the ECE region? May existing policies and targets with regard to wood energy changeover the next 5-10 years, and with what consequences for forests? Can ECE region forests provide the biomass expected from its own resources on a sustainable basis, and without causing excessive damage to existing material industries?
- (e) What are the consequences for ECE forests and the forest sector of the structural changes in demand, for raw material for the bio-based industries, notably biorefineries? Total supply, prices, availability for other uses, trade are all important aspects
- (f) Are ownership/tenure systems in the ECE region adequate to deliver all the benefits society and policymakers expect from the region's forests?
- (g) How can the ECE region forest sector continue to deliver over the long term the full range of products and services, including for biodiversity conservation and climate change mitigation? What are the tradeoffs between products and services?
- (h) What are the options and tradeoffs for the ECE region forest sector contribution to climate change mitigation (including sequestration, storage in forests and products, substitution for materials and for energy).
- (i) How can the region's forest sector adapt to climate change: forests, markets, industries, trade? Can it help adaptation of other sectors, e.g. agriculture?
- (j) What would be the consequences for the region's forest sector as a whole of complete achievement of the Aichi targets on biodiversity?
- (k) What would be the consequences for the ECE region of a successful sustainable mobilisation of the Russian forest resource? Which role could play the forest resources in other countries

with economies in transition (wood energy for domestic consumption, timber for local and/or export markets...)?

- (l) How serious a threat is forest damage, notably fires and insect outbreaks, to the sustainable management of ECE region forests? What would be the consequences for the sector as a whole of a significant increase in damage, possibly due indirectly to climate change? Include consequences to wood supply as well as supply of non-wood products, recreation, biodiversity etc.
- (m) What would be the consequences for the forest sector of significant progress towards the Green Economy? Structure of the sector, relative competitiveness of products and regions, competitiveness of forest products v. others, new revenue flows etc.
- (n) What would be the consequences for the ECE forest sector of widespread implementation in practice of valuation of forest functions and benefits and payment for ecosystem services? Consequences for forest management and revenue of forest owners, wood supply, trade etc.
- (o) How can the sector adapt to changing patterns of raw material demand and wood supply? Is there a mismatch in quality between what buyers want, and what forests can supply? Examples are demand for smaller diameters, and supply of less spruce, more beech in central Europe. Adaptation to climate change will also influence the type of raw material availability.
- (p) What analytical methods and approaches generate the most useful outputs for policy makers? Should the general approach for ECE/FAO outlook studies be maintained or modified?

Annex III:

Aspect ²	Policy questions	Impact ³	Likelihood	Interest
Sustainable Production and Consumption	Contribution of the ECE Region Forest Sector SPC (esp. in China, India, Africa)	13/0/0	1/2/0	7/2/0
Climate Change	What is the potential contribution of forest in the ECE region to meet balance of emissions and removals by 2050? (or by second half of the century)	14/0/0	4/1/0	10/1/0
Renewable Energy	What is the potential contribution of forests in the ECE Region to increase the share and quantity of renewable energy?	4/4/0	1/2/0	8/2/0
Employment	What is the potential contribution of forests and its value chain in the ECE region in employment	2/7/3	1/1/1	3/4/1
Climate change	Forest and forest sector as a contributor to tackle climate change (carbon sinks)	12/0/0	5/0/0	9/0/0
Climate change	More need to spread awareness that wood products help fight climate change	6/3/0	4/1/1	5/3/0
Transformation of forests	What is the impact of transformation from multiuse forest to plantations or protected area on biodiversity, climate change, soil degradation, land and water use and all together	1/3/0	0/0/0	0/0/0
Expanding demand	How will forest conservation, forest restoration and intensification of management be incentivized to meet expanding demand for forest goods and services	1/7/0	0/0/0	0/0/0
Different regional needs	How can political controlling capture different regional needs of resource-efficient instruments	1/5/4	1/1/2	2/2/4
Climate change will increase the stress of forests	How could we increase resilience by adaptive management? What would be the productive capacity of different ECE region under changing climate?	14/0/0/	8/1/0	10/1/0
The extent of natural disasters will increase	What can be done to increase resilience and regenerate damaged forests?	8/6/0	1/2/1	4/6/0
The pressure to protect more forest will continue	How to maximize the benefit of forest protection, at the same time taking other ecological services into account? How to arrange for compensation to forest owners?	8/3/1	1/4/0	4/5/0

² Results from cards were typed up as written down with only very minor corrections to spelling, grammar or sentence structure.

³ Numbers in the columns impact, likelihood and interest for policy makers refer to the number of ratings given for high / medium / low.

ECE remains a net exporter of wood and wood products	What developments would be need in wood technology? What would be the conditions to increase the production of wood	3/5/0	2/4/0	1/2/1
Wood production in ECE will be strongly affected by non- ECE demand	What would be the effect of the increased demand on forest management? What will be the effect of increased plantation forestry outside the ECE?	11/1/0	3/2/0	4/2/1
Share of protected and plantation forest will increase at the expense of multiuse forest	What ground rules are needed?	5/3/6/	1/3/3	3/3/2
The demand for certified products will increase	Will the market accept the cost of the certification process	2/4/4	2/3/2	0/8/2
Land-use change	How to mobilize wood when small forest owners are disconnected from their own forest	9/1/0	4/0/0	2/2/1
Image of wood products will increase strongly (CO2, earthquakes,...)	Worldwide higher wood consumption → more pressure, profitable, need for efficient processing and recycling, investment	5/3/0	1/4/1	4/5/0
Consumer attitude change towards environmentally friendly products	Need for certification, EPIs, LCA to be improved, source of origin data	13/4/0	1/4/1	6/3/0
Urban population grows → segregation of forest management	Forest zones close to cities, plantations further away, → payment of ecosystem services	2/3/5	0/4/0	0/7/1
Strong biorefinery industry	Use of hardwood, competition with pulpwood, residues Or more synergy	9/2/0	4/0/0	3/3/0
A variety of use of fibers increase	Wood market integrates into other (fashion, chemical, nutrition...)	7/3/0	4/1/0	4/5/0
Lack of skilled labor (high cost for skilled labor)	Mechanization, digitalization	0/5/4	1/2/2	0/6/2
Migration increase	More lively urban areas? Cheaper working forces	1/5/3	2/4/0	3/3/2
Demand for luxury products (e.g. woof, NWFP) increase	More need for ideas, designers, architects, working together with industry	1/7/1	1/2/1	0/2/3
Digitalization	Integrating digitalization with processes and products	1/7/1	2/3/0	2/4/0
Employment	How will the forest sector contribute to employment outside of large cities?	6/3/0	0/2/0	2/1/0
Environmental footprint (internationally)		3/0/0	1/0/0	1/1/0
Emergence of new energy sources	Would wood remain a competitive energy source? What would be the impact on profitability? How would this affect the role of the forest in the circular economy	9/3/1	3/5/1	11/2/0
Lack of stability in the regulatory framework – at all levels	How would this impact investment? How to avoid the damaging impact on competitiveness in particular due to different regional regulations?	8/5/0	3/4/0	5/3/0

Payment of Ecosystem Services will become more widespread	Who will be paying? What will be the impact on costs? What will be the impact on forest management practices? What will be the impact on supply?	4/9/0	1/3/5	0/9/0
Environmental costs are more fully taken into account including with the help of life-cycle considerations	How will this affect perceptions of competitiveness? How will non-financial reporting at the sector level support comparability? How will this affect decision by forest owners?	9/2/0	1/4/0	3/4/0
The circular economy becomes more dominant as a policy framework	How to deal with transparency issues in this framework? How to address conflict?	5/5/1	4/4/0	4/4/0
Disruptive events, including events linked to climate change	What would be the impacts on the supply and demand sides? In the presence of long horizon investment cycles?	3/6/0	2/3/0	1/4/0
Wider development of biotechnology?	What new material / possibilities will emerge? How will competition shape within and between sectors? How will competition be affected by reliable and transparent information?	5/4/0	4/1/0	3/4/0
GDP development	What will be the consequences for the forest sector?	10/0/1	3/1/0	3/2/0
Regional differences	Mismatch between what kind of species forests can supply and what market wants?	6/3/3	3/2/3	5/1/6
End-use sectors furniture, construction, packaging		4/2/0	1/2/0	3/0/2
Wood species for industry demand 2050	How can a fitting forestry structure be set up today?	7/1/3	2/1/2	3/3/2

Wood production in ECE will be strongly affected by non-ECE demand	What would be the effect of the increased demand on forest management? What will be the effect of increased plantation forestry outside the ECE?	physical production potential under SFM, realistic supply (socio-economic). Demand side quantification	EFI-GTM/GFPM plus WRB plus EFISCEN	technological change (different resource mix, efficiency, new products)	UNECE production potential, global demand	current resources (age/species), management, (future) demand, resource mix, plantation plans?	FAO data, NFIs	current FAO data is not always accurate	is only making the scenario enough, or do we need to model possible solutions as well?
The demand for certified products will increase?	Will the market accept the cost of the certification process?								
Consumer attitude change towards environmentally friendly products	What would be the consequence?	attitude of consumers? Area of (or wood supply from) certified forests,		added value of products from certified wood					
Strong biorefinery industry	What would it mean for the use of hardwood species? Competition with pulpwood? Residues or more synergy?	What raw material resources will it be able to use? What will be the demand?	not a separate product category in current trade models	not a separate product category in current trade models		data is very limited	data is very limited, emerging product	data is very limited	Lack of knowledge in the current team. Possibly hardwood could be used, giving a market to the hardwoods (that are increasing now to stabilise forests)
A variety of use of wood fibres increase, increased demand	Wood market would integrate into others (fashion, chemical, nutrition...) What would be the consequence on wood supply and prices?	Wood supply, changing prices because of alternative market uses	GLOBIOM						
Land-use change	What would be the consequence	Forest Area, urban growth, infrastructure projects, agriculture, climate change, trade patterns, can be also afforestation	Forest Area						
Employment	How will the forest sector contribute to employment outside of large cities? Is there a shortage of labour supply? What will be the consequence?	Statistics on Employment on forest sector (Eurostat).	Annual statistics, case studies on the forerunners of bioeconomy production (Äänekoski mill)	Effect of mechanization/automation/productivity change on the need of labor in different tasks					

Emergence of new energy sources	Would wood remain a competitive energy source? What would be the impact on profitability?								
Lack of stability in the regulatory framework – at all levels	How would this impact investment? How to avoid the damaging impact on competitiveness in particular due to different regional regulations?	data on investments	assumptions on different levels of investments						
Payment of Ecosystem Services of forests will become more widespread	Who will be paying? What will be the impact on costs? What will be the impact on forest management practices? What will be the impact on supply?	- Impacts on harvests and forest stocks, wood-prices, and management and harvesting costs, price of forest land	- European forestry dynamics model - efi - global forest sector model (global forest sector model)	- At national level there is a need for modelling wood and land markets			model included (source?)		
Environmental costs are more fully taken into account including with the help of life-cycle considerations	How will this affect perceptions of competitiveness? How will non-financial reporting at the sector level support comparability? How will this affect decision by forest owners?						EPD		
The circular economy becomes more dominant as a policy framework (e.g. EU's circular economy package (re-use, recycling, etc.))	How to deal with transparency issues in this framework? How to address conflict? What would be the consequence?	Footprint of different materials needs to be calculated (including but, not limited to, life cycle assessment).							
Disruptive events (e.g. significant economic collapse) including events linked to climate change	What would be the impacts on the supply and demand sides? In the presence of long horizon investment cycles?	<i>(no other fields filled out)</i> Extreme weather conditions may cause sudden disruption of supply. Possible price fluctuations in case of disasters. Effect depends on kind of event (case-specific). Direct impact of climate change (what happens) and indirect impact (how to manage forests later/adaptation and tree species choices) -Probability of indicators of a list of disruptive events							

