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Item 4f of the provisional agenda

EFC matters**Strengthening FAO's work on boreal and temperate forests****Strengthening FAO's work on boreal and temperate
forests****Note by the Secretariat***Summary*

The FAO Committee on Forestry (COFO) requested FAO to “strengthen its work on boreal and temperate forests and explore further options in this regard, such as, *inter alia*, participation in existing initiatives, bodies and processes and the establishment of a dedicated working group of COFO, and to present a detailed document with concrete proposals on that issue to its next session in 2018 under a separate agenda item”.

This paper provides background information about boreal and temperate forests in the region and relevant questions for the attention of the Commission.

I. Introduction

1. In 2014, the FAO Committee on Forestry (COFO) requested FAO to “scale up its support to countries on boreal forests, (...) address the specificities of boreal forests in the normative and field work of FAO, especially those related to forest protection, forest fires, wildlife management and carbon monitoring; continue exploring further possibilities for enhancing interdisciplinary work on boreal forests”.¹ In 2016, this COFO mandate was extended to also include temperate forests. COFO specifically requested FAO to: “strengthen its work in the area of boreal and temperate forests, taking into account their contribution to the implementation of the 2030 Agenda for Sustainable Development, including combating climate change and enhancing food security and nutrition” and to “explore further options in this regard, such as, inter alia, participation in existing initiatives, bodies and processes and the establishment of a dedicated working group of COFO, and to present a detailed document with concrete proposals on that issue to its next session in 2018 under a separate agenda item”.² This recommendation has been endorsed by the 40th Session of the FAO Conference.³

II. Importance of boreal and temperate forests

2. Most of the boreal and temperate forests are found in a broad belt across Eurasia and North America where they form opposite ends of a natural continuum running from the boreal north to the temperate south. A continuum with similar characteristics can be found in mountainous areas, where it runs from higher to lower elevations. Boreal forests dominate in 7 countries, all in the northern hemisphere where they surround the increasingly important Arctic Ocean watershed. Temperate forests dominate in 48 countries, most of which are in the northern hemisphere. In the southern hemisphere, temperate forests dominate in Chile and New Zealand and can also be found in Argentina and Australia. Many countries in the northern hemisphere have forests in both the boreal and the temperate domains⁴.

3. Boreal forests grow in high-latitude environments where freezing temperatures occur for 6 to 8 months. Analogous conditions can be found in mountainous regions at high elevations. The boreal domain represents about 30 percent of the global forest area and has large tracts of unmanaged forests including half of the world’s remaining primary forests. This biome contains more surface freshwater than any other biome in the world, and about one-third of it is underlain by permafrost. Boreal trees, soils and peatlands constitute the largest terrestrial carbon pool with 559 Gt C (mostly stored in soils and permafrost), thus playing a key role in regulating the global climate.⁵ Most of the boreal ecosystems are characterized by a low diversity of tree species, but are home to a unique biodiversity and wildlife, including some of the most endangered species and habitats.⁶

4. Temperate forests extend from the boreal zone towards the tropics. At lower latitudes, they are bounded by the continental grasslands (steppes) or the subtropical forests. The climate of temperate forests is characterized by cold winters with snow and mild and moist summers. Vegetative growth occurs for up to nine months each year in most parts of the zone. Temperate forests have been historically managed for multiple purposes with a recent increase in access for recreation, as more people in urban areas use forests. Forest

¹ Report of the 22nd Session of COFO (23-27 June 2014), COFO/2014/REP, paragraphs 97-99.

² Report of the 23rd Session of COFO (18-22 July 2016), COFO/2016/REP, paragraphs 14(c) and 34.

³ Report of the 40th Session of the FAO Conference (3-8 July 2017), C 2017/Unedited Report, paragraph 53.

⁴ FAO, 2012. Global ecological zones for FAO forest reporting: 2010 Update. Forest Resources Assessment Working Paper 179. The map of global ecological zones is available at <http://foris.fao.org/static/data/fra2010/ecozones2010.jpg>.

⁵ Enhancing work on boreal forests. COFO/2014/7.3a.

⁶ Gauthier et al. 2015. Boreal forest health and global change. *Science* 349 (6250), 819-822.

management planning in the temperate zone increasingly recognizes amenity and use values. However, forest fragmentation and degradation of forest health may be reducing the social benefits available in some areas.

5. The boreal and temperate forests differ in important ways and there are also major differences within each domain. Large-scale stand-replacing fires and insect attacks occur naturally in the boreal forests whereas small-scale gap dynamics dominate in the temperate forest, which also has a higher biological diversity. The temperate forest has a much higher human population density, with an average of 0.25 hectares of forest per person compared to 6 hectares in the boreal biome⁷. The extent of historical deforestation is higher in the temperate forest and the remaining forest is more deeply transformed by long-term human influence. Forest management for timber production, often industrial at large scale, dominates in the boreal forests, whereas the temperate forest is dominated by small-scale management for a wider range of purposes. The use of management plans is widespread in both biomes⁸. The proportion of planted forest is much higher in the temperate domain, which often provides shorter rotation times due to higher productivity.

6. Boreal and temperate forests play a significant role in achieving the Sustainable Development Goals and other international agreements including the Aichi Biodiversity Targets of the Convention on Biological Diversity, the Paris Agreement of the UN Framework Convention on Climate Change, and the UN Strategic Plan for Forests. Boreal and temperate forests are a significant source of food, income and livelihoods for both indigenous and local people and an essential provider of various socioeconomic values and ecosystem services, both nationally and globally. They provide habitats, they capture carbon, and they are a potentially sustainable source of products and services.

7. Taken together, boreal and temperate forests represent a major component of the global forest cover. They account for almost half (48 percent) of the world's total forest area and more than a quarter of carbon stock in living biomass⁹. The forest products industry is generally well developed, providing job opportunities in rural areas and, in some countries, making a significant contribution to national GDP. Most of the commercial activity is in the private sector, although governments are major land owners in some countries, particularly in continental boreal regions. In 2016, countries in which boreal and temperate forests dominate produced 60 percent of the world's industrial roundwood, 63 percent of sawnwood, 35 percent of wood-based panels, 64 percent of wood pulp, 46 percent of paper and paperboard, and 90 percent of wood pellets.¹⁰ Logging is typically not a cause of forest loss. Forest cover has been expanding for several decades while the rural population has decreased, particularly in the temperate domain (a 15 percent reduction in the decade ending in 2010¹¹). The area of forest and other wooded land increased with 28.1 million ha (1.5 percent) between 2000 and 2015. Natural forest expansion onto former agricultural land accounts for most of the increase, but afforestation in the context of public programmes has played a significant role in some countries. Between 2006 and 2013, the area of forests certified as sustainably managed in the region expanded by 45 percent.¹²

⁷ FRA 2015.

⁸ FRA 2015 reports that 88% of the boreal and 63% of the temperate forest area have forest management plans.

⁹ FRA 2015.

¹⁰ FAOSTAT Forestry Database.

¹¹ FRA 2015.

¹² UNECE and FAO. 2015. Forests in the ECE region: trends and challenges in achieving the global objectives on forests.

III. Forest issues and challenges – a conversation starter

8. Boreal and temperate forests face different challenges, although some are relevant to both biomes while others pertain only to a portion of a single biome. For example, issues often differ between continental and coastal areas, and between flat and mountainous areas. They also differ depending on the length and intensity of human use.

9. In the continental boreal forest, vast areas of little or no human influence remain. Maintaining the intactness of these globally significant areas, while continuing to supply the world with forest products, is a major forest management challenge. Another major boreal issue concerns areas that were logged without being embedded in an effective silvicultural programme. The spontaneously regrowing forest in these areas are calling for management interventions, e.g., thinning, to improve its commercial attractiveness and carbon sequestration capacity. On the other hand, possible melting of permafrost and conversion of wetlands/peatlands are huge potential risk factors with major implications on future carbon balances.

10. Another legacy of past management practices in boreal forests concerns areas in which the biological diversity has been reduced by intensive forest management. Such areas are calling for interventions that will enhance biodiversity without reducing their commercial value, e.g., locating, maintaining and restoring critical structural components such as key habitats and dead wood. Abandoned agricultural lands, some of which are regrowing spontaneously, are also calling for a management strategy that will make the most of these often comparatively productive lands.

11. The temperate forest faces different issues. Forest management is at a smaller scale and is often carried out by non-industrial land owners in landscapes with high population density and substantial presence of agriculture. Production of timber needs to be combined with the provision of a wide range of other services including recreation. Ecologically representative portions of the forest need to be conserved. Shifts in these conditions have helped the classical model for sustainable forest management to evolve. Some of the lands that were once cleared to make space for agriculture, notably in Europe, are no longer needed for this purpose. Tree-based management systems for restoring these areas into forest need to be developed that are attractive both to land owners and key stakeholders. Fire continues to be a major issue in the temperate part of the Mediterranean region, where farm abandonment and lack of management increases the risk. The multitude of small forest owners create collaboration issues if economies of scale are to be captured. Forest health may yet be an issue in the temperate domain, although the fear of catastrophic forest die-back has receded.

12. In terms of genetical composition, much of the boreal forest is unaffected by deliberate efforts to improve tree characteristics, although there are highly developed tree improvement programmes that include active selection, breeding, and seed orchards. Tree improvement efforts are more widespread in the temperate forest, although the precise overall proportion is poorly known in both biomes. There is a significant potential for using tree improvement programmes, including in the afforestation of abandoned agricultural land but appropriate attention should be given also to biodiversity considerations.

13. The effects of climate change on boreal and temperate forest landscapes are insufficiently understood, although growth and risks are both expected to increase with larger expected impacts in the boreal domain. Boreal and temperate forests are currently a carbon sink but could turn into a carbon source due to increased incidence of pests and fire and, in the boreal, decomposition of organic deposits following the melting of permafrost. The boreal forest offers opportunities for achieving the so-called “negative emissions” of carbon dioxide that are assumed to be necessary to reach the targets of the Paris Agreement by increasing the stocking through forest management measures, including in spontaneously regrowing

areas. For this to be possible, the fuel load in the managed portion of the forest must be reduced, e.g., by clearing windthrow and dead trees, and fires and insect attacks must be fought as they occur. Adaptive forest management strategies are needed that will prevent damage and build resilience to changes that still remain difficult to predict.

14. Adaptive strategies call for effective monitoring and assessment. The forest information that is available across the two domains is generally good in comparison with other domains; yet it is uneven in terms of resolution, quality, and age, making comparable statistics unreliable. Some countries do not make sufficient funds available to sustain adequate inventory programmes while others are global leaders in the field. The countries of the boreal and temperate domains can serve as a frontrunner in developing techniques and systems with improved capabilities, e.g., covering a wider scope of aspects, enabling more comprehensive greenhouse gas inventories, delivering data with greater precision and more quickly, providing quick-alerts on threats, etc. Current systems for global monitoring of tree cover are of limited relevance to the two domains, as deforestation is not a major issue in boreal and temperate forests. More comprehensive systems are needed that are equally sensitive to loss and gain of tree cover and that are capable of monitoring forest quality in addition to forest extent.

15. Forest governance is less of an issue in the boreal and temperate forests than elsewhere. Tenure is generally clear and secure. Governance models for different types of ownership are well developed based on a long tradition. Third party certification to voluntary national standards for sustainable forest management is widely available. Governance remains an issue in some countries with economies in transition. Production and trade of wood in contravention of relevant laws is also an issue. Lack of spatially explicit data on the location and tenure of forest management units along with limitations on transparency hamper efforts to improve legality.

16. In terms of social impacts, the big difference in population density is a key factor. Boreal forest landscapes are generally sparsely settled, while existing settlements tend to be characterized by their remoteness. Highly sophisticated production chains emanate from the boreal forests, providing locally significant job opportunities and supplying forest based products to people near and far. Yet forest settlements based on the logging economy are often in decline, some of them because the supply of surrounding forest has been exhausted and all of them due to technical advances that reduce the need for labour. Closings of local mills, sometimes as a result of unsustainable logging and/or the transition to a market based economy, have created pockets of deprivation¹³. Temperate forest landscapes, while also subject to rural depopulation, provide more resilient livelihoods due to a wider variety of economic opportunities. The general contribution of boreal and temperate forests to people¹⁴, including regulation of the water and climate cycles and provision of food, health and recreation, is likely undervalued. Developing new mechanisms for identifying, valuing and financing forests' contributions to people is a promising area of development.

IV. Existing institutional experiences and new opportunities

17. Many international organizations and initiatives have been active for years in the area of boreal and temperate forests. They differ and overlap in complex ways, e.g., with regards

¹³ UNECE and FAO. 2015. Forests in the ECE region: trends and challenges in achieving the global objectives on forests.

¹⁴ The updated conceptual framework of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (ES IPBES/INF/24) prefers the term "nature's benefits to people" over "ecosystem services". The term includes all the contributions, both positive and negative, of nature to the quality of life of humans as individuals, societies or humanity as a whole.

to issues, country participation, and level of engagement. Some are specifically dedicated to a biome (e.g., Circumboreal Working Group¹⁵, International Boreal Forest Research Association¹⁶), others are regionally focused (e.g., Barents Forest Sector Network of the Barents Euro-Arctic Council, Economic Commission for Europe, European Forest Institute, Forest Europe), yet others are global in coverage while addressing various issues that are pertinent to boreal and temperate forests (e.g., Convention on Biological Diversity, FAO, Intergovernmental Platform on Biodiversity and Ecosystem Services, Intergovernmental Panel on Climate Change, International Union of Forest Research Organizations, Montreal Process, UN Framework Convention on Climate Change, UN Forum on Forests).

18. FAO maintains active technical cooperation in the forest sector with a number of countries that have boreal and/or temperate forests (e.g., Argentina, Belarus, Chile, China, Georgia, Kosovo, Kyrgyzstan, Mongolia, Russian Federation, Serbia, Turkey, among others). Furthermore, FAO's normative work on e.g. forest fires, forest health, pests and diseases and climate change is highly relevant to boreal forests and temperate forests. Examples include the guidelines on forest fires, phytosanitary measures and climate change for policy makers, global review of forest pests and diseases, forestry for a low-carbon future, and socioeconomic surveys in forestry.

19. The member countries of the United Nations Economic Commission for Europe (UNECE), which also include Canada and USA, encompass the bulk of the world's temperate and boreal forests. Within the Integrated Programme of Work of the FAO European Forestry Commission and UNECE Committee of Forestry and the Forest Industry, there are joint activities on forest products markets, wood energy, and forest resources (including inventory, sustainable forest management criteria and indicators), all of which have direct relevance to the boreal and temperate forest issues. The programme has delivered successive forest sector outlook studies that have brought together country representatives across the UNECE region to evaluate future forest markets. European and US experts have produced coordinated outlooks for Europe and North America, while FAO has worked with the Russian Federation to create a Russian outlook. Work is ongoing for an updated UNECE outlook study. Additional UNECE studies include a recent (2015) study assessing the contribution of forests in the UNECE region to the Global Objectives on Forests. Regarding other regions with

¹⁵ The Circumboreal Working Group (CWG) is an ad hoc group comprising Canada, Finland, Norway, Russia, Sweden, and the United States that was formed to provide focus on the importance of boreal forests. It has no official standing or "home" and while it has provided opportunities to share information, its ability to effect change or deliver products remains to be seen. The primary issues that have been raised by the group so far are: (1) climate change that is threatening the sustainability of the forest products industry in some countries where forest products play a large economic role and better information on future effects and adaptive actions would be highly useful; and (2) changes in technology and pressures to reduce greenhouse gas emissions that will affect the mix of forest products and competitiveness across the global economy. On the first issue, the group commissioned the International Boreal Forest Research Association to synthesize the science on boreal forest vulnerability to climate change. On the second issue, outlook studies such as being done by the ECE are a venue since markets work across tropical/temperate/boreal and there is no point to a "boreal" outlook study independent of the global market.

¹⁶ The International Boreal Forest Research Association (IBFRA) was founded in 1991 with the mission to "promote and co-ordinate research to increase the understanding of the role of the circumpolar boreal forest in the global environment and the effects of environmental change upon that role." Uniting scientists of 9 countries (Austria, Canada, China, Finland, Japan, Norway, Russia, Sweden, and the United States), IBFRA does not have any national administrative and financial support and is highly dependent on activities of committed individuals. IBFRA research covers issues of both boreal and temperate forests of its participating countries. During 25 years of its existence, the Association organized 17 international conferences, which were attended by about 3500 scientists and professionals, and published over 700 research papers. For a number of reasons, the 2017 IBFRA conference was cancelled.

boreal and temperate forests, an outlook study for Latin American forests and forestry up to 2020 was published in 2006. An outlook study on East Asian forests and forestry to 2020 was published in 2010 as a subregional report of the Second Asia-Pacific Forestry Sector Outlook Study. The forthcoming session of the Asia Pacific Forestry Commission in October will consider the options for developing the next outlook study for 2030.

20. The Montréal Process Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests, UNECE and the Ministerial Conference on the Protection of Forests in Europe are all members of the Collaborative Forest Resources Questionnaire (CFRQ) of the Global Forest Resources Assessment (FRA). The CFRQ covers some 100 countries and 88 percent of the world's forest area. The commonly collected data are shared among the CFRQ partners. This collaboration has both reduced the reporting burden and increased data consistency across organizations.

21. The boreal and temperate forests offer tremendous potential for leading the way towards realizing the green economy concept. Wood from established forest management systems can be used to make new products and services with lower climate and environmental impact than conventional, non-wood solutions. Promising new forest-based product types include clothes, mouldable composite materials, construction and insulation material, transparent wood, and light-weight biodegradable packaging. Forest products can be used to make tall buildings and other long-lasting structures such as bridges. Wood-based energy can replace energy from non-renewable sources. Although the carbon benefit varies according to the chosen pathway, energy production from by-products such as black liquor, saw-dust and bark is generally positive and the energy market can potentially also provide an outlet for wood from thinnings, thus enabling a more intensive silviculture in areas that have grown back spontaneously after logging many decades ago. The commercial side of this development generally lies in a range of stakeholders, including the private sector, whereas the public sector has a role to play including through research and by providing suitable incentives.

22. Nevertheless, the current scope of international collaboration on boreal and temperate forests appears lower than the existing potential. This is partly due to the fact that the prevailing international funding architecture is not conducive to supporting 'north-north' cooperation outside of already existing regional initiatives.

23. In terms of strengthening collaboration across and within the boreal and temperate domains, potential areas include:

- Technologies for realizing a forest based green economy;
- Management of legacy areas, including where logging many decades ago has been followed by spontaneous regrowth without silviculture;
- Restoration of former forest lands that are no longer needed for agriculture;
- Valuation of boreal and temperate forests' environmental and socio-economic contributions and development of new revenue streams, including payment for ecosystem service schemes;
- Further development and implementation of sustainable forest management;
- Forest inventory as well as assessments of carbon stocks in boreal and temperate forest and soils, peat and permafrost including their vulnerability to climate shocks;
- Forest-based strategies for mitigating climate change;
- Forest-based strategies for adaption to climate change;
- Policies for making remote forest dependent settlements viable; and
- Urban and peri-urban forestry.

V. Points for consideration

24. The Commission may consider the following questions:
- a) What current or emerging issues shall be at the top of national and international attention as putting at risk the potential contributions from the boreal and temperate forests to the 2030 Agenda for Sustainable Development and other relevant global and regional agreements on forests?
 - b) How can these risks be most effectively addressed through the existing institutions, processes, programmes at national and international levels?
 - c) What specific aspects of the required effort may call for the creation of additional formats and mechanisms of collaboration, e.g. as per the COFO23 recommendations (see para. 1 above)?
 - d) Which of these activities are better justified for the boreal and temperate forests combined, and which should be dealt with through separate geographic lenses?
 - e) Given the organization's mandate, where should FAO concentrate its efforts and resources to bring its best added value to such activities?