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Progress report on forest damage
and disturbance work

Improving the assessment of forest damage/disturbance in the Economic Commission for Europe region – project progress report and preliminary results

Note by the Secretariat

Introduction

1.   This document was prepared by the Secretariat to inform delegates about the progress of work and preliminary outcomes of the project, "Improve capacities of the United Nations Economic Commission for Europe (UNECE) member States on assessing forest damage/disturbance in the UNECE region", under agenda item 6 (f) of the eightieth session of the Committee on Forests and Forest Industry.

2.   The status of the ongoing implementation is reported in line with the mandate, given by the ECE Committee on Forests and the Forest Industry (COFFI) and the Food and Agriculture Organization of the United Nations (FAO) European Forestry Commission (EFC) during their joint session in 2021 (ECE/TIM/2021/2-FO:EFC/2021/2).

3.   In addition to the preliminary results, as well as key findings of the research, more detailed information about the results and conclusions from the scientific-technical symposium on "Assessing Forest Damage and Disturbance in the ECE Region", which was held in Vienna, Austria on 29-30 September 2022, will be presented directly during the Committee session.

4.   Delegates are invited to consider the key points outlined below and provide feedback on their possible implications for international and national forest damage/disturbance reporting and assessment.

I.   Background

5.   Given the effects of natural and anthropogenic stressors, monitoring forest health and conditions is essential to ensure the continued vitality of forests and their provision of ecosystem benefits. Therefore, information about forest damage/disturbance is important to maintain forests, organize prevention and mitigation activities, increase forest resilience, reduce losses, minimize harm to societies, economies, and ecosystems, and preserve the benefits of forests overall in a rapidly changing world.

6.   In December 2019, the ECE/FAO Team of Specialists (ToS) on Monitoring Sustainable Forest Management (SFM) proposed to carry out a comprehensive project to investigate theoretical and practical aspects of forest damage/disturbance monitoring, assessment and reporting in the ECE region.

7.   The project, established in October 2020, aims to provide a basis for analysis of national forest damage/disturbance inventories, to review international reporting systems and to contribute to data harmonization in the ECE region.

8.   The project covers the entire ECE region and contributes to the objective of subprogramme 7 "Forests and the forest industry" of the ECE programme of work, which aims "to strengthen sustainable management of forests and enhance the contribution of forests and forest products to sustainable development in the ECE region". The project is part of Work Area 1: Data, monitoring, reporting and assessment of the ECE/FAO Integrated Programme of Work 2018-2021 and 2022-2025.

9.   The implementation of the project is led by the Joint ECE/FAO Forestry and Timber Section supported by the ECE/FAO ToS on Monitoring SFM, with contributions from Austria, Canada, Finland, Germany, and the United States, and individual experts from countries of the ECE region.

10.   The overall objective of the project is to improve knowledge, methodology and reporting capacity on forest damage/disturbance in the ECE region.

II.   Project activities

11.   The implementation of the project began in October 2020. In line with the project's objective, the following activities were carried out:

       (a)   Analysis of the concept of forest damage/disturbance reporting and related approaches in countries;

       (b)   Analysis of the current national and international reporting on forest damage/disturbance in the context of data availability and needs;

       (c)   Analysis of the methodological aspects of harmonized forest damage/disturbance assessment;

       (d)   Analysis of innovative tools for forest damage/disturbance monitoring in line with methodological aspects for harmonized data assessment in the ECE region;

       (e)   Analysis of the extent and trends of forest damage/disturbance in the ECE region.

12.   For this purpose, the Joint Section, together with the ToS on Monitoring SFM, organized and compiled the results of a survey on monitoring, assessing and reporting of forest damage/disturbance in ECE member States. In this survey, national correspondents from ECE member States were also consulted about their assessment of international reporting on forest damage/disturbance agents as well as their recommendations for improvement.

13.   Furthermore, the project seeks to provide a basis for enhancing the capacities of countries and organizations to collect, analyze, report and use information on forest disturbance/damage. To achieve this goal, recommendations for international and national reporting on forest damage/disturbance in the ECE region will be proposed.

14.   The secretariat is finalizing the report with the project team for December 2022.

III.   Preliminary results

15.   The enhanced investigation of international reporting and national assessment of forest damage/disturbance in the ECE region provided several findings relevant to data harmonization. The following findings and conclusions are drawn from the preliminary study results and the discussions at the September 2022 Scientific-Technical Symposium.

A. International reporting of forest damage/disturbance

16. Different reporting frameworks for forest damage/disturbance have been established among international organizations and processes such as the Food and Agriculture Organization of the United Nations (FAO), the United Nations Economic Commission for Europe (ECE), the Montréal Process, or Forest Europe.

17. International reporting on forest damage/disturbance is shaped either by criteria and indicators (C&I) processes on sustainable forest management, such as by Forest Europe or the Montréal Process, or other schemes such as the Global Core Set of Forest-related Indicators.

18. All ECE member States are part of the FAO Global Forest Resources Assessment (FRA). In addition, countries of the pan-European region participate in the Joint ECE/FAO/Forest Europe data collection on forests and sustainable forest management.

19. There is potential for the further refinement of international reporting, e.g., by setting thresholds and reference levels, as well as clarifying the difference between forest damage and disturbance, adjusting frequency of reporting, and distinguishing primary and subsequent damage agents. Any decision on that matter should consider related increase of burden in relation to expected benefits.

B. Trends of forest damage/disturbance in the ECE region

20. Of 33 million hectares (ha) of damaged forest area in the ECE region, the 2020 FRA identified insects as the most damaging agent affecting over 20 million ha of forest (mostly in the North American sub-region).

21. Additionally, in descending order of occurrence, forest fires (11 million ha), extreme weather events (3.2 million ha), and diseases (4.5 million ha) and 5 million ha by other causes. were reported.

22. Forest area damaged by fire indicated increasing trend during 2000-2017, and varied from 3 million ha in 2001 to almost 11 million ha of forests affected by fires in 2015, most of which are from the North American sub-region (8 million ha).

23. The reported forest area affected by other agents did not indicate any clear trend. Areas affected fluctuated but remained in the same region, except the North American region where damages by diseases, extreme weather events (wind, storm, drought, etc.) and other factors were raising until 2011 and decreased in the last decade (reported data covered 2000-2017 period).

24. The main types of damage vary across the ECE sub-regions. Different damage groups exhibit dissimilar damage patterns among sub-regions, and these patterns also change over time. However, in most ECE sub-regions, insects are the most impactful category (in terms of area affected) of damage agents.

25. Natural disasters and damaging events are expected to occur with greater frequency and intensity owing to the increasing effects of climate change. As a consequence, multifactorial hazard events will probably develop more frequently in forest areas and are likely to change damage patterns in terms of severity, extent and seasonal duration over the long term. However, so far, no clear trend can be found to confirm this tendency in the internationally reported information.

26. Ultimately, the anticipated changes in damage/disturbance patterns will seriously impact forest ecosystems and their biodiversity. The provision of ecosystem services as well as the economy of the forest sector will also be affected. Successfully counteracting forest damage/disturbance impacts under a changing climate will likely require a significant increase of resources dedicated to this purpose.

C. Conceptual challenges for forest damage and disturbance assessment

27.   The project revealed conceptual challenges related to the varying definitions of forest damage and disturbance across the ECE region. These terms are also subject to differing interpretations owing to diverse perspectives, individual human values and reporting goals among ECE member States. The results emphasize conceptual differences between the two key terms, "damage" and "disturbance" which are interchangeably used despite disparity in their meanings.

28.   The analysis showed that the use of these two terms in national data collection systems varies among ECE member States. Current national data collection efforts typically don't allow for the differentiation or comparison between forest damage and disturbance.

29.   These conceptual differences and reporting heterogeneity therefore cause data gaps in international reporting and environmental accounting.

30.   Insufficient, incomplete, or incoherent information hampers the scientific analysis of forest ecosystem dynamics, the understanding of underlying factors and targeted management responses.

31.   Consistent monitoring and reporting of these aspects can improve the knowledge of natural disasters, the effectiveness of managerial activities, and thereby, the resilience of forest ecosystems.

D. National reporting of forest damage/disturbance

32.   ECE member States apply various/different approaches to data collection in National Forest Inventories (NFIs) and other general or targeted monitoring efforts related to forest damage/disturbance. In the ECE region, ground-based observation, plot-based sampling, remote sensing, and combinations of these techniques are used in different ways.

33.   The consistent recording of the time of occurrence of forest damage/disturbance events, along with their underlying causes, is essential for the better understanding of multifactorial hazard events; unfortunately, this information is not always available owing to the limited coverage, both spatially and temporally, provided by NFIs and other damage/disturbance related forest inventory approaches.

34.   Recording the severity and location of damage within segments of standing trees (e.g., in the crown, stem or roots) is an uncommon practice in the European sub-region, which hampers opportunities for more refined interpretation of reported information.

35.   Reference information (e.g. forest type, form of ownership) on forest areas affected by damage/disturbance, as well as information about the condition of adjacent areas, are insufficiently reported through inventories in the ECE region.

E. Reporting burden and harmonization

36.   Forest conditions and forest damage/disturbance have been the subject of multiple general and/or specialized national inventories and assessments. Information about the timing, duration and extent of damage/disturbance events is essential for monitoring impact (e.g., current vs. cumulative damage/disturbance), adjusting managerial responses and developing adaptation strategies.

37.   The initial data analysis shows that forest damage/disturbance is reported inconsistently among member States across the ECE region, making further data comparison and interpretation difficult. Comparable reporting on forest damage/disturbance is challenged by different data-collection systems and monitoring cycles.

38.   Monitoring and reporting on the time and duration of forest damage/disturbance are not coordinated in the ECE region. The main source of information remains national inventories, primarily covering national priorities. There is potential for integration/harmonization of this data at the international level; however, it requires

additional work, and long-term commitment and effort, both in international and national reporting systems.

F. Innovative tools for forest damage/disturbance monitoring:

39.   The consistent application of state-of-the-art technologies, tools and analytical approaches in member States across the ECE region offers the potential to improve the completeness, quality and coherence of data and reduce the reporting burden.

40.   The project provided an overview of cost-effective methods and tools that could be implemented by member States in the ECE region to address issues of spatial and temporal scales, attribution and data coverage of damage/disturbance agents.

41.   In particular, the project highlighted potential improvements of satellite-based mapping of forest damage/disturbance facilitated by cloud computing and open-source software, which provide access to extensive image and geospatial data archives as well as increased analytical capacity. Furthermore, the introduction of machine learning techniques with automated algorithms for collected data should enable the combination of multi-disciplinary datasets to assess forest damage/disturbance.

42.   Moreover, the project proposed techniques/methods that could be applied not only for collection of additional data, but also for the improvement of already collected data. For example, aggregation of data from remote-sensing sources as well as information on ground-based sampling may provide added value and improve the interpretation of gathered information (e.g., on the spatially or temporal origin of forest damage/disturbance events, processes).

43.   These enhancements make it possible to extend the analytical framework for forest damage/disturbance reporting and assessment. Likewise, the preliminary results show that innovative technologies are vital to ensuring long-term data time series and high data accuracy for harmonized national and international data collection processes like the Global FRA or the Joint ECE/FAO/Forest Europe data collection.

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