



POSITION PAPER

EUROPEAN POLICY OFFICE • APRIL 2024

WWF asks on the proposed regulation for a monitoring framework for resilient forests

SUMMARY

Forests and other wooded land cover about half the EU. We depend on our forests: they provide timber and other products, are home to many wildlife and plant species, are places of recreation, and they regulate the climate – making them important allies in fighting and coping with climate change.

To maintain and enhance all these functions, we need our forests to be healthy and resilient. Currently, there is a lack of information about forests at European level: on where different forest types are, their health, their biodiversity, and their uses. The European Commission is therefore proposing a new legislation on a monitoring framework for resilient European forests^{R1}. WWF considers it important to have a robust monitoring system that provides key information on how our forests are performing environmentally, socially and economically.

An EU forest monitoring framework can provide many benefits, such as data to support:

- countries' efforts to plan sustainable bioeconomies and meet carbon and nature targets
- a harmonised, EU-wide picture of how the Union's forests are doing, and how forest-related policies are being implemented
- access to Payment for Ecosystem Services
- the diverse information needs of stakeholders: from governments to the general public, to forest owners, to researchers, to fire-fighters, to ecotourism ventures, to start-ups in forest monitoring.

The proposal from the EC features various important aspects, including:

- achieving harmonisation of forest data across a range of important indicators, from economic aspects to crucial ecological information such as locations of primary & old-growth forests, priority forest types from the Habitats Directive, and threatened species
- providing a service to Member States whereby the EC harvests data from Copernicus satellites^{R2}, and ensures information is publicly available and organised in a Geographical Information System (GIS)
- encouraging Member States to utilise this data in long-term forest planning.

The EC's proposal provides a good basis and should be supported. However, there are some improvements that should be made during co-decision process.



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1. Coherence with other legislation, commitments, strategies & data collection

WWF agrees that forests fulfil “various environmental, social and economic functions” that are not adequately monitored in a harmonised way across the EU¹. That said, there are some gaps in the proposal’s coverage of each of these aspects. Similarly, the objective to track progress towards Union policy objectives and targets across various policy instruments (Rec. 9) is laudable – but there are gaps in covering these instruments. By ensuring the FML delivers the data required (and often already collected) across forest-relevant policies, most of the gaps in the FML proposal would be filled (though we do suggest a few further additions, also).

- **Environmental elements** that should be added include: *soil organic carbon* (e.g. relevant to LULUCF^{R3} & NRL^{R4}), information on *forest species prioritised by the Habitats^{R5} and Birds Directives^{R6}*, and indicators the EU should report to the Global Biodiversity Framework (GBF)^{R7} such as *extent of natural ecosystems*, *services provided by ecosystems*, and *Red List forest habitats*.
- **Economic indicators** should go beyond data on wood production and processing. More information is needed on forest management, particularly the *silvicultural approaches* deployed – such as the ratio between *even and uneven-aged forest*, *permanent habitat trees*, and *area of clear-cut*. *Logging notifications* should be published in order to provide transparency on how forestry relates to areas protected and prioritised by the Nature Directives and NRL.
- **Social indicators** are missing - such as the extent to which the traditional forests of *indigenous and forest-dependent communities* are managed with consent – consistent with the GBF.

2. Effective timescale & spatial resolution

WWF acknowledges the utility of an ongoing, stepwise approach where techniques are fast evolving (and we herein suggest some additions to Annex III). However, it is important that crucial indicators in Annex III are not delayed: particularly *threatened species*, *location of forest habitats outside Natura 2000 sites*, *forest disturbances caused by factors other than fire*, and the EUDR *forest naturalness classes*. The importance of EU forests, the pressures they are under, and the technical means available to facilitate monitoring, point to the need and viability of swift and thorough implementation.

It is also important the information collated be available both over time (enabling the tracking of trends), and to the greatest spatial resolution possible. The utility of GIS needs to be harnessed, with data organised spatially wherever possible, with the level of granularity determined per indicator based on technical feasibility and taking into account other considerations such as privacy (e.g. the “forest units” need not identify specific properties).

3. Long Term Plans

Science needs to inform policymaking: it is crucial to Europe’s resilience and vitality during a century of climate change, that Member States undertake transparent long-term planning that addresses the multiple functions of forests. This can help streamline the delivery of existing plans required under climate and nature restoration legislation.

The European Commission has presented an important proposal that efficiently utilises satellite data and Geographical Information Systems whilst enabling Member States to plug-in their national reporting approaches. With some improvements, the monitoring framework can play an essential role in helping to track the essential forest functions that the European Union relies upon, as well as monitoring threats to our forests. The opportunity should be grasped to ensure the adoption of the strongest possible Forest Monitoring Law, in support of a resilient, vibrant Europe.

¹ See p.1 of the FML proposal’s Explanatory Memorandum, “Reasons for and objectives of the proposal”^{R1}.

INTRODUCTION

Forests are vital for the European Union

Forests and other wooded land cover about half the European Union. They are home to many plant and animal species, are places of recreation and enjoyment of nature, and they support the European economy. Forests and their biodiversity are often transboundary, as are their ecosystem services such as climate regulation, rain generation and hydrological regulation. Europe's forests are crucial for a viable future and to address climate change.

Yet there are many challenges affecting forests today, such as droughts, pests and disease, pollution, forest fires and forest degradation. European forests are not in good condition and the pressures they face are increasing². An EU-wide forest monitoring system is urgently needed to support healthy and resilient forests, now and in the future.

The European Union needs a strong Forest Monitoring Law

Whilst the EU has many policy instruments related to forests³, ranging from the Habitats Directive (HD) to the Renewable Energy Directive (RED)^{R8}, the EU lacks a coherent reporting framework to support these agendas and their implementation and enforcement. The European Commission (EC) proposal for a monitoring framework for resilient European forests, or "forest monitoring law" (FML), is a good basis that will enable the assessment of the current status of forests and inform actions to help ensure our forests will be healthy and resilient in the future. Getting this new law adopted should be a priority.

There is much to support in the EC's proposal: there is a need for monitoring the effectiveness of EU forest-related policies; it is urgent that forest data and forest planning be improved; it is important forest data be transparent and regularly updated; it is efficient to combine remote sensing and ground survey techniques and to use data which is already being collected in EU Member States; various important indicators are stipulated; and it is right to include elements that address long-term planning. However, there are some gaps and weaknesses that should be strengthened to ensure the monitoring framework is effective.

WWF PRIORITIES FOR CO-DECISION PROCESS

WWF has analysed the EC's proposal in order to make recommendations on how to improve the draft law. Below, we highlight recommendations for additions and alterations, as well as essential aspects that are already proposed in the law.

KEY

Indicators (either already proposed in the FML or suggested by WWF), are in *purple italics*:



Important indicators, already proposed, that WWF is in support of



Indicators that should be added



Indicators that need moving or altering

General recommendations (i.e. not regarding indicators) are in **purple (not italics)**

² The EU's forest C sink has reduced by a third in 10 years due to increased harvesting combined with increased mortality from wind, pest outbreaks, fire, etc^{R21}. The naturalness of our forests is amongst the lowest in the world^{R22}. Only 14% of HD forests are in favourable conservation status and only 35% of HD priority species have favourable conservation status^{R15}; thousands of forest species are red-listed^{R23}; 39% of EU forest types are threatened or near-threatened^{R24}; 37% of EU's native tree species are threatened, and 58% of endemic trees... "in general the condition of EU forests is poor, and there are serious concerns regarding upward trends of several pressures and degrading condition indicators... only 20% of forest land is exposed to one or no degradation drivers"^{R25}.

³ A review identified 570 policy instruments with a "clear relevance to the forest-based sector"^{R26}.



1. Coherence with other EU legislation, commitments, strategies & data collection

The EU “acquis” on forests is broad, featuring a range of forest-relevant legislation, strategies and data services. The FML presents an opportunity to ensure the EU not only has sound policy goals on forests, but also the monitoring required to support the implementation and monitoring of existing instruments, and to inform future policymaking.

An EU forest monitoring framework provides a unique opportunity to streamline existing reporting requirements related to forests stemming from different EU laws such as LULUCF, RED, and the Birds and Habitats Directives. The integration of these requirements would address most of the gaps in the proposal without adding much by way of additional work for Member States. There is also considerable data collection already undertaken by EU bodies concerning forested land, that should be added to the service the EC provides to Member States (Art. 5.2), such as the mapping of riparian forest, pollution, and drought risk - as covered below.

The FML can help achieve more coherent monitoring. For instance, both LULUCF and RED encourage Member States to have “systems of monitoring” - several aspects of which are relevant to the FML proposal, such as land with high biodiversity value, primary and old-growth forest, the natural habitats listed in Annex I of the Habitats Dir and the habitats of species listed in Annex II (both inside and outside Natura 2000 sites)⁴.

Monitoring of forest types of high importance for biodiversity and ecosystem services is important

-  **Location of primary and old-growth forests** are included (Art. 5.3), and this is indeed essential⁵.
-  **Red List forest habitats** should be included (GBF)⁶ in Annex II of the EC proposal, as should **Areas subject to restoration** (LULUCF & NRL).
-  **Riparian forests** and **roadless forest areas** should also be mapped as these are important information for environmental ministries, regarding forest connectivity and landscape and river basin planning⁷. Riparian forests are already mapped by the EEA using Copernicus^{R9}, and could be added to Art. 5.2(b) (Forest type). Roadless forest areas would likely be straight-forward for Copernicus and could be added to Art.5.2(c) (Forest connectivity).
-  **Condition and conservation status** of primary and old-growth, Red Listed, and Nature Directives forests (in and out of Natura 2000 sites), should also be integrated as it is not enough simply to map important habitats - we also need to know their condition and likely status going forward (eg Habitats Dir Art.17 reporting).

Monitoring of forest species needs strengthening

-  **Threatened Species** (GBF), as included in Annex III, are a priority, so the monitoring of which should not be delayed by a stepwise approach but instead be moved to Art. 5.3 (and Annex II).
-  **Species of community interest** as defined in the Habitats and Birds directives should also be added to Art. 5.3 (and Annex II).
-  **Automated technology / A.I. biodiversity monitoring** should be added to Annex III, including eDNA metabarcoding⁸ and soundscape monitoring, as these techniques are revolutionising the efficacy and cost-efficacy of species monitoring - across all taxa, from the soil to the canopy^{R10–12}. It is also of benefit to the EU's tech industry that the FML supports it to be a world-leader. The use of Implementing Acts referred to in Art. 8.3 is important to keep abreast of efficient and effective technological innovations.

⁴ The specifications of LULUCF and RED overlap but also differ - see LULUCF – Annex V, Part 3^{R27}; RED – Art.29.6(a)^{R8}

⁵ RED establishes exclusion areas in which logging for bioenergy should not occur, which thus necessitates having the data. There is, however, a very problematic loophole in RED that waives this provision in cases “where there is no data”. (compare RED Art. 29.6(a,iv) with loophole in RED Art. 29.6(b)). Therefore, it is urgent the FML plugs this gap. Further, the EC's Biogeographic Process coordinates efforts to map primary and old-growth forests^{R28}.

⁶ See GBF indicator A.1, *Red List of Ecosystems*^{R7}. The European Red List of Habitats^{R24} concludes that 39% of forest types are threatened or near threatened, and identifies two types as “endangered” that are not covered by the Habitats Directive - riverside and marsh forest.

⁷ On the important of riparian ecosystems - see^{R29–31}. On the value of roadless areas to European conservation, see^{R32,33}.

⁸ as the proposed Soil Monitoring Law (SML) includes provision for (see ^{R34}Annex I, Part C)

Additional information is needed on forest structure and ecosystem services

To achieve the FML's goal of supporting resilience, and to inform the climate adaptation and disaster risk management planning of the Long Term Plans, it is important that forest ecosystem services and the aspects of forests that underpin them, should be more systematically addressed.

- ✦ **Forest connectivity**, included in Art. 5.2(c), is important but the methodology proposed is not sufficient as it does not take into account the naturalness of forests. As such, tracts of plantations and highly simplified forests, which can reduce the functional connectivity of forests for animals and other taxa^{R13}, would score as highly as areas of natural forest. It should be changed to align with the GBF's **Extent of natural ecosystems**⁹.
- ⊕ **Services provided by ecosystems** is also a GBF indicator¹⁰, and should be added to Annex III and integrated with Annex IV (Long Term Plans). This is consistent with the proposed Soil Monitoring Law^{R14} that includes "quantification of loss of ecosystem services" such as "change in floods intensity", as well as suggested ecosystem services amendments to the European Environmental Economic Accounts Dir, such as "local climate regulation"¹¹. **The EC should publish regular updates on forest ecosystem services provision at EU scale.**
- ⊕ **Forest carbon accounting aspects of the FML need strengthening.** As well as the carbon in **Above ground biomass**, soil carbon also needs including – e.g. through **Stock of organic carbon** as proposed in the NRL and SML. **Each of LULUCF's forest carbon pools should be integrated**¹².
- ⊕ **Soil and hydrological indicators need to be added**¹³: **drought risk** data are already routinely collected by the EC and should be added to Art.5.2¹⁴. **Mapping of pollution**¹⁵ is already undertaken by the European Environment Agency and should be integrated with the FML because pollution is a pressure affecting forests^{R15,16}.

Further economic and forestry details are needed

Whilst the proposal includes important economic fundamentals, particularly on provision of materials to the bioeconomy, further information is needed. Most of Europe's forests are available for wood supply¹⁶. It is important to be able to relate how forests are managed with the other indicators in the FML to provide data on the results of silvicultural practices. This is crucial to inform the development of resilient and multifunctional forestry. The information will be of value to forest managers, to Member States in the preparation of Long Term Plans, to researchers, as well as other stakeholders.

- ⊕ **Forest available for wood supply** (FAWS) should be further differentiated by adding **silvicultural approach**, either as its own sub-indicator of FAWS (Art. 5.3a) or cross-referencing to Annex III's **Forest structure** (in which case the latter will need further defining, e.g. to include ratio of even-aged:uneven-aged). **Permanent habitat trees**¹⁷ is an important indicator that should be added (as national average per Ha and also by silvicultural types) to Annex III (as it could either be collected by Member States or by remote sensing).

⁹ GBF indicator A.2^{R7}. Suitable methodologies include either Marín *et al*^{R35} or Grantham *et al*^{R22}.

¹⁰ GBF Indicator B.1^{R7}.

¹¹ Dir (EU) 691/2011^{R36}, and proposal to amend it with new environmental economic accounts modules^{R37}.

¹² LULUCF's (Annex I) carbon pools are: living biomass, litter, deadwood, dead organic matter, mineral soils, organic soils, and harvested wood products. These all need to be integrated with the FML. "Soil organic carbon and carbon pools of deadwood, much of which feed the soil carbon pool, are...of particularly high relevance" (Rec. 2)^{R27}.

¹³ The proposed Soil Monitoring Law includes "Reduction of soil capacity to retain water"

¹⁴ The European Drought Observatory, a service run by the EC's Joint Research Centre, uses Copernicus to map: i. reductions in precipitation, ii. when that affects soil moisture, and iii. when that affects vegetation.

¹⁵ EU critical loads mapping of acidification (S, N), eutrophication (N, P), tropospheric ozone, and heavy metals – are already mapped by the EEA regarding legislation such as NEC Dir^{R38}, so can be added to Art. 5.2 simply by integrating with FML's GIS. Ideally, levels of soil contamination would also be included (not just rates of deposition)^{R16,39}.

¹⁶ 76.6%, according to Forest Europe^{R40} (though this is neither a complete 'nor an EU-specific data set).

¹⁷ Sometimes called "retention trees", i.e. that are not harvested and allowed to go through all life-cycle stages. Usually monitored per Ha. This can be important either as "retention" trees in clear-cut systems, or as trees that are never harvested in continuous cover forestry – ensuring older age classes are not neglected. This indicator has the value of being a measure that all forestry approaches can incorporate (to a greater or lesser degree) and provides an indication of where a silvicultural system is placed on the continuum of clear-cut to continuous-cover forestry. See^{R41,42}.

-  **Clear-cut area** needs adding (national total, average clear-cut, and by silvicultural approach¹⁸) to Art. 5.3 (or to Annex III as could also be determined by remote sensing). RED requires Member States to have either monitoring & enforcement systems, or management systems, regarding various aspects of forestry “with the aim of minimising negative impacts” including from “large clear-cuts”¹⁹.
-  **Forest areas under EU sustainable forest management schemes** should be added, as it would be useful to know the spatial coverage of forests participating in EU schemes such as the Green Taxonomy^{R17}, Carbon Removal Certification Framework^{R18}, and Closer-to-Nature Forest Management certification^{R19}. Annex III may be the most appropriate place for this, given the uncertain timeframes on some of these mechanisms.
-  **Logging notifications** should be integrated into the data provided to the GIS by Member States (added to Art. 5.3), as already made publicly available by some major forestry countries such as Sweden and Finland. This is needed to ensure commitments are observed on no logging in strictly protected areas (HD) and to increase transparency on where logging affects other important habitats such as primary and old-growth forests (RED); as well as useful for national and EU forest planning as a record of harvesting (relevant to future yields) and of economic activity (e.g. relevant to taxation).

Social indicators are missing and should be added

Whilst WWF recognises the FML is an important contribution to societal resilience, specific social indicators are missing from the proposal and should be included. In addition to the need to track key ecosystem services (see above, to which could be added more overtly social aspects such as cultural and recreational services), perhaps the most important social addition would be:

-  **The rights of indigenous and forest-dependent communities** (GBF²⁰) – whose traditional lands should be mapped, and an indicator added to Art. 5.3 or Art. 8 on % managed by them or with Free Prior and Informed Consent.

2. Effective timescales & spatial resolution

No delaying of important indicators through the “stepwise approach”

Whilst there is logic in enabling stepwise implementation on topics requiring further methodological work (Art. 8 & Annex III), crucial indicators are included in Annex III that should not be delayed.

-  **Indicators should be moved to Art. 5** – urgent ones for which Member States should already have collected information or are required to[^], or for which remote sensing can provide the data*: **Threatened species**[^] (GBF) (to Art. 5.3), **Location of forest habitats outside Natura 2000 sites**[^] (to Art. 5.3), **Forest naturalness classes**[^] (EUDR) (to Art.5.3), **Forest disturbances caused by factors other than fires*** (to Art. 5.2).
-  **A clear and prompt timescale** should be added for the collection of data on the remaining Art. 8 indicators (e.g. within 1 year of regulation coming into force).

Data trends need to be available

-  **Availability of time-series data needs clarifying:** as it is not currently clear the Data Sharing Framework (Art. 7) will retain past data to enable analysis of trends.

¹⁸ Harvesting approaches vary from: large clear-cuts to small coupes for felling of small groups (these being the focus of this suggested indicator); to selective cutting of individual trees (not the focus of this suggested indicator).

¹⁹ RED Art. 19.6(a) & Art. 19.6(b)

²⁰ GBF Target 22 is *Ensure participation in decision-making and access to justice and information related to biodiversity for all*, with sub-indicators including *Land tenure in the traditional territories of indigenous peoples and local communities by sex and type of tenure; Proportion of population who believe decision-making is inclusive and responsive, by sex, age, disability and population group; Trends in land-use change and land tenure in the traditional territories of indigenous peoples and local communities*^{R43}. In addition to the EU's indigenous people^{R44}, attention should also be given to traditional forest-dependent communities^{R45}. The exact formulation of the indicator should be in consultation with indigenous and forest-dependent communities.

Spatial resolution should be as high as possible

✚ **All possible data should be organised within the GIS system.** It is not totally clear what is meant by Art. 4, with regards the remit of the GIS, and **this should be clarified**. We assume that Art. 4.3(b), on identifying “forest units on the basis of a combination of data referred to in Art. 5.2 and Art. 8.1”, means that all possible data will be geographically located within the GIS. This is the intrinsic value of GIS, which, if not utilised, would be a great missed opportunity. Without this, if data were only presented as national statistics, we would be unable to track and anticipate which geographic areas, types of forests and management practices, are being most affected by pressures such as wind, fire, drought, disease, invasive species and illegal logging. Geographic presentation of data is essential for transparency and building trust²¹. “Forest units” and presentation of data need not relate to specific properties, and any genuine data concerns can be addressed²². **Furthermore, the GIS should also pick up the indicators in Art. 5.3 - this needs adding to Art. 4.3(b)**, which currently only refers to indicators in Arts.5.2 & 8.1).

✚ **Art. 4’s GIS “level of accuracy” should be as high-resolution as possible, determined per indicator.** For most if not all indicators, a resolution of 1:100,000 (1cm = 1km) will not be sufficiently granular, and would result in lumping together forest types, silvicultural approaches, and all the data therein. The resolution of each indicator (i.e. the extent of their aggregation) should be determined separately – for instance, *Tree cover disturbances* can, through remote sensing, track loss of individual trees, whereas deadwood stats are usually given per Ha and will depend on ground survey protocols. Whilst the highest level of resolution is preferable, determining the resolution per indicator could ensure the masking of individual monitoring locations, private properties, defence concerns, as needed, whilst retaining the most useful scale of resolution possible.

3. Long Term Plans

Long Term Plans (LTPs) should be produced by all Member States

Both the monitoring framework and long-term planning aspects of the FML are of great importance: the information in the forest monitoring framework should inform Member State decision-making, enable tracking of progress on EU policies, and give the public improved transparency on the aims and performance of our forests²³.

LTPs can only be of *benefit* to Member States and the EU. They represent an holistic approach that can support Member States in optimising the ecosystem services derived from forests and minimising trade-offs between potentially competing objectives. LTPs are needed to ensure forest planning extends beyond short-term political horizons and addresses the long-term interests of Member States and the EU, creating resilient and multifunctional forests.

The proposal’s approach to LTPs is flexible - it is for Member States to determine the level of detail and resources to invest. Highly forested countries will likely gain most by investing more, and therefore choose to produce more developed LTPs than countries, like Malta, with little forest - but all MSs stand to benefit from taking, and transparently communicating, a long-term planning approach to forest ecosystems (which are important, or potentially so, across all of Europe).

LTPs help deliver other EU legislative requirements

The LTPs should not be seen as a financial burden on MSs as they can help to optimise the financial benefits flowing from forests (from wood provision to carbon drawdown to nature tourism to the health benefits of air purification and forest recreation), and to minimise costs (such as damage from wind, forest fire, disease, etc).

LTPs will synergise efficiently (by providing forest-related aspects) with other requirements such as: the NRL’s *National Restoration Plans*²⁴; LULUCF’s *Compliance Reports*²⁵; and the Climate Governance Regulation’s 10-

²¹ “Greater trust in forest data from different stakeholders” was identified as a key need of stakeholders during the Commission’s public consultation on the Forest Monitoring Law^{R46}.

²² The Impact Assessment outlines options for privacy, if required^{R46}

²³ consistent with Aarhus Convention^{R47} and EU Dir 2003/4/EC^{R48} on public access and environmental information.

²⁴ See Arts. 11 & 12 of NRL

²⁵ LULUCF (Art. 14) requires Compliance Reports to explain synergies between the land-use sector and efforts on climate mitigation and adaptation, and biodiversity, including regarding the goals of the Biodiversity Strategy and 8th Environmental Action Programme

year *National Energy and Climate Plans* and 30-year *Long Term Strategies*, which will generally require forest planning with regards adaptation and potentially also bioenergy²⁶

Furthermore, the LTPs are an important opportunity to support the efficacy of the EU's *Wildfire Prevention Action Plan*^{R20}. This would be strengthened by adding further indicators to the fire section: Annex I's fire indicators are useful (relating to fire occurrence, extent, severity, and physical aspects of the risk of fire), but they do not address the causes of fire, essential aspects of fire ecology, 'nor the controlled use fire to reduce fuel loads. Therefore, essential indicators to add, of importance to the production of LTPs, are:

- ⊕ **Cause of fires**²⁷; the natural **Fire return intervals** of forests²⁸; the **Species that require fire**²⁹; the **Forests vulnerable to fire** (which need more protection); and the usage of **Prescribed burning** in fire management. *These should be added mainly to Art. 5.2 and Art. 5.3*, though there could be potential for EC-facilitated analysis also (e.g. by EEA/JRC).
- ⊕ **Annex IV needs to cross-reference Annex III indicators**. It may simply be a typing oversight, but Annex IV - on information to consider during preparation of LTPs - cross-refers to Annex I and II indicators only. However, information in Annex III will also be relevant (e.g. *Forest disturbances caused by factors other than fires* (Annex III(a)), or predictions for changes in *Location of forest habitats outside Natura 2000 sites* (Annex III(e)), or *Threatened species* (Annex III(i)).

CONCLUSION

The EU's forests are crucial, particularly in the context of the climate and biodiversity crises currently faced. The FML is an opportunity to ensure we have a sound view of environmental, economic and social aspects of the forests on which we depend. The FML proposal is an important step towards safeguarding the future of Europe: WWF strongly urges its further strengthening during the co-decision process and its subsequent adoption by the European Parliament and the EU Member States.

²⁶ Art. 19 & Annex VIII^{R49}, which cross-refer to Long Term Strategy commitments under the Paris Agreement^{R50}

²⁷ About 96% of forest fires in the EU are caused by human activities (from accidents to arson) – a metric society can aim to drastically reduce, and it is also necessary to track ignitions from natural causes (e.g. lightning) as climate change occurs. *Cause of fires* is already data that approx. 23 EU countries report to the JRC's European Forest Fires Information System (EFFIS)^{R51}.

²⁸ Forest ecosystems vary widely in the extent to which fire occurrence is a natural phenomenon. Fire becomes problematic ecologically when it occurs more often, or more severely, than natural fire frequencies/intensities. Some forests need protecting from fire, other forests are better served by maintaining natural fire regimes (or mimicking them with prescribed burning) – which can help reduce risk of the catastrophic fires that may occur after build-up of flammable materials beyond natural intervals.

²⁹ In fire-adapted forests (e.g. Mediterranean and Boreal), species composition may be strongly influenced by the natural fire regime and in such cases over-suppression of fire may even lead to species becoming threatened^{R52,53}.

KEY TO ACRONYMS

AI	Artificial intelligence
Art.	Article
BD	Birds Directive
HD	Habitats Directive
EC	European Commission
GIS	Geographic Information System
GBF	United Nations Kunming-Montreal Biodiversity Framework
HD	Habitats Directive
FML	Forest Monitoring Law (proposed)
MS / MSs	Member State/s
NEC	National Emissions Reduction Commitments Directive
NRL	Nature Restoration Law (proposed)
SML	Soil Monitoring Law (proposed)
8th EAP	8th Environmental Action Programme

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N.B. In the text, references are differentiated from footnotes through the addition of ^R before the citation.

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