



Old Growth/Primary Forest and related terms

A practical definition structure to support sustainable protection

**Update 05/06/2020 V6
20/07/2020 V7
21/07/2020 V8
07/09/2020 V10**

Old growth/primary forest – a practical definition structure to support sustainable protection

Context

The 2030 EU Biodiversity Strategy stipulates strict protection of all old growth/primary forest within the EU.

Implementation of this protection should also be promoted actively for non EU countries which contain some of the largest, most pristine and biodiverse forests in Europe.

Achieving the right definitions is of course critical to successful protection and restoration. We are happy to contribute to this, drawing on recommendations from our network and liaison with forestry and other interests.

Wild Europe's engagement

Since 2014 Wild Europe has focused on promoting protection of old growth/primary forest, collating inputs from a range of organisations. In 2016 the European Commission (DG Environment) encouraged our plans on this, linking us to the EU Committee of the Regions in Brussels for a conference, which we organised in 2017¹.

Recommendations from this conference were incorporated into a Protection Strategy² that includes definition, mapping, monitoring (a LEAF network and Early Warning System)³, ecosystem services and compensation mechanisms. Over 500,000 EUR was raised for projects to initiate implementation.

A second Wild Europe conference in Bratislava in 2019⁴, presided over

¹ <https://www.wildeurope.org/old-growth-forest-protection-strategy-old-growth-forest-protection-conference/>

² <https://www.wildeurope.org/wp-content/uploads/2019/10/old-growth-forest-protection-strategy-outline.pdf>

³ <https://www.wildeurope.org/leaf-initiative-to-support-2030-biostrategy-forest-protection-target/#more-2768>

⁴ <https://www.wildeurope.org/a-landmark-for-conservation/#more-2107>

by President Caputova of Slovakia, assessed progress and produced further recommendations which will be published shortly.

Targets for old growth/primary forest

It is estimated that old growth/primary forest currently covers around 4% of total forested area in Europe outside Russia. In order to provide sustainable protection and effective ecological function a further 11-12% immediately adjacent is likely to need strict protection, with restoration to consolidate fragmented areas and provide adequate connectivity. This equates to a total of c 15% of existing forest.

On a European scale this represents a small proportion of forest cover, and plans for adequately protecting it in the EU represent no threat to the timber industry.

Indeed they offer significant opportunity for local communities and landholders to benefit from the ecosystem services it can provide in the form of compensation payments, together with income from carbon storage & sequestration, flood mitigation, water table stabilization, nature tourism and other elements in the Payment for Ecosystem Services (PES) agenda.

Designation of strictly protected areas needs to be linked to adequate provision of such compensation and PES related income.

On the remaining 85% of forest area not covered by strict protection, or protection within a multi-use context, conservation friendly practices should be adopted within an overall regime of timber extraction including closed canopy forestry where feasible.

It should be understood by all parties that there is overwhelming public demand for this strict protection of Europe's most precious natural forest asset, addressing climate change and species decline, through whatever means are necessary including legal. The value of a healthy forestry sector is rightly well recognized, and locally important, but overall it represents 1% of EU Gross Domestic Product (GDP)⁵ and, as argued above, protection itself can bring economic benefits.

⁵ European Parliament Factsheet 02/2020 <https://www.europarl.europa.eu/factsheets/en/sheet/105/the-european-union-and-forests>

Principles for definition of old growth/primary

These should involve the following elements:

- Not overly 'purist' or narrow in stipulating lack of human impact as a criterion for designation where other appropriate characteristics defining old growth/primary status are present, otherwise there will be inadequate protective coverage of remaining areas
- Avoidance of unintended consequences – eg removal of trees by landholders in an attempt to avoid designation of protected status; this is more likely to be attempted with overly strict definition
- Seek consensus on definition between conservation and forestry interests in particular so far as possible. Hence the need for strong compensation mechanisms and PES arrangements
- Resolution of misunderstanding, or overlap, eg between end-of-cycle commercial crop in managed forests and old growth forest in conservationist terms – agreeing differentiation or incorporation of the former into the latter
- Support with scientific evidence – eg on the high carbon storage content and ongoing high levels of sequestration from old growth/primary forest
- Aiming to influence rather than replace national definitions in the first instance at least, except where these could result in degradation or destruction of old growth/primary forest

The definition structure

There is no single phrase or definition that could embrace the diversity of primary/old growth forest in Europe.

Instead it is recommended that a definition structure is adopted, incorporating key elements from the different approaches below, based on sets of identifiable criteria. This should be underpinned by a gradient of naturalness.

Primary Forest

Primary forest is generally regarded as the overall category of forests, with high conservation value. It is described as primeval, virgin, near virgin, ancient, old growth, intact, undisturbed, long untouched, climax, even over-mature or senescent (the latter two being a viewpoint for many in the timber sector).

This equates to the classification framework proposed by Buchwald (2005)⁶ incorporating classes N7 – N5, which has been adopted by Francesco Sabatini et al, in their initial mapping exercise of 1.4 million published in May 2018⁷. This was expanded by a further 700,000 ha in 2018 with funding from the Brussels conference, results to be published shortly.

It is recommended that the Sabatini mapping initiative be adopted by the 2030 Biodiversity Strategy for undertaking the remainder of the mapping exercise, attaching an interactive platform for further updates.

Here, primary forests are defined as:

“Relatively intact forest areas that have always or at least for the past sixty to eighty years been essentially unmodified by human activity. Human impacts in such forest areas have normally been limited to low levels of hunting, fishing and harvesting of forest products, and, in some cases, to historical or pre-historical low intensity agriculture.”

The classification framework used from Buchwald includes the following classes⁸:

N7 Very high degree of naturalness – Near-virgin forest – “Forest ecosystems (forest scale) untouched long enough to have attained structures, dynamics and species composition similar to virgin forest, even though they may have been significantly modified, e.g. by clearcutting or agriculture at some time in the past. They are distinguished by a mixture in time and space between different seral stages, e.g. between old-growth stages and younger stages. Human impact on the forest structures is not obvious to see. The time necessary in untouched development before this level can be reached depends on how modified the situation was at the start. It is at least several hundred years if the starting point is a plantation-like forest [ie much less if the starting point was near natural].”

N6 High degree of naturalness – Old-growth forest – “Ecosystems (stand scale) distinguished by old trees and related structural attributes. Old-growth encompasses the later stages of stand development that

⁶https://forestsandco.files.wordpress.com/2015/11/buchwald_2002_definitions.pdfhttps://www.researchgate.net/publication/309428667_A_hierarchical_terminology_for_more_or_less_natural_forests_in_relation_to_sustainable_management_and_biodiversity_conservation

⁷ <https://onlinelibrary.wiley.com/doi/full/10.1111/ddi.12778>

⁸ In the classification framework developed by Buchwald, the concept of primary forests includes all forests having a high naturalness levels N5-N10. We are here only reporting the definitions of those naturalness classes most likely to occur in the European landscapes, which are N5-N7. We cannot exclude, though, that forest tracts of higher naturalness (N8-N10) might exist in remote areas of eg Fennoscandia or European Russia. Such tracts would obviously also fall within the scopes of this document

typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species composition, and ecosystem function.” “The age at which old growth develops and the specific structural attributes that characterise old-growth will vary widely according to forest type, climate, site conditions, and disturbance regime. However, old growth is typically distinguished from younger growth by several of the following attributes: 1) large trees for species and site; 2) wide variation in tree sizes and spacing; 3) accumulations of large-size dead standing and fallen trees that are high relative to earlier stages; 4) decadence in the form of broken or deformed tops or bole and root decay; 5) multiple canopy layers, and 6) canopy gaps and understory patchiness. Old-growth is not necessarily “virgin” or “primeval.” Old-growth can develop following human disturbance.”

N5 Quite high degree of naturalness – Long untouched forest “Relatively intact forest (stand level) that has been essentially unmodified by human activity for the past sixty to eighty years or for an unknown, but relatively long time. Signs of former human impacts may still be visible, but strongly blurred due to the decades without forestry operations. The time limit depends on how modified the forest was at the starting point.”

A corresponding definition for primary forest equates to that outlined by FAO (FRA 2015 Forest Resources Assessment Working Paper 180⁹) and used in the Natura 2000 network.

This definition is close to Buchwald’s definition of primary forest, but includes the issue of size – relating to the significant restoration required around remaining fragments of primary/old growth forest to secure their long-term function and sustainability on a landscape scale. It has the following key characteristics:

- naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed
- natural forest dynamics, such as natural tree species composition, occurrence of dead wood, natural age structure and natural regeneration processes
- the area is large enough to maintain its natural characteristics
- there is no known significant human intervention or the last significant human intervention was long enough ago to have

⁹ <http://www.fao.org/3/ap862e/ap862e00.pdf>

allowed the natural species composition and processes to have become re-established

Virgin Forest, supplementary notes

Virgin forest is defined by the Carpathian Convention (Article 7)¹⁰ as natural forests which have not been influenced directly by human activities in their development. In effect it approximates to the most natural examples of class N7 on the Buchwald scale.

It is only found in a few locations: large areas in the boreal region (Lapland, North Sweden, North Norway), in the Carpathians of Central Europe - including for example Romania and Bulgaria - and small pockets in the Alps.

For obvious reasons it is most often located in inaccessible areas with poor soil and aspect where the forest may not typify 'normal' characterization, eg with small trees often of considerable age.

Virgin forest is defined by the following characteristics:

- composed of tree species indigenous to the area
- having ecosystem cycles with complex structures, and with age structure proven by biometric characteristics
- occurrence of individual trees with exceptional dimensions according to site and species, and signs of physiological decline
- presence of deadwood, vertical and lying, at all stages of degradation and all over the forest surface [NB in practice this also dependent on species and biogeographic location which impacts on rate of decay, as well as disturbance, eg by fire, that may remove deadwood]
- no documented evidence or visible traces of forest exploitation infrastructure (eg absence of remnants of water transport or regulation activities, roads, trails, dams, cable systems); any footpaths are no wider than 1m
- no documentary evidence or visible traces of felling in the past
- no visible traces of gathering of forest litter or non wood forest products (mushrooms, fruits, herbs), though previous light extraction is allowable in the definition
- no grazing/erosion other than by passing livestock with no impact

¹⁰http://www.carpathianconvention.org/tl_files/carpathiancon/Downloads/03%20Meetings%20and%20Events/COP/2014_COP4_Mikulov/Follow%20Up/DOC13_Criteria_Indicators_virginforests_FINAL_26SEP.pdf

- size of qualifying area not less than 20 ha, with distance between boundaries no less than 200m except for rare ecosystems of relic stands

There are concerns that this definition is overly focused on presence of large trees, makes insufficient allowance for anthropogenic impact - which is regarded as unrealistic - and imposes a minimum limit to size of area which restricts potential to protect and consolidate smaller fragments of natural forest.

Furthermore in practice whilst “The majority of virgin forest is old growth virgin forest is not limited only to the climax stage, often because of disturbance: fire, wind-throw, disease or other factor. The majority of virgin forest is however old growth.” [Parviainen COST action. E4, ‘Forest Research Network’, 1995-1999]¹¹.

These factors need to be taken into account when developing registers of virgin forest for their protection.

Old growth forest identification: supplementary notes

As outlined above, old growth forest is a key element of primary forest, equating to Buchwald class N6. It generally represents a late successional stage.

The following further characteristics are worth noting:

- It often occurs in relatively small and fragmented patches, although individual areas can be large. Generally a late successional stage, it is often located in isolated and less accessible areas which has deterred logging.
- Tree size and forest age do not necessarily correlate: location factors (altitude, climate, soils, aspect) may result in small trees of substantial age; and disturbance eg by wind, fire, beetle may create significant patches of young trees.
- As with virgin forests, the amount of deadwood can vary according to biogeographic circumstance, species involved and localized human impact

¹¹ <https://www.yumpu.com/en/document/view/17084750/cost-action-e4-forest-reserves-research-bfw>

- There can be a high number of late successional and shade tolerant species, with epiphytes, substantial ground cover vegetation and forest floor litter – and of course high carbon storage and moisture retention capacity.
- Pit and mound surface relief is often in evidence, as a result of windthrow of large trees that subsequently disintegrate over multiple generations.

Key considerations for identification and management of old growth/primary forest

These considerations are all important considerations in design of protection and restoration plans within the Biodiversity Strategy for 2030 and the UN Decade for Restoration.

- 1) Definition of ‘strict protection’. A critical element for future management of natural forest areas is that there should be a current or intended regime of complete non-extraction and non-intervention. No logging, salvage logging, livestock grazing or other impact activities likely to disturb what is generally a fragile and highly complex ecosystem.
- 2) Near natural - the practicalities of definition. In some areas there has been a reluctance by conservation authorities to register old growth forest where a few key trees have been felled. However the overall impact from previous long-term lack of disturbance may well have left the forest ecosystem and its processes relatively intact despite the felling – in which case the area should qualify. Applying this realistic but more flexible approach will discourage the perverse impact of logging to avoid designation.
- 3) Exact identification is not necessary, indeed inappropriate. Old growth/primary forest by definition needs to be protected - and restored - on a very long-term timescale. Any relatively minor and/or long past human impacts are likely to effaced.
- 4) Hence the need for emphasis on appropriate provision of long-term legal protection structure¹² and compensation for the private sector.

¹² <https://www.wildeurope.org/new-legal-structure-for-long-term-protection/#more-2640>

- 5) While this document focuses on conservation related issues, the context needs to be recognized and addressed of how old growth/primary forest together with other habitats fits into a wider land-use pattern – adjacent to low impact and fully productive areas of forestry and other commercial uses. Zonation is needed for practical management.

A spatial context – size and linkage matter

A significant area around old growth/primary forests, particularly where remnants are relatively small and fragmented, should wherever feasible also be strictly protected to ensure maximum feasible ecological function and long-term sustainability:

- 1) to provide adequate buffering from external impacts, such as ‘edge effect’ of temperature, humidity, general disturbance, conferred by having significant adjacent areas of non-extraction and non-intervention
- 2) to allow space for all stages in the natural cycles appropriate to the tree species and location, including the impact of natural disturbances
- 3) to facilitate sustainable recovery for a wide range of dependent species (eg capercaillie as one indicator species), with scale being adequate for gene pool and territorial requirements
- 4) resilience and adaptation to climate change, for forests and dependent fauna & flora
- 5) to cover a range of forest types and biogeographic locations, from high altitude slow growth upland and montane to rich alluvial lowland
- 6) to ensure full benefit from the ecosystem characteristics of these forests; this should include “overspill effect” of species, economies of scale in the PES agenda for carbon sequestration and storage, river basin scale planning for effective flood mitigation, water-table stabilization, water and air purification
- 7) with the above in mind, appropriate consolidation of smaller fragments also be secured wherever possible
- 8) this linkage should extend to connectivity in general – both between patches of old growth/primary forest and to ensure full interaction with other habitats: wetland, heathland, natural grassland etc. The ecological benefits of ecotones, which often host very high biodiversity, should be fully enabled.

The above requirements should be taken full account of in restoration as well as protection plans, and reflected in mapping exercises.

Application to non EU countries in Europe

As indicated at the start, it is important that strict protection for old growth/primary forest be implemented as strongly as possible outside in non EU countries.

Processes facilitating this include: Neighbourhood Agreements, Accession Treaties, trade and aid policies, exchange of best practice and other mechanisms. Non EU bodies need to be engaged including UNESCO with its World Heritage and Biosphere sites particularly outside the EU. And the Council of Europe/Bern Convention with its Emerald Network - with special attention to ongoing support for the latter.

Funding for non-EU states needs to be identified and secured from the start of the Biodiversity Strategy implementation planning process for parallel projects involving identification, mapping, monitoring, galvanising the PES agenda and other aspects. Aside from the mechanisms listed above, sources could also include the 45% Europe component of the new Neighbourhood, Development, International Cooperation Instrument (NDICI) to address climate change, as well as PES related funding mechanisms.

Implications for Mapping

It is hoped that the above definition structure can provide practical support for the mapping exercise being promoted through the new EU Biodiversity Strategy.

This exercise needs to take account of the natural forest area (11% of total forest cover) that should be restored and strictly protected adjacent to the 4% of old growth/primary known to exist.

The mapping should focus on a MAES basis (Mapping & Assessment of Ecosystem Services), so that the ecosystem benefits of old growth/primary forests can be fully realized in calculation of their value, and converted – wherever possible – into income to incentivise local landowners and users for its protection, additional to provision of conservation grants.