Striving at a low carbon and biobased economy

Does forest certification help?

Certification under the magnifying glass

Certification of responsible forest management, originally sustainable forest management, has been around for more than 25 years now. The original motivation behind the development of certification systems was the concern about the negative effects of timber harvesting, especially in tropical forests. The loss of biodiversity , degradation of forests with high conservation value (HCV), and the threat to the habitat of indigenous peoples had to be countered . The concern about climate change was added later. The recent Greenpeace report, " Destruction certified " shows that even now the focus still lies mainly on biodiversity and rights of indigenous peoples.

Tropical forests are very different in all respects from temperate and boreal forests. These should therefore not be lumped together. The contribution of tropical forests to biodiversity and climate cycles is enormous. The habitat function is also of greater relative importance. Tree species variety is a multiple of those in the temperate and boreal regions and is part of complex ecosystems. As a result of all this, the management's ability to influence the wood increment and thus the CO2 absorption capacity in natural tropical forests is very limited.

In the following analysis, we try to provide clarity as to whether, and if so to what extent , forest certification promotes the absorption of CO2 and the production of wood in the **temperate and boreal forests.** To that end we start with a brief discussion of the importance of forests to capture CO2 and the importance of wood for the realization of a biobased economy .

Societal and forestry context

Transition to biobased economy

Society is increasingly aware of the need to transfer to a sustainable circular economy, a bio- based economy . Resource-depleting products and energy-consuming production processes must make way for renewable raw materials and low- energy production methods. In addition, further global warming must be prevented by reducing greenhouse gases, especially CO2, in the atmosphere.

Forests and wood play a unique positive role in this. Forests are the producers of wood. This is a production process in which net CO2 is being absorbed. The more CO2 the forests capture the more effective they contribute to the reduction of global warming. Wood is a renewable raw material that use no energy in its production phase and requires only a small amount of energy in many of its applications. Replacing aluminium, steel and concrete with wood provides enormous environmental benefits.

The conclusion is therefore that the world benefits from an increase in the production and use of wood. The latter requires a steady increase in harvesting. This increase can be achieved, in addition to expanding the forest area, by making better use of the production capacity of the existing forest and, where possible, also increasing it.

Forest as a CO2 sink and wood producer

The extent to which CO2 is absorbed , the amount of wood that can be permanently harvested annually , and the quality of the wood depend on the type of forest. Forest site conditions such as latitude, climate , soil and forest characteristics such as tree species composition , genetic

origin, age and stem density are decisive . The optimal stem density, number of trees per ha, is depending on the dimension of the trees.

The development of CO2 sequestration and the development of the wood production in a forest run grosso modo parallel. In both cases, we have to distinguish between absorption/growth and storage. We must realize that only during a limited period in the life of a tree, both the CO2 absorption capacity and the stored CO2 stock increase. The same applies to the mean annual wood increment and the standing wood stock. Increment/CO2 absorption and stock increase both until the moment (age) when the mean annual increment has reached its maximum. After that, the stock increases further, but the CO2 absorption capacity and the annual increment decrease. This law applies to one tree, as well as to a group of trees and a forest.

Trade off with other features

Purely with a view to the highest possible net CO2 sequestration and the largest possible amount of m3 of wood, forest management should focus on a harvesting age at which the average CO2 absorption capacity and the mean annual wood increment culminate. Harvesting at that culmination point is without doubt the most favourable for the absorption of CO2. A caveat should be made regarding the amount of wood. The dimension of the wood determines, after all, the suitability for various applications and the price of the wood. Therefore, with a view to the timber market and for financial reasons, the average harvesting age may be higher than at which the mean annual increment is at its maximum. However, this also means that the average annual CO2 absorption is lower than at its culmination point.

Aiming at maximum sequestration would also jeopardize other valuable functions of the forests. The goal must be to achieve an optimum level of CO2 sequestration and wood supply. In practice, other important functions of the forest, such as preserving biodiversity, habitat of indigenous peoples, regulatory functions , aesthetic aspects and recreation, will be reasons to cut a tree or stand at a later age, or even allow it to grow until natural death occurs. These functions may also impose different requirements on species composition and tree densities.

It is important to keep a close eye on the trade off. The management plan must be clear on the considerations which have led to a particular felling and regeneration methods . From a climate perspective, a choice for a felling age which higher is than the age when the average increment culminates should be well justified. The amount of CO2 not absorbed is then the price that is paid for the realization of other goals. On the other hand, when choosing a particular felling regime with a view on achieving the highest possible increment, it is necessary to show the possible consequences for the fulfilment of other functions of the forest. This is particularly true for biodiversity, as conservation and where possible restoration of great significance is for the realization of a sustainable society.

A closer look at forest management

What are the buttons that the forest manager can turn? A forest manager cannot influence the latitude, the climate and, in a general sense, the soil. He has the following attributes available to direct the management of the forest: the cutting age in coherence with the method of regeneration, species composition, genetic origin, stem density and thinning of clusters and stands of trees of more or less the same age. Successive thinnings should not, however, be carried out to such an extent that this leads to a relative low stem density . Moreover trees which are left after successive thinnings may be less suitable for higher grade applications and which therefore are less suitable as a source for natural regeneration.

Analysis of the effectiveness of certification

The importance that governments and developers or certification systems attach to CO2 sequestration and production of wood should be reflected in the principles and criteria of relevant regulations and certification systems for responsible forest management .

Standards of the following regulations are included in the analysis: the " Renewable Energy Directive II" (RED II), the new Dutch biomass standard (which is in the approval phase) , the current Sustainable Energy Subsidy (SDE+) and the Dutch Timber Procurement Assessment System (TPAS) . The NL biomass standard is largely based on the articles of RED II. There is therefore a great similarity between the text of the relevant criteria.

The for forest management most relevant certificationsystems have been studied.
Forest Stewardship Council (FSC), Program for the Endorsement of Forest Certification Systems (PEFC) and a major player in Certifying sustainably generated woody biomass Sustainable Biomass Partnership (SBP).

Regulations contain requirements, whether or not linked to subsidies, that countries and/or companies must comply with. Certification systems for sustainable forest management and sustainably produced woody biomass often include these requirements in their standards in one form or another. In this way, the certificate offers a guarantee that the requirements set by the regulator, both nationally and internationally, are being met.

Unfortunately, some of the regulatory requirements that are relevant to forests seem more the product of political wishful thinking than of professional knowledge based on a scientific basis. As a result, those requirements may fall short in achieving the intended goal, as will become apparent from the analysis below.

The tables below summarize the criteria that appear in one or more of the examined regulations and certification systems. It is also indicated in which regulations and certification system the criterion occurs.

<u>Wood production and Wood supply</u>

Overview table I Wood

Wood production and wood supply							
subject	Wood production capacity		Wood supply	Soil quality		Reforestation /regeneration	Tree species
criterium	Maintain	**or** Increase	Long-term continuity	Maintain	**or** Improve	Obligatory	Native preferred
EU RED II	v	v	--	v	--	v	--
NL biomass	v	v	--	v	--	v	--
NL SDE +	v	--	--	v	v	--	--
NL TPAS	v	--	--	v	v	--	--
int. FSC	v	--	--	?	?	v	v
int. PEFC	v	--	--	v	--	v	v

int. SBP	v	--	--	v	v	--	--

Wood production capacity
In the standards of all the investigated regulations and certification systems is *maintaining the timber production capacity* required. RED II and NL biomass require maintaining **or** increasing the wood production capacity. The three certification systems state as a condition of maintaining production capacity that the current harvest must not exceed the harvest level that can be sustained over the long term . It is also stated that *the harvest should not exceed the growth*. Harvest levels must be substantiated by inventory and growth data. Besides, the standards do not set any requirements for the actual marketing of wood. Supplying wood is not an obligation.

Maintenance of soil quality and the requirement for reforestation are both conditions for maintaining the production capacity.

Consideration
In order to assess the effect of these requirements, we compare the aforementioned **attributes available to the forest manager to influence growth and harvest volumes with the criteria in the standards.**

Harvesting age in coherence with methods of regeneration.
None of the standards and of the regulators and certification systems explicitly stipulates requirements for the harvesting age and/or method of regeneration.

Reforestation, regeneration.
RED II and the new NL biomass standard make regeneration mandatory, as do FSC and PEFC**.** In the standards are no time limits included within which the regeneration should be carried out.

Tree species composition and genetic origin.
Regulators do not rule on tree species composition. Both FSC and PEFC state that preference should be given to native species. FSC also expresses a preference for " local genotypes ". The FSC and PEFC standards allow the use of exotic species to the extent that knowledge and experience have shown that no uncontrollable invasion occurs. The standards of both the regulators and the certification systems do not impose any requirements on tree species regarding growth rate and suitability of the timber to be produced for the market.

Stem density.
None of the standards of the regulators and certification systems makes explicit demands on stem density.

Thinning.
None of the standards of the regulators and certification systems imposes requirements on the method and timing of thinning.

Conclusion
No specific objectives regarding growth, felling volumes and wood quality are supporting the requirement to maintain the production capacity. Standards suffice with the requirement that over the longer term, *the current felling may not exceed the mean annual increment*. Also, no specific measures are required other than giving preference to the use of native tree species.

This means that the present condition of the forest the reference is for the production level that should be maintained and for the quality of the timber that will be brought to the market. In forests with predominantly relative low stem density or with a predominance slow-growing tree species or with arrears in thinning , the production capacity (increment) lower is, in some cases much lower, than the optimum production capacity. Meeting the production criteria of the standards does not change that. In fact, if the annual cut stays behind the annual increment for a long period, the mean annual increment will decline. As the basic requirement is that *current fellings should not exceed the annual increment c*ertification does not even guarantee maintenance, let alone increase, of the mean annual increment. For an effective contribution to a circular bio-based economy, **certification should focus on achieving the optimal mean annual increment and the optimal annual wood supply**.

CO2 stock and capture

Overview table II CO2

subject	Carbon stocks (storage)		Carbon absorption capacity (sink)	
criterium	Maintain	**and/or** Increase	Maintain	**and/ or** Strengthen
EU RED II	v	v	v	v
NL biomass	v	v	v	v
NL SDE +	v	v	--	--
NL TPAS	v	--	v	--
int. FSC	v	--	v	--
int. PEFC	v	--	v	--
int. SBP	v	--	v	--

Maintaining and/or enhancing carbon stocks and absorption

Standards of RED II and NL Biomass as well as those of the three certification systems require at the same time the maintenance of the carbon stocks in the forest as the maintenance of the CO2 absorption capacity. The absorption capacity is the amount of CO2 that is absorbed from the air every year. RED II and NL biomass talk about maintaining **and** enlarging both the CO2 stocks and the absorption capacity. However RED II also talks about ***or enlarging***. So that is ambivalent. SDE+ requires maintaining **or** strengthening the carbon stock . The FSC standard demands the preservation of " environmental values " including CO2 stocks and CO2 absorption capacity. PEFC requires that the capacity for storage and absorption are guaranteed.

Consideration
Present management units can meet the requirement of (at least) maintain both the CO2 stock and the absorption capacity if the younger trees and stands of the dominant tree species compensate sufficiently for the decline of the absorption capacity of the older trees and stands. In forests where the trees and stands are mainly older than the age at which the absorption capacity culminates, regeneration must be carried out. Cutting trees is necessary for this. The standing CO2 stock will then be (temporarily) reduced. This means that the criterion of maintaining the CO2 stock is not met. On the other hand, when no intervention takes place, the absorption capacity will continuously decline, which also does not comply with the criterion. Only young trees and forests under the age of the maximum average CO2 absorption capacity and average annual increment meet the criterion.

It is a mystery why maintaining the CO2 stock in the forests has been included as a criterion for net CO2 emissions. It seems that lobbyists have taken advantage of the lack of expertise and the hectic pace of the political decision-making arena. But focus on maintenance of the CO2 stock ignores the essence of forests in the CO2 issue, i.e. the ability to absorb CO2. In connection with this, the criterion should be 'the highest possible annual CO2 absorption in the forest and the largest possible CO2 stockpiling in or outside the forest'. It is correct that as much CO2 stored in solid biomass as possible should be retained. But that doesn't necessarily have to be in the forests. This is also possible through long-term retention of wood in construction, furniture and other long-term applications. When the wood eventually ends up on the scrap heap, it can be burned to generate energy to replace fossil fuels.

Conclusion
Forest management units will typically not be able to meet the requirement to simultaneously increase the carbon stock as well as the CO2 absorption. Maintaining the carbon stock is the primary focus of regulators and certification systems. This is understandable in the case of imminent conversion, but not for permanent forest. Maintaining carbon stocks in the forest itself contributes little to none to the necessary reduction of net CO2 emissions .
Aangezien niet de voorraad in het bos maar de CO2 opnamecapaciteit van het bos van belang is voor het verlagen van de netto CO2 uitstoot is het **wenselijk dat beleid en certificering zich uitsluitend richten op het bereiken van de optimale CO2 opnamecapaciteit**, op zijn minst instandhouding van de opname capaciteit en niet tegelijkertijd ook op instandhouding van de voorraad. Daarmee gaat ook een stimulans uit op verhoging van de bijgroei van hout.

Since it is not the stock in the forest but the CO2 absorption capacity of the forest that is important for reducing net CO2 emission it is **desirable that policy and certification focus exclusively on achieving the optimal CO2 absorption capacity**, or at least maintaining that capacity, and not also simultaneously focus on maintaining the stock. This approach would also encourage an increase in the growth of wood.

Conversion of forests

Summary table III Conversion of Forests

subject	Conversion of natural forest		
criterium	Reference date	Allowed on small areas	Conditionally
EU RED II	2008	--	--
NL biomass	2008	--	--
NL SDE +	1997	--	v
NL TPAS	1997	v	v
int. FSC	1994	v	v
int. PEFC	--	v	v
int. SBP	2008	--	--

Reference date
All standards studied, except the one of PEFC, refer to a reference date for conversion from (semi) natural forest to plantations or agricultural land. After the reference date, wood and biomass derived from agricultural crops and plantation of the converted forest is not accepted as responsible produced wood and biomass .

Requirements
TPAS and the two forest certification systems FSC and PEFC leave room for conversion on a small scale, under 'justified circumstances'. However, in such cases is compliance required with a set of circumstances and conditions, such as:

- the conversion amounts to a maximum of 5% of the forest area of the management unit;
- current management was not directly or indirectly responsible for the conversion;
- the conversion is based on undisputed government decisions , such as an approved land use plan;
- the conversion is beneficial for biodiversity and the economy over a long period of time;
- the conversion does not damage 'High Conservation Values '

Consideration
The standards contain criteria to prevent conversion of forest to other land use. Repercussions for conversion are twofold. In case of substantial conversion, the forest management unit loses the ' responsible forest management ' certificate, at least that should be the result.
Secondly, wood and biomass from converted forest land are not accepted as sustainably produced raw materials.
Conversion is allowed on a small scale provided certain conditions are met. If the government can be held responsible, the conversion is readily accepted. The requirement that the conversion has a favourable effect on biodiversity and the economy can hardly be met. Moreover, compliance with that requirement is particularly difficult to assess and demonstrate.

Conclusion
Conversion, both on a large scale and on a limited scale, occurs regularly in practice. The question whether the requirements of the certifiers affect the frequency and size of conversion cannot be answered in the scope of this analysis. A further and focused study is needed to provide such an answer.

Summary of conclusions and recommendations

The present condition of the forest is the reference for the production level that should be maintained and for the quality of the timber that will be brought to the market. As the basic requirement is that *current fellings should not exceed the annual increment c*ertification does not even guarantee maintenance, let alone increase, of the mean annual increment. For an effective contribution to a circular bio-based economy, **certification should focus on achieving the optimal mean annual increment and the optimal annual wood supply**.

Forest management units will generally not be able to meet the requirement to simultaneously increase the amount of captured CO2 and the CO2 absorption capacity. Maintaining the stock in the forest itself hardly makes any contribution to reducing net CO2 emissions
Maintaining carbon stocks in the forest itself does not contribute to the necessary reduction of net CO2 emissions . Since it is not the stock in the forest but the CO2 absorption capacity of the forest that is important for reducing net CO2 emission. **It is desirable that policy and certification focus exclusively on increasing the absorption capacity, or at least maintaining it**. This also encourages an increase in the growth of wood.

Conversion, both on a large scale and on a limited scale, occurs regularly in practice. The question whether the requirements of the certifiers affect the frequency and size of conversion cannot be answered here and now. A further and focused study is needed to provide such an answer.

Consulted sources

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T table Sustainability criteria adjustment (002) June 9, 2021
3) Verification protocol for the sustainability of solid biomass for energy applications Commissioned by the Ministry of Economic Affairs and Climate Change January 2021 version
4) Dutch Timber Procurement Policy - Annex I - User Manual for the assessment of certification systems by the Timber Procurement Assessment Committee (TPAC) Version 4.1 – March 2014
5) F FSC-STD-60-004 V2-0 EN SC International Generic Indicators 2018
6) PEFC ST 1003-2018 - Sustainable Forest Management 2018-12-12
7) SBP Framework Standard 1: Feedstock Compliance Standard , March 2015
8) Green peace report ‘Destruction certified’ 2021

Contributions of Certification Bodies.
NEPCon
Control Union

I S A F O R
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