Carbon Budget Regulation: Deforestation vs [Re]afforestation

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Populism, Nativism, Democratic Backsliding, and Pandemic Politics

by

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Abstract

What role do trees play in curbing climate change? This paper intends to provide a broad overview of the importance of forests and greenery in general in terms of analyzing the remaining carbon budget. The document looks at international institutions, agreements, and programs that contribute to solving the problem; considers the weaknesses and strengths of world environmental politics. Some experience in REDD+ practice implementation in developing countries is discussed; alternatives and suggestions for improving sustainable forest management are offered.

Keywords: deforestation, climate change, REDD+, politics, sustainable development

Problem overview

According to the non-profit organization One Tree Planted – "Every 1.2 seconds man destroys an area of forest the size of a football field"[1]. If we take as a basis an average American football field, which is around 57,600 square feet (~5,351 m^2)[2], then it means that per minute we lose 50 football fields of trees, 3,000 football fields per hour, and 72,000 per day. It means that each additional month will cost the planet 2,160,000 football fields, which are equal to 124,416,000,000 square feet (11,558,624,624 m^2) or 11,558 km^2. Suppose, if such an island-country as Jamaica – with its territory of around 11,000 km^2 would be completely covered with forest – it could become, "greenery-undressed" in 30 days. This dramatic picture raises an open question: how would the population of the "Jamaica case", which is, according to the United Nations data, has ~3 million people, cope with such a challenge. This counterfactual does not require a direct answer because the more time flies the more climate threats we [people worldwide] notice and virtually feel.

In the era of highly polarized development, time is the only factor that matters. Those countries that are already advanced are progressing faster, while low-income countries are trying to catch up in a slower fashion. This creates the gap of backwardness that brings implications to the open-system with side effects both for humans and the planet. Isn't it an absurdity that industrialized countries destroy the planet in different ways in pursuit of progress, while the dangerous effect is embraced by low-income countries predominantly? But is it fair to claim that the progress should be limited? Whatever the answers are, the problem of a constant amount of greenhouse gases (GHGs) is ascending, while important absorbents – forests – are going down

[1] One Tree Planted. One Tree Planted. Support Global Reforestation: One Dollar, One Tree, 2019. https://onetreeplanted.org/ accessed February 1, 2020.

[2] American Football Field Dimensions & Drawings. Dimensions. Guide. https://www.dimensions.guide/element/american-football-field accessed February 12, 2020.

exponentially. Since the danger is global, solutions also should be supported and implemented universally.

Role of Plants

It is not a secret that trees are vital entities that serve our existence. Forests protect the land from heating, create the "cooling pillow" for lands, saturate the soil, stabilize climate, maintain animals and humans' wellbeing (especially poor people dependent on land). Typically, one tree captures and absorbs carbon dioxide (CO_2) from the atmosphere in a proportion of 48 pounds per year and 1 ton per 40 years (but it depends on the age of a tree, etc.)[3]. It is believed that starting from the mid-19th century around half of the GHG emissions were absorbed by forests (today the amount is about 600 Gt) [4]. Paradoxically, but at the same time, stored carbon in trees can be released once the forests are burned or somehow destroyed, creating destructive emission impacts.

Nevertheless, the rapidity of other types of GHGs ejections is growing dramatically. Due to this reason many international conferences and agreements were held, and the Paris Agreement (under the United Nations Framework Convention on Climate Change (UNFCCC), plays a significant role. If according to the aim of the Paris Agreement[5] it is possible to keep the temperature below or within 2°C from the pre-industrial level, then in the best-case scenario, relying on projections of different agencies, we will have an overall carbon budget (cumulative amount of CO_2) within a range of 565 Gt/CO_2 –1550 Gt/CO_2 with a probability between 50%

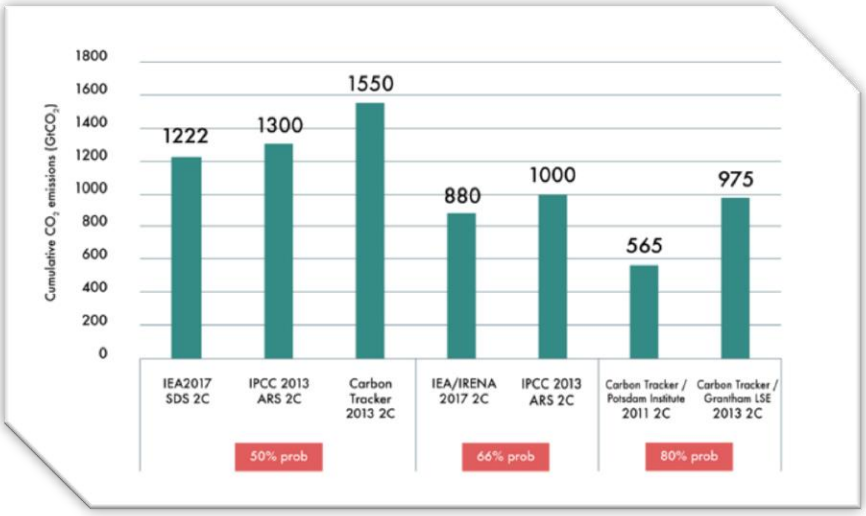
[3] Could Global CO_2 Levels be Reduced by Planting Trees? The CO2 Meter. October 29, 2018 https://www.co2meter.com/blogs/news/could-global-co2-levels-be-reduced-by-planting-trees accessed February 18, 2020.

[4] Brack Duncan. Forests and Climate Change, 14th session of the UN Forum on Forests 2019, 5.

[5] The United Nations. The Paris Agreement. https://unfccc.int/sites/default/files/english_paris_agreement.pdf accessed February 18, 2020.

(Energy Agency (IEA)) and 66% (The Intergovernmental Panel on Climate Change (IPCC)[6]. This timeframe can help us to mitigate problems posed by climate change, and probably to pay more attention to tree growth practice. However, it is worth noting, that the annual GHGs emissions consist already of near or more than 40 Gt/CO_2, which means that less than 15 years (~14 years and 125 days) separates us from the cut-off point in the worst-case scenario as of 2020, and gives us not too much time for real changes (that are still possible).

Figure 1: Number of Differences Lie beneath 2°C Budgets Published by Different Institutions



Source: The Carbon Tracker https://www.carbontracker.org/carbon-budgets-explained/

Following the objective that is established in Article 2 under the United Nations Framework Convention on Climate Change (UNFCCC) – "to achieve stabilization of greenhouse gas concentrations..."[7], we must admit that measures should be started immediately. To achieve this, **two options** can be used as a relief – either *reduction of greenhouse gas (GHG) emissions* or enhancement of the *removal of such emissions from the atmosphere* (the sequestration of

[6] Carbon Tracker Initiative Carbon Budgets Explained, February 6, 2018, https://www.carbontracker.org/carbon-budgets-explained/ accessed February 18, 2020.

[7] The United Nations. United Nations Framework Convention on Climate Change, 1992, 9. https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf accessed February 18, 2020.

carbon dioxide)[8]. In this sense, trees are the cheapest, durable, and biologically beneficial absorbers of life-threatening emissions. Whereas new technological methods are high-priced and not always appropriate, or even environmentally dangerous. In this regard, the first option – GHG emissions reduction – is far from being a feasible solution in climate change containment. In comparison, the second option – as forest growth (re-; afforestation) practice – can be much more efficient. However, if the latter practice is used, to have progress, deforestation must be massively prevented or visibly reduced at the same time. In this case, the carbon-budget regulation mechanism will work in favor of humanity, not at its expense.

The green blanket of the world's area allows us to mitigate the climate. Tropical forests alone can "provide 23% of the climate mitigation needed over the next decade to meet goals set in the Paris Agreement."[9] Andreas Dahl-Jorgensen, deputy director of the Norwegian government's International Climate and Forest Initiative, fairly told that "we simply won't meet the climate targets that we agreed to in Paris without a drastic reduction in tropical deforestation and restoration of forests around the world."[10] Indeed, if the world will continue to lose trees and forests massively, then the worst case, that separates us from the tipping point, will reduce the amount of the remaining carbon budget more quickly. But if within 15 years the "greenery practice" will be willingly picked, then the carbon budget can be extended. This will give a chance for the first option to be implemented and use the second option in parallel. The equation that can be offered for understanding all of the *Carbon Budget Benefits* (*CBB*) received within this time may look as follows: all newly planted fast-growing trees within future 15 years (*Q15*)

[8] Sven Bode and Martina Jung. Carbon Dioxide Capture and Storage—Liability for Non-Permanence under the UNFCCC, 2006, 174.

[9] Christina Nunez. Deforestation explained, National Geographic, February 7, 2019. https://www.nationalgeographic.com/environment/global-warming/deforestation/ accessed February 18, 2020.

[10] Yale E360. The World Lost 40 Football Fields of Tropical Trees Every Minute in 2017, June 27, 2018. https://e360.yale.edu/digest/the-world-lost-40-football-fields-of-tropical-trees-every-minute-in-2017 accessed February 19, 2020.

multiplied by CO_2 absorption amount by one new tree per year (*1Tree/CO_2*) subtracting years required for the growing process of all fast-growing trees and absorption process (*Y*1Tree/CO_2*), plus remaining overall carbon budget at a given point in time when the equation is calculated (*tRem/CO_2*). Should look like this*: (Q15*1Tree/CO_2) – (Y*1Tree/CO_2) + tRem/CO_2*. However, before one could use this formula, it is highly recommended to understand the potential of reforestation or afforestation practice and its feasibility in a limited time. Additionally, it is necessary to acknowledge the limitations of this formula, like the fact that mature trees, comparing with new-planted ones, can theoretically absorb more emissions. Next, I will consider if the tree growth practices sustainable and feasible.

The Lesser Danger the Bigger Time

Based on the aforementioned "Jamaica case" it would be interesting to estimate how much carbon budget can be lost within a month. Suppose we will take the fast-growing tree hybrid poplar that during 3 years can reach 30-40 feet in height[11] (take 35 feet as an average). It is worth mentioning that, relying on some research results, the sequestration potential of hybrid poplar plantations is competitively high[12].

If, as was earlier said, one tree generally absorbs 48 pounds of CO_2 per year, then within 15 years according to the worst-case scenario (with a cumulative budget of 565 Gt/CO_2), one hybrid poplar will absorb ~ 0.360 tons of GHGs emissions. But it is necessary to subtract 3 years of the growing process from 15 years of remaining time, which gives 12 years of "working period" of the tree. Then, we want to conclude that in 12 years one hybrid poplar will absorb ~ 0.288 tons of GHGs.

[11] The Tree Center Plant Supply Co. https://www.thetreecenter.com/fast-growing-trees/ accessed February 20, 2020.

[12] Kiara S. Winans, Anne-Sophie Tardif, Arlette E. Lteif, Joann K. Whalen. Carbon sequestration potential and cost-benefit analysis of hybrid poplar, grain corn and hay cultivation in southern Quebec, Canada. Agroforestry Systems 89(3), 2015, 429.

Next, we need to understand how many trees one football field can accommodate. According to Austria's project created by Swiss art dealer Klaus Littmann in September 2019, the football field Wörthersee Stadium in Klagenfurt (capital of the federal state Carinthia) in Austria was transformed into an art installation. The surface of the football field was covered with 300 different trees out of central Europe[13]. Since this stadium is not fully planted, it seems to be justified to take this as an example, despite its size of about 7,140 m^2 (should be considered as a limitation regarding estimations below).

Figure 2. The Austrian Football Stadium with a Forest on the Pitch

Source: The Guardian https://www.theguardian.com/sport/gallery/2019/sep/06/for-forest-an-art-intervention-transforming-austrian-stadium

This means that if 300 hybrid poplar trees (or one destroyed football field of trees) during 12 years (starting from present days), hypothetically, will absorb 86.4 ton of GHGs emissions (300 trees * 0.288 tons), then 2,160,000 football fields that we lost in "Jamaica case" are equivalent to 186,624,000 tons of lost carbon budget (or 0.186624 Gt/CO_2) that people could

[13] Jim Powell. The Austrian football stadium with a forest on the pitch – in pictures, The Guardian, 09/06/19. https://www.theguardian.com/sport/gallery/2019/sep/06/for-forest-an-art-intervention-transforming-austrian-stadium accessed February 20, 2020.

potentially own during 12 years. It means, that each month world loses 0.001296 Gt/CO_2 of absorptive capacity (0.186624 Gt/CO_2 / 12 years / 12 months) because of the rapidity of the tree cover loss scale per second. This implies that if the "Jamaica case" would not happen, then the annual rate of emissions was not 40 Gt/CO_2, but ~39.98 Gt/CO_2. This would extend the time before the tipping point because it would allow gaining an additional 7 days per year (565 Gt/CO_2 divided by 39.98 Gt/CO_2 = 14 years and 132 days vs 14 years and 125 days).

Finding 1. If time will be extended due to the reforestation practice, it is still not enough to offset those damages that have been already made.

Finding 2. The effect of restoration practice of lands, in which trees have been lost, differs and it can reduce time because of deviations in a process of reforestation practice. That is why it is not reasonable to focus on it.

Finding 3. In both reforestation and afforestation practices, countries and their population will not be able to prevent tree cover loss immediately. And they will not plant enough trees right away to offset the losses that already exist and those losses that will come in the next second.

The Scale of the Global Tragedy

Advanced countries, main emitters of GHGs, are strongly criticized because of the negative influence of their activities on the ecosystem, but very little is said about underdeveloped countries, which destroy forests that help to contain and absorb these emissions.

It does not matter where forests are located since the effect that they produce is worldwide. Once a single tree is destroyed or a large part of the rainforest has disappeared, then the double hazard occurs. It can happen in the form of released emissions stored in the tree and in an inability to uptake "not captured" CO_2 that a destroyed tree (or forest) could have.

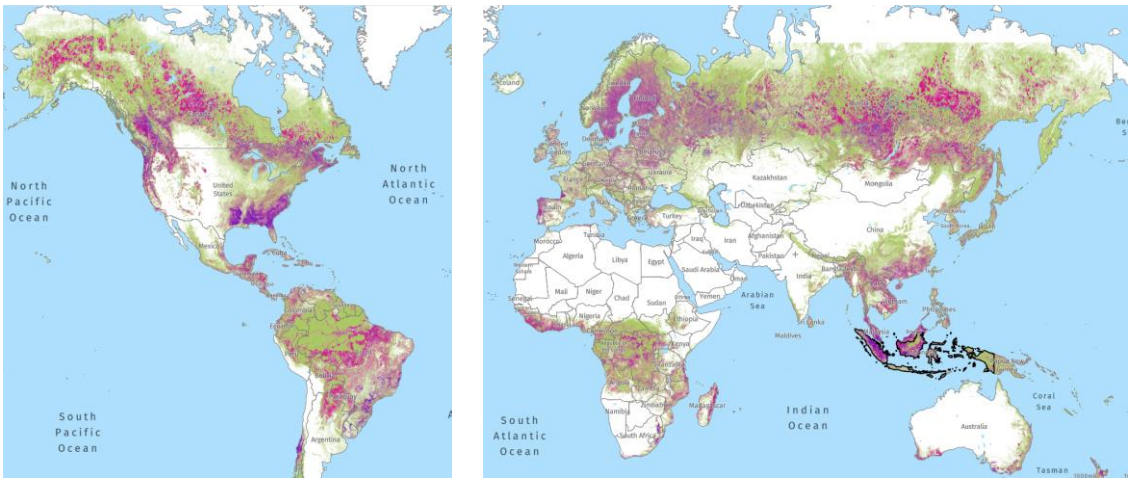
Looking at the Interactive Map designed by Global Forest Watch (2020), we can see that almost all of the countries pigmented with "rose spots", that depict the tree cover loss, participate to some extent in the global "ecocide".

Figure 3. Tree Cover/Loss/Gain

tree cover

tree cover loss

tree cover gain



Source: Interactive Map | Global Forest Watch https://www.globalforestwatch.org

Deforestation risks can be divided into two main categories: *natural deforestation* and *intentional deforestation*[14]. The first category includes non-human interventions in the process of tree cover loss, while the second comprises the consequences of anthropogenic impact. These two categories can be subdivided further as follows:

Natural deforestation	Intentional deforestation
Wildfire	Commodity-driven deforestation (including agriculture, mining, energy infrastructure);

[14] Philip G. Curtis, Christy M. Slay, Nancy L. Harris, Alexandra Tyukavina… Classifying drivers of global forest loss, Science 14 Sep 2018: Vol. 361, Issue 6407, 1108.

Overgrazing Terra inappropriata (spoiled soil) Natural decomposition Weather disturbances Demographic growth	Shifting agriculture (abandoned areas that followed by subsequent forest regrowth); Forestry (forestry operations within managed forests and tree plantations with evidence of forest regrowth in subsequent years); Wildfire (intentional burning of the forest with human activity afterward); Urbanization (intensification of urban centers).[15]

Subdivision of the two categories tells that the most harm has been inflicted by the intentional deforestation process. However, "natural deforestation" is dependent on "intentional deforestation" to some degree. The more anthropogenic effect influences the ecosystem, the more intensive "natural deforestation" occurs as the result of this factor. Climate change anomalies will likely aggravate the intensity of "natural deforestation".

As can be noticed, the main areas with an alarming rate of tree cover loss vary regionally with high intensity among Latin America, sub-Saharan Africa, and South Asia. For example, Brazil has lost 18.3 Gt of CO_2 between 2001 and 2018 (10% of global tree cover loss); the Democratic Republic of Congo has lost 5.49 Gt of CO_2 (6.7% of global tree cover loss) since 2000; Indonesia has lost 10.5 Gt of CO_2 (16% of global tree cover loss) within the same period[16]. It means that three countries together have been inflicting ~1.9% annually regarding the decrease in the number of forestries globally. According to this, the time in 15 years that we have with the remaining carbon budget, under the worst-case scenario (with a cumulative carbon budget of 565 Gt) will be reduced if the trees' cover loss and its emissions to be continued. This shortage in time indicates the clear discovery that tree-grow practice, cannot be an effective tool for actions

[15] Ibid.

[16] Data analyzed from: *Interactive Map; Global Forest Watch*. https://www.globalforestwatch.org accessed February 24, 2020.

in conditions of emergency as we have faced. Although it refutes the hypothesis that [re]afforestation is desirable alone. This practice can be useful if done in parallel with other measures. So, to "restore carbon stocks that have been lost"[17] it is necessary to "reduce the rate of deforestation to decrease carbon losses from ecosystem"[18] and to find other alternatives that will be analyzed in the next sections of this writing.

REDD+

Problems of unsustainable forest management emerged many years ago. This phenomenon has been considered by the international community since the 1980s and continues to be one of the worrisome challenges. Before UNFCCC came into force in 1992, many of the rich-forest countries could not achieve consensus on the effective tree-conservation policy and designed only temporal *pas grand* reforestation programs. The more time went by, the larger the scale of the problem grew (tropical wildfires, aggressive commercial cutting, etc.). This showed that a much more sound global reaction was needed. So, the negotiation process has been started in Montreal.[19] This prepared the first documental basis for saving forests as part of the protocol under the UNFCCC by Conference of the Parties (COP-11) in 2005, along with legitimization of the Kyoto protocol. Later, the global policy framework of incentives– Reducing Emissions from Deforestation and Forest Degradation (REDD+) in 2009 on the COP-15 in Copenhagen – was designed. "Initially conceived as a scheme focusing narrowly on deforestation (RED), this framework has evolved over the years to include forest degradation (REDD), and to count

[17] Charlotte Streck and Sebastian M. Scholz. The Role of Forests in Global Climate Change: Whence We Come and Where We Go, International affairs., 2006, Vol.82(5), 865.

[18] Ibid.

[19] The United Nations Framework Convention on Climate Change. Decisions - Montreal Climate Change Conference - December 2005. https://unfccc.int/process-and-meetings/conferences/past-conferences/montreal-climate-change-conference-december-2005/decisions-montreal-climate-change-conference-december-2005 accessed February 24, 2020.

rewards for enhancing carbon storage through forest restoration, rehabilitation, and afforestation/reforestation (REDD+)."[20]

Encouraging developing countries to contribute to climate change mitigation efforts, REDD+ developed a 3-phase ladder of requirements through which interested countries can progress: readiness phase (development of national strategies/action plans); implementation; result-based actions[21]. However, the problem is that like any agreement under UNFCCC, the REDD+ is voluntary. It is expected to be picked by the developing countries as the manual to undertake substantial steps to prevent deforestation within their territories. This also helps developing countries to receive some financial "awards" for saved CO_2. Additionally, there are uncertainties about the implementation of the framework within national legislation and its harmonization between the international and local levels. It is not very clear how to mobilize the positive intentions of the REDD+ within all of the stakeholders (politicians, business people, and managers) for the ecological benefits and to avoid inflictions on dwellers whose livelihood depends on the forests.

For example, even though yet in 1881 forest-burning was banned in Madagascar, indigenous poor people have not had a chance except to clean territories from the forest for agricultural needs to survive. "Since upland plots are less likely to destruction from floods associated with cyclonic events than lowlands, farmers living in areas exposed to cyclonic risk are more prone to clear the forestlands to practice slash-and-burn agriculture."[22] The case study from the Makira Forest, located in Madagascar showed that despite solid theoretical concepts of

[20] Emma Doherty, Heike Schroeder. Forest Tenure and Multi-level Governance in Avoiding Deforestation under REDD+, Global Environmental Politics, Volume 11, Number 4, November 2011, 66.

[21] The Food and Agriculture Organization of the United Nations. REDD+ Reducing Emissions from Deforestation and Forest Degradation. Overview. http://www.fao.org/redd/overview/en/ accessed February 27, 2020.

[22] Laura Brimont, Driss Ezzine-de-Blas, Alain Karsenty, Angélique Toulon. Achieving Conservation and Equity amidst Extreme Poverty and Climate Risk: The Makira REDD+ Project in Madagascar, Forests 2015, 6(3). https://doi.org/10.3390/f6030748 accessed February 27, 2020.

the first REDD+ pilot project, the real political experience on the ground brought little changes. It is underscored that "pilot project in the Makira Forest does not differ greatly from past conservation efforts (restriction measures), but reproduces models used over the last fifteen years, with a protected area surrounded by a green belt of community-based natural resources management."[23] Moreover, another investigation of forest policy in conjunction with the REDD+ framework in such countries as India, Tanzania, and Mexico also demonstrated that results were feeble. While policymakers in "India and Tanzania deploy REDD+ as a venue for consolidating their gains in a rapidly changing political and economic context, Mexico uses these instruments to outline measures to protect the rights of groups that are excluded in national forest and land tenure regimes"[24].

Although there are flaws in the mitigation of problems related to climate change, it would be unfair to omit positive practices in other regions. According to D. James Baker, Brazil, Guyana, and Indonesia achieved some results in "reducing deforestation in the context of developing economies"[25] under the REDD+. For example, Guyana received more than $125 million ($5 per ton of CO_2) under the REDD+ Investment Fund and signed a contract with Norway. It helped to invest in a low-carbon development strategy, which created conditions for climate change adaptation (e.g. sea wall constructor in the vulnerable area)[26]. So, the financial issue plays an important role in avoiding the deforestation process. However, created "self-motivation" incentives under the REDD+ can trigger climate change policy in the hands of bona fide governors to the side of real changes. Despite there are still many questions about the

[23] Cécile Bidaud. REDD+, the Color of a Revolution? A Case Study from the Makira Forest in Madagascar, Revue tiers-monde., 2012,111

[24] Prakash Kashwan. Forest Policy, Institutions, and REDD+ in India, Tanzania, and Mexico, Global environmental politics., 2015, Vol.15(3), 113.

[25] D. James Baker. From Kyoto to Paris: Growing Recognition of the Role of Tropical Forests in Climate Change. Seton Hall Journal of Diplomacy and International Relations; South Orange Vol. 16, Iss. 1, (Fall 2014), 41.

[26] Ibid, 44.

feasibility of the REDD+, it would be helpful to create an ad hoc analysts team that could summarize positive and negative practices among beneficiary countries. This would help to elaborate on special criteria for the effective allocation of finance proportionally to undertaken measures in the developing countries.

Alternatives for Sustainable Forest Management

Despite worldwide tree-growth practice is a good idea for a long-lasing perspective (in parallel with other measures) some other forest-related mechanisms can also regulate greenery conservation. In 2017, on the Special Session of the UN Forum on Forests, an agreement on adaptation was achieved. The document *The United Nations Strategic Plan for Forests 2030* was introduced as a "global framework for action at all levels to sustainably manage all types of forests and trees outside forests, and to halt deforestation and forest degradation."[27]

Under this Plan, parties agreed that by 2030 special six Global Forest Goals and 26 associated targets[28] will be reached (which correlate with Sustainable Development Goals). But still, there is a problem that these goals and targets are *voluntary* and *universal*[29]. Although all of them worth considering, Goal number 5, devoted to the issue of implementation of sustainable forest management on the national level, seems to be attractive for analysis. Under this Goal, target 5.2 says that "forest law enforcement and governance are enhanced, including through significantly strengthening national and subnational forest authorities, and illegal logging and associated trade are significantly reduced worldwide."[30] This target can work as a mitigation

[27] The United Nations Forum on Forests Secretariat. Global Forest Goals and Targets of the UN Strategic Plan for Forests 2030, New York – April 2019, 2. https://www.un.org/esa/forests/wp-content/uploads/2019/04/Global-Forest-Goals-booklet-Apr-2019.pdf accessed March 2, 2020.

[28] Six Global Forest Goals agreed at UNFF Special Session, January 20, 2017. https://www.un.org/esa/forests/news/2017/01/six-global-forest-goals/index.html accessed March 2, 2020.

[29] Ibid, 5. https://www.un.org/esa/forests/wp-content/uploads/2019/04/Global-Forest-Goals-booklet-Apr-2019.pdf accessed March 2, 2020.

[30] Ibid, 15. https://www.un.org/esa/forests/wp-content/uploads/2019/04/Global-Forest-Goals-booklet-Apr-2019.pdf accessed March 2, 2020.

toolkit (prevention of illegal logging in greenery-affluent regions, once the special universal Climate Change Code is introduced) on climate change. Also, it can become a launching pad for many developing countries to rethink their legal mechanisms. However, above all, forest legislation must be *obligatory* for signatory parties of the Plan and related frameworks. It is believed that despite a weak social and political context in developing countries, the legal tool will help to reduce the number of destroyed forests distinctly (e.g. with international control of performance monitoring under the established Global Justice Party[31] in the future).

Under the Code or other universal acts on climate change, sustainable managerial practice concerning forest management should be introduced – *forest certification* and *forest taxation policy*. They need to be obligatory for all, but flexible due to the country's context.

Although ***forest certification*** is not a new phenomenon, it is an effective regulatory piece in deforestation and illegal logging prevention. This practice is used in both developed and developing countries in limited form. While Canada and the US are accountable for 51% of all certified forests (2014), some developing countries have only 2% of all tropical forests that are certified (where 4% is in Latin America, 3% in Asia, and 1% in Africa). [32] This, in general, comprises 440.3 million hectares (10.7%) out of 4.03 billion hectares of total forest area (that are certified by such NGOs as the Forest Stewardship Council (FSC) and Programme for the Endorsement of Forest Certification (PEFC)[33]. Although there were and still are some national projects that have been initiated in such countries, for example, as Brazil – Brazilian Forest Certification Programme (CERFLOR) or Malaysia – Malaysian Timber Certification Scheme

[31] Paul Clements. Fostering a Global Political Economy of Sustainability, Western Michigan University, 2019, 19.

[32] Yale School of forestry and environmental studies. Global Forest Atlas, Forest Certification, accessed on November 6, 2019. https://globalforestatlas.yale.edu/conservation/forest-certification accessed March 2, 2020.

[33] Ibid.

(MTCS), in reality, the forestland losses were not significantly restrained. So, illegal timber purchase is still ongoing domestically and worldwide.

Obstacles for usage of broad forest certification practice are different: high value of certification that must be included in the final forest goods; high certification standards to meet; lack of legislation and weak government support; additional paperwork that is time-consuming. Additionally, the sharp question is how to certify forests that are used by local communities as a means of survival (fishing, farming, and hunting). "However, the capacity for certification to be effective at reducing… it must be noted that certification is also not intended to account for deficiencies in national forestry law enforcement and governance."[34] There is thinking that international forest certification as a minimum should be mandatory for implementation at the national level with the participation of national governments as the main implementers. It is vital to create a strict policy on deforestation reduction and to prevent this process globally to be able to save and accumulate the carbon budget.

Forest taxation policy is another alternative option that can be used to supplement the forest certification. "Taxation should be based on income or earning power. In the case of forests, the tax based on income may be applied either as a tax on the yield whenever any timber is cut or as an annual tax on the present capital value of the forest, based on all its expected future incomes and expenditures, what the foresters call "expected value."[35]

In the forest taxation process, "policy marginal abatement cost curve (MACC) can be used to estimate the potential of GHG emissions reduction over a baseline to the costs of such

[34] Ibid, https://globalforestatlas.yale.edu/conservation/forest-certification March 6, 2020.

[35] Jay B. Hann, Forest Taxation, O.A.C. School of Forestry. Seminar Thesis presented before the class Mar. 16, 1926, 9.

reduction"[36], which needs to be used in the tax establishment process for forest commodities. However, it is necessary to understand that "in the case of CO_2 tax implementation, an uncertain MACC may have a high influence on the expected reduction of CO_2 emissions."[37]

One of the main dangers in establishment tax policy in developing countries is a high corruption rate because it increases the level of uncertainties that defines the amount of taxes. However, it is logical to conclude that the higher level of corruption in the country, the more illegal logging activity is occurring, causing worldwide deforestation. In this case, a 'tax fine' can be charged out of the government exhibiting reckless behavior, incompliance, and lack of control. The value of the logged forest must be lower than the value of the tax that should be calculated with consideration of the potential or "value" of the forest destroyed.

Once the tax is defined according to the global and local demands and necessary institution arrangements are prepared, the system of alternatives should work complementary mutually. For example, the Ministry of Forest/Nature in one or another developing country (accountable to the UN or so) will be responsible for the allocation of permissions for forest usage based on special quotas after meeting all of the standards of certification by the future beneficiary. After such a procedure the tax will be calculated and applied to the forest (timber). But in this case, it is necessary to divide types of timber for domestic and international trade/business purposes (*profit-gaining timber*) and subsistence purposes (*nonprofit timber*). It is crucial to create two different approaches in the smart forest management policy for different categories of forest users.

[36] Mykola Gusti, Nicklas Forsell, … The sensitivity of the costs of reducing emissions from deforestation and degradation (REDD) to future socioeconomic drivers and its implications for mitigation policy design, Mitigation and Adaptation Strategies for Global Change, 15 August 2019, Vol.24(6), pp.1124.

[37] Ibid, 1124.

Conclusion

This research evidences that deforestation prevention proved to be a more effective solution in climate change policy rather than reforestation and afforestation practice. Although worldwide tree-planting is a desirable practice for long-time strategies, it can be used as a complementary tool in policy on deforestation reduction. This is because immediate actions are needed in the present situation, which I consider as emergency conditions.

The international policy-tightening attitude toward changes from voluntary conditions of international frameworks on forest management to mandatory can significantly redesign the green picture of the world. Starting with the top-down approach along with serious consideration of bottom-up suggestions can alleviate the life of many forest-dependent people and hold potential climate migrants. Also, it can preclude the plundering of forests in developing countries by corporations and illegal profit-makers. Finally, it can influence the climate change process in a way of saving the remaining carbon budget to save time and prepare for future technological interventions. Despite international measures, it is necessary to change the vision on the tree conservation process at the national levels as well. Primarily, the most vulnerable regions must flip the policy over, starting from the normalization of the legislation as a fundament. Legislation should be harmonized and compliant with international standards but at the same time flexible to the local context. In this connection, many methods can be effective, but two offered alternatives can be considered as the part of a larger scale.

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