

Changing the Path of Climate Change. Voluntary Certification for Carbon Removals in European Union: The Case of Forestry Projects

Caradaica, Mihail

Veröffentlichungsversion / Published Version

Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:

Caradaica, M. (2023). Changing the Path of Climate Change. Voluntary Certification for Carbon Removals in European Union: The Case of Forestry Projects. *Perspective Politice*, 16(Special Issue), 67-75. <https://doi.org/10.25019/perspol/23.16.0.7>

Nutzungsbedingungen:

Dieser Text wird unter einer CC BY-NC-SA Lizenz (Namensnennung-Nicht-kommerziell-Weitergabe unter gleichen Bedingungen) zur Verfügung gestellt. Nähere Auskünfte zu den CC-Lizenzen finden Sie hier: <https://creativecommons.org/licenses/by-nc-sa/4.0/deed.de>

Terms of use:

This document is made available under a CC BY-NC-SA Licence (Attribution-NonCommercial-ShareAlike). For more information see: <https://creativecommons.org/licenses/by-nc-sa/4.0>

How to cite this paper:

Caradaică, M. (2023). Changing the Path of Climate Change. Voluntary Certification for Carbon Removals in European Union: The Case of Forestry Projects. *Perspective Politice*. Special Issue. 67-75[08].

<https://doi.org/10.25019/perspol/23.16.0.7>

Received: April 2023

Accepted: May 2023

Published: June 2023

Copyright: © 2023 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license.

Article

Changing the Path of Climate Change. Voluntary Certification for Carbon Removals in European Union: The Case of Forestry Projects

Abstract: Climate change and environmental degradation are the crisis generators today and, in the years, to come as they threaten our social, economic and political order in Europe and worldwide. In this context, European Union committed to reaching climate neutrality by 2050 as the member states have agreed on a European Green Deal, and the European Commission has adopted several proposals for reducing net greenhouse gas emissions by at least 55% by 2030. Nevertheless, achieving no net emissions of greenhouse gases by 2050 requires high investments in the decarbonisation of the economy and in developing ways to remove carbon dioxide (CO₂) from the atmosphere for the residual emissions that cannot be eliminated.

In this paper, I will focus on the EU's strategy for carbon removal, especially on carbon farming, where carbon can be naturally captured in the soil or forests. Since the signing of the Kyoto Protocol in 1997, when an offsetting

carbon mechanism was also created for the Voluntary Carbon Market (VCM), many projects based on different carbon crediting schemes were created worldwide. However, there needs to be more presence of European projects on voluntary carbon markets and the EU prepares legislation for its certification scheme. In this context, I will try to figure out the main challenges of VCM in Europe and answer the following research question: "why

European Union is trying to boost its voluntary market through specific legislation?". Moreover, my examples will focus on forestry projects as nature-based solutions are the cheapest way to remove and store carbon.

Keywords: carbon removal; climate change; European Green Deal; forestry; voluntary certification

Mihail CARADAICĂ

Department of International Relations and European Integration, National University of Political Studies and Public Administration, Lecturer, Bucharest, Romania;
mihai.caradaica@dri.snsa.ro

1. Introduction

Today the crisis is becoming an integrated part of the political language and discourse. Economic crises, migration crises, food crises or health crises are just some examples of crises that could be often found

in mass media. These crises have many causes, but one of the most important is climate change and environmental degradation. As long as our carbon footprint increases, planet warming generates more extreme weather events, affects agricultural lands and modifies freshwater flows and reserves. Since human society is highly dependent on natural resources to support an increasing population of 8 billion people, the Twenty-one Century might be a crisis age until an equilibrium will not be reached between society, economy and environment as sustainable development models are advocating.

In this context, climate change emerges as the most significant contemporary challenge generating fast and irrevocable transformations (Singh, 2023: 77). Intergovernmental Panel on Climate Change¹ (IPCC), the most relevant scientific voice in the field, defines climate change as “any change in climate over time, whether due to natural variability or as a result of human activity” (IPCC, 2007: 6). Recent statements from the IPCC emphasise that human influence has warmed the atmosphere, ocean and land, the scale of recent changes is unprecedented over many centuries, and many changes determined by the emissions of greenhouse gases (GHG) are irreversible for centuries to millennia (IPCC, 2021: 4-21). Evidence of these changes can be seen as heatwaves, heavy precipitation, droughts, and tropical cyclones (IPCC, 2021: 8).

In front of these challenges, the global community set ambitious goals in December 2015 when 197 member countries of the United Nations Framework Convention for Climate Change gathered in Paris and signed the Paris Agreement (Xiang, 2022: 1). Their main commitments are to limit the average global temperature increase to less than two degrees Celsius above pre-industrial levels by the end of the century and to set greenhouse gas emissions to a net zero by half of the century (United Nations, 2015: 3).

Human imagination and creativity have already designed solutions and policies to meet the challenges of the climate crisis and the goals of the Paris Agreement². One of the solutions already translated into public policies and will be discussed in this paper is the voluntary carbon market. This could also mean the involvement of civil society in decarbonisation. In a voluntary carbon market, NGOs, private companies, public institutions, and individuals can be involved in different stages. They can develop removal or storage projects, transact carbon credits generated by these projects, reduce their carbon footprint, or raise public awareness regarding carbon neutrality. Empowering civil society could increase the market’s potential and the value of the carbon credits, generating sustainable businesses.

Until now, the voluntary carbon market mainly generated projects worldwide, while a small number of these projects were developed in European Union. In the meantime, European Commission is preparing its legislation for a European certification scheme. Therefore, the paper’s research question will be the following: “why European Union is trying to boost its voluntary market through specific legislation?”. I will answer this research question by identifying the main impediments of the European actors in developing local carbon projects, with a focus on forestry projects.

To address the research question concerning the EU legislation in the field of the Voluntary Carbon Market, the content analysis methods and the case study are the proper methodological approach for this paper. The content analysis focuses on the evolution and obstacles of the international and European Voluntary Carbon Market (VCM) comprised of specific academic works (books, academic articles, and impact studies) and official documents, while the case study is focused on specific carbon forest projects. The novelty of this study field justifies this methodological choice as the carbon market for climate mitigation is still at an early age, and its evolution is yet uncertain.

2. Voluntary Carbon Market

The Voluntary Carbon Market emerged with the Kyoto Protocol was adopted in 1997 and entered into force in 2005. Since then, as part of civil society involvement, it has capacitated many firms who integrated climate change into their strategic management as global warming became one of the most crucial business concerns (Lee, Park and Klassen, 2013: 1). This is how climate action became a strategic priority for corporate social responsibility. However, the Kyoto Protocol pioneered the system of norms and rules framing climate governance, as it has “divided the world into countries with and without greenhouse gas emission reduction targets” (Lang, Blum and Leipold, 2018: 1-2). Adopting the Paris Agreement, a new climate regime has emerged. From that moment, all the states are free to formulate their national commitments, called nationally determined contributions (Lang, Blum and Leipold, 2018: 1-2).

In this context, VCM could be seen as a part of the private sector mechanism in climate governance. However, scholars have different approaches regarding the best way to define the voluntary carbon market. Dirk Forrister (2021: 4) understands it as a political construct where political drivers have created the legal framework for the market to exist, Dong-Ho Lee, Donghwan Kim and Seong-il Kim see it as a way for governments and businesses to participate in carbon offsetting projects that go beyond the regulatory framework for GHG emissions (Lee, Kim and Kim, 2017: 1), while Jang-Hwan Jo, Taewoo Roh, Jongmin Hwang, Kyeong-hak Lee and Changbae Lee as payments for ecosystem services (PES) try “to internalise the positive externalities made by nature systems, creating incentives for the landlord’s behaviour that ensures service provision” (Jo, Roh, Hwang, Lee and Lee, 2020: 1).

Voluntary carbon offsets generated outside the government regulatory framework encounter different problems, such as lack of transparency, low reliability of carbon credits, insufficient regulatory tools and relatively high business risks because of lax validation and verification procedures (Lee, Kim and Kim, 2017: 1-2). To face these challenges, various standards were created to oversee the quality and credibility of the carbon credits. “Each unit of a voluntary carbon offset represents the verified removal or reduction of one ton of CO₂ or its GHG equivalent” (Chen, Marbough, Moore and Stern, 2021). These third parties that claim objectivity for the carbon offsets, called standards, created different methodologies to develop and assess a project.

Carbon credits can be issued from projects such as industrial gases, waste, fuel switches or coal mine methane. Nevertheless, the carbon credit issuances were dominated in 2022 by nature-based solutions (NBS) and renewable energy (RE) projects, representing 78% of total issuances. Forestry projects also dominate these nature-based solutions. Forests that were “initially valued for their provision of wood are now increasingly valued for their function as the global carbon sinks: enhancement of the biodiversity, improvement of the air quality, and support for a healthy life” (Jo, Roh, Hwang, Lee and Lee, 2020: 1-2). Regarding the climate change mitigation potential, forests can store carbon dioxide as leaves, branches, trunks and roots. A ton of carbon stored by a tree is the equivalent of 3.67 tonnes of carbon dioxide extracted from the atmosphere (Hunt, 2009: 1).

Forest carbon projects are more attractive than others because of the multiple benefits of the carbon removal potential. This type of project may include socio-economic benefits (job creation, poverty alleviation, alternative livelihoods) and environmental benefits (erosion control, water resource management, and conservation of biodiversity). It can increase the moti-

vation of potential buyers to purchase the credits (Lee, Kim and Kim, 2017: 4). The central carbon standards that govern the development of forest carbon projects in the voluntary carbon market are Verified Carbon Standard (VCS/Verra), Plan Vivo, Gold Standard, Climate Action Reserve or American Carbon Registry (Lee, Kim and Kim, 2017: 2).

Regarding the types of forest carbon projects that can be developed, there are three main areas of action: reduce emissions from deforestation and forest degradation (REDD+), carbon sequestration through afforestation/reforestation (A/R) activities and improved forest management (IFM) (Merger and Pistorius, 2011: 2). The numbers for 2020 show that REDD+ projects covered 24.9% of the total number of projects, wind energy 17.9%, forest offsets 14.5% while solar cookers, solar-distributed, and wetland restoration 0.6%, 0.4% and 0.2% (Chen, Marbough, Moore and Stern, 2021).

Recently, in January 2023, the VCM was shaken by the results of a complex investigation conducted by The Guardian, showing that 90% of the rainforest offset credits certified by Verra are worthless (Pek, 2023). This is a dire situation because it could generate mistrust in the VCM as a potential tool for mitigating global warming. The challenges here are related to the REDD+ projects and the reliability of forecasting the future (Greenfield, 2023). In this case, the additionality of a project is calculated on what could have possibly happened in the absence of a REDD+ activity.

Because carbon dioxide is not a tangible commodity, the quality of forest projects is highly controversial. Plenty of room exists for low-quality projects that produce cheap carbon credits. As long as buyers look for better prices, quality projects cannot compete on the market (Merger and Pistorius, 2011: 3). Therefore, the necessity for more transparency and quality assurance emerged. The European Union is an adequate case study due to the low number of carbon projects developed on the voluntary market.

3. EU's Voluntary Carbon Market

Since the beginning of the 1990s, an essential part of civil society, such as aid agencies, international organisations, and nongovernmental organisations (NGOs), has gradually joined the fight against climate change (Mikulewicz, 2020: 2) and opened the academic debate around the democratisation of the global climate governance (Wendler, 2022: 90). To fulfil the expectations of the European civil society and to meet all the Paris Agreement objectives, the EU decided to take the lead in the global struggle against climate change. Therefore, in December 2019, the president of the European Commission, Ursula Von der Leyen, presented "The European Green Deal" as an ambitious programme to achieve climate neutrality by 2050. Also, in December 2019, The European Council validated the EU's Commission plan (Kramer, 2020: 269) after the head of state found an agreement regarding the main objectives and the fair transition to a decarbonised economy. The European consensus was not easy to reach as in the next 30 years, energy systems, mobility, logistics or agriculture will have to dramatically transform (Wyns and Khandekar, 2019: 326) to reduce GHG emissions.

The European Green Deal did not emerge from a policy vacuum (Wendler, 2022: 68) but from previous policies and strategies. One of these policies that have been functioning for several years is the European Union Emissions Trading System (EU ETS), a mandatory cap and trade programme where operators can use the carbon credits from Kyoto's Clean Development Mechanism and Joint Implementation (Kollmuss, Lazarus, Lee, LeFranc and Polycarp, 2010:

68). This is a government-operated programme where “regulators set total emissions targets which fall over time and give participants credits for GHG emissions. The regulators then set the rules for measuring the emissions and validating the carbon credits. The participants are then allowed to trade credits with each other to collectively achieve the targeted overall emissions reductions at the least total cost” (Chen, Marbough, Moore and Stern, 2021). This European initiative is by far the largest in the world, summing up around 90% of the global trade of carbon credits.

If the mandatory cap and trade system were a successful model, the case of the voluntary carbon market would be different. Independent carbon projects need support on the European continent. In the following paragraphs, I will cover the obstacles faced by these types of projects in the European Union. I will focus my examples on the forest carbon projects because of the high number of projects in the field of REDD+ and A/R. After identifying the relevant obstacles, I will try to understand how a new European legislation would tackle these challenges.

A study conducted by the European Commission on the projects included in the Clean Development Mechanism (CDM) under the Kyoto Protocol has shaken the trust in the quality of carbon credits (Keohane and Seymour, 2021: 15). Forest carbon credits were risky because of the difficulties in measuring carbon fluxes, and the carbon credits might not reflect reality. Therefore, the first obstacle would be the difficulty of assessing the quality of carbon removal. Suppose a company is in search of quality carbon credits. In that case, it needs “to invest time and cognitive effort to find robust carbon removal certificates and to compare the quality of the carbon removals between the various certification approaches” (European Commission, 2022b: 5). Another obstacle emerges as stakeholders would not trust existing carbon removal certificates (European Commission, 2022b: 5).

Regarding financial obstacles, carbon removals may find barriers to accessing finance because “different certification schemes serve different financing models, and they adapt the certification rules to the final use that will be made of the certificate” (European Commission, 2022b: 6). This high diversity generates high costs for the operators and makes this business less profitable. Other small obstacles would be that Europe is a well-developed region, and there is less room for nature-based offset projects³ and government subsidies and legislation (Dreesen, 2022). The carbon projects’ additionality criteria requires added value to generate carbon credits. It means all the “business as usual” (BAU) models should be avoided. For example, the Romanian forestry legislation obliges all forest owners to reforest the clear-cut areas or land plots affected by natural calamities. In these cases, no additionality applies, and no carbon credits can be generated. Only the projects of afforestation and reforestation where there is no legal obligation might be an option.

Considering the European-specific obstacles, the situation requires external legislative intervention to boost the projects on the voluntary market. Therefore, “market participants have called on European lawmakers to merge the EU compliance and voluntary carbon market systems, as they seek to achieve harmonisation of national accounting practices with increased VCM transparency” (Dreesen, 2022). Consequently, European Commission has proposed a Regulation to European Parliament and Council to establish a Union certification framework for carbon removals. The main objectives of this Regulation are to set up quality criteria for carbon removal activities that take place in the Union, to create rules for the verification and certification of carbon removals and for the functioning and recognition by the Commission of certification schemes (European Commission, 2022a).

The legislative proposal has two main components: framing high-level quality criteria and shaping detailed certification rules. These two components are mainly designed to tackle the barriers to carbon projects in the European Union and to boost a local voluntary market. The QU.A.L.I.T.Y criteria involve the following principles: Quantification is determined with a specific formula where “the net carbon removal (CR) benefit by subtracting the net carbon removals in tCO₂e from a CRbaseline. Net carbon removals are determined by subtracting any GHG increase due to implementation of the activity from CRtotals” (Jensen, 2023: 5); **A**dditionality means that there are no other funds or legislation for that project except for the incentive of the carbon credits; **L**ong-term storage depends on the type of activity, but the operators should ensure long-term storage; **S**ustainability contains a set of criteria such as climate change mitigation, adaptation, sustainable use and protection of waters, transition to a circular economy, pollution prevention and control and protection and restoration of biodiversity and ecosystems (Jensen, 2023: 5).

Regarding the detailed certification rules for the measurement, monitoring, reporting and verification, the Regulation dealt “with the mandatory steps set out in a certification process, from the submission of application by a carbon removal activity operator, the operator’s detailed description of the activity and applied certification methodology” (Jensen, 2023: 6). These procedures include small details like how a certification body should conduct an audit, how advisory services are provided, that the operators will take notes of expected carbon removals and net carbon removal benefits, and that the periodic re-certification audits can be performed (Jensen, 2023: 5) or that the all the certification schemes, even if they are public or private, would need to apply to the Commission in order to be recognised (Jensen, 2023: 6). The high level of technical details is meant to generate a coherent system that will reshape the trust in the VCM of the European Union.

For the forestry sector, the difficulties in measuring carbon fluxes and generating carbon credits that do not reflect reality is mitigated using new technologies. The Regulation encourages monitoring of the land using “digital databases, Geographic Information Systems (GIS) and remote sensing, including the Copernicus Sentinel satellites and services (e.g. Climate and Land Services), or commercially available services” (European Commission, 2022a). By doing so, monitoring activities will be conducted at lower costs, save more time, and have the potential to claim objectivity.

4. Conclusions

In the last decades, the climate emergency pushed the international community to look for adaptation and mitigation solutions. Starting with the Kyoto Protocol, a carbon market was established to generate transactions between those who emit CO₂ and those who remove it from the atmosphere as part of the solution to limit global warming at two degrees Celsius compared with the pre-industrial era. A VCM is a place where transactions happen voluntarily, and many other actors from civil society can be involved. The actors involved can be operators, consultants, or buyers. The need for carbon certificates is generated by the desire to reach carbon neutrality, not by formal obligations.

Because of the different certification schemes, the difficulty in measuring and assessing a carbon removal project and the low trust in the current international carbon standards, especially in the field of forestry that I took as a case study, an insignificant number of projects

were developed in the European Union. Also, recent investigations showed that some carbon credits generated for rainforests under REDD+ were not reflecting reality, shaking the public trust in the VCM.

European Commission recently drafted a legislative proposal aiming to boost the European VCM. European Parliament or the Council can still modify the proposed Regulation, but clear directions can be found for tackling the identified obstacles. A set of Q.U.A.L.I.T.Y criteria was proposed for assessing carbon projects and clear certification rules for the measurement, monitoring, reporting and verification. These new changes are trying to design a clear set of rules and methods for carbon projects to increase public trust and boost the number of European projects. Also, robust and transparent carbon storage and removal practices might make a carbon-neutral Europe easier to achieve.

The forestry sector, dominant in VCM through A/R and REDD+ initiatives, faces specific challenges in achieving additionality because of the high and diverse national regulations and diverse funding opportunities (e.g. National Recovery and Resilience plans). In this case, the EU's future certification schemes will provide more coherence and introduce new technologies like satellite monitoring for proper assessments.

Endnotes

1. IPCC was established in 1988 by the United Nations Environment Programme and the World Meteorological Organisation and has become a centralising voice in climate change, gathering notorious researchers and scholars. IPCC's central role is to disseminate the scientific results of its Working Group studies (Holloway, 1999: 2020-2021).

2. Besides the policies regarding climate change mitigation, there are also various adaptation strategies. Many plans, policies and strategies are set to anticipate the global climate's future destabilisation and prepare the human population for these challenges. The actors involved in this process are academics, businesses, NGOs and governments (Mikulewicz, 2020: 2).

3. The case of Eastern Europe might be slightly different. The depopulation process left more room for nature. Fred Pearce argues that after many years of illegal logging, which started in the 1990s, the rural communities' exodus left large amounts of farmland abandoned, and new young forests started to colonise these areas (Pearce, 2022).

Conflicts of interest

The author declares no conflict of interest.

About the author

Mihail Caradaică was born in 1987, in Pogoanele, Romania. He is currently a Lecturer in European Studies at the National University of Political Studies and Public Administration (SNSPA). His academic path is strongly connected with the same university as follows: a bachelor's degree in political science, a master's degree in international relations and European integration, and then a PhD thesis entitled "European Union in the Neoliberal Age: A Neo-gramscian Approach". He coordinates the activity of two research centres: the Institute for Global Digital Policies and the Institute for International Cooperation and Development.

References

- Dreesen, B. (2022) \$2 Billion Global Voluntary Market Leaves Europe in its Wake. Available at <https://blog.opisnet.com/vcm-leaves-europe-in-wake>, [accessed March 18 2023].
- European Commission (2022a). Regulation of the European Parliament and of the Council establishing a Union certification framework for carbon removals. Available at: https://climate.ec.europa.eu/system/files/2022-11/Proposal_for_a_Regulation_establishing_a_Union_certification_framework_for_carbon_removals.pdf, [accessed March 18 2023].
- European Commission (2022b). Commission Staff Working Document Executive Summary of the Impact Assessment Report. Accompanying the document. Proposal for a Regulation of the European Parliament and of the Council establishing a Union certification framework for carbon removals. Available at <https://climate.ec.europa.eu/system/files/2022-11/Impact%20Assessment%20report%20on%20the%20Regulation%20for%20a%20Union%20certification%20framework%20for%20carbon%20removals.pdf>, [accessed March 18 2023]
- Forrister, D. (2021). Introduction. In Kouchakji, K. *The Anatomy of the Carbon Market*. Available at: https://www.ieta.org/resources/Resources/GHG_Report/2021/IETA-2021-GHG-Report.pdf, [accessed March 17 2023].
- Greenfield, P. (2023) Revealed: more than 90% of rainforest carbon offsets by biggest certifier are worthless, analysis shows. *The Guardian*. Available at: <https://www.theguardian.com/environment/2023/jan/18/revealed-forest-carbon-offsets-biggest-provider-worthless-verra-aoe> [accessed March 28 2023].
- Holloway, L. (1999) Understanding climate change and farming: scientific and farmers' constructions of 'global warming' in relation to agriculture. *Environment and Planning A* 1999, 31 (1), pp. 2017-2032
- Hunt, C. (2009) *Carbon Sinks and Climate Change. Forests in the Fight Against Global Warming*. Cheltenham: Edward Elgar.
- IPCC (2007). *Climate change: Impacts, adaptations and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the IPCC*. New York: Cambridge University Press.
- IPCC (2021) Summary for Policymakers. In Masson Delmotte, V. et al. *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. New York: Cambridge University Press.
- Jensen, L. (2023) A Union certification framework for carbon removals. *EPRS – European Parliamentary Research Service*. Available at [https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/739312/EPRS_BRI\(2023\)739312_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/739312/EPRS_BRI(2023)739312_EN.pdf), [accessed March 19 2023]
- Jo, Jang Hwan et al. (2020) Factors and Paths Affecting Payment for Forest Ecosystem Service: Evidence from Voluntary Forest Carbon Market in South Korea. *Sustainability*, 12 (7009), pp. 1-17.
- Keohane, N. and Seymour, F. (2021) Forests and International Carbon Markets. *Climate and Forests 2030. Forests and International Carbon Markets*. Available at <https://invenio.unidep.org/invenio/record/25699/files/CARBON-MARKET.pdf>, [accessed March 18 2023]
- Kollmus, A. et al. (2010) *Handbook of Carbon Offset Programs. Trading Systems, Funds, Protocols and Standards*. London: Earthscan.
- Kramer, L. (2020) Planning for Climate and the Environment: the EU Green Deal. *Journal for European Environmental & Planning Law*, 17 (2020): pp. 267-306.
- Lang, S., Blum M. and Leipold S. (2018) What future for the voluntary carbon offset market after Paris? An explorative study based on the Discursive Agency Approach. *Climate Policy*, 19:4, 414-426. Available at: <https://doi.org/10.1080/14693062.2018.1556152>.
- Lee, D-H., Kim, D-H. and Kim S-I. (2017) Characteristics of forest carbon credit transactions in the voluntary carbon market. *Climate Policy*, 18:2, 235-245. Available at: <https://doi.org/10.1080/14693062.2016.1277682>.
- Lee, S-Y., Park, Y.S. and Klassen, R.D. (2013) Market Responses to Firms' Voluntary Climate Change Information Disclosure and Carbon Communication. *Corporate Social Responsibility and Environmental Management*. Available at: <https://doi.org/10.1002/csr.1321>.
- Merger, E. and Pistorius, T. (2011) Effectiveness and legitimacy of forest carbon standards in the OTC voluntary carbon market". *Carbon Balance and Management*, 6 (4). Available at <http://www.cbmjournals.com/content/6/1/4>, [accessed March 17 2023].

- Mikulewicz, M. (2020) The Discursive Politics of Adaptation to Climate Change. *Annals of the American Association of Geographers*, 110:6, 1807-1830. Available at: <https://doi.org/10.1080/24694452.2020.1736981>.
- Pearce, F. (2022) *A Trillion Trees: Restoring Our Forests by Trusting in Nature*. Greystone Books. eBook.
- Pek, G. (2023) Verra scandal summarised & the complexity of forest-related carbon credits. *Mothership*. Available at: <https://mothership.sg/2023/02/verra-carbon-credits-scandal/>, [accessed March 28 2023].
- Si C., Marbough D., Moore S., and Stern K. (2021) Voluntary Carbon Offsets: An Empirical Market Study. Available at: <https://ssrn.com/abstract=3981914> or <http://dx.doi.org/10.2139/ssrn.3981914>, [accessed March 18 2023].
- Singh, P. (2023) Climate Change, Gender and Traditional Livelihoods: Some Reflections from India. In Pardeep, S., Bendangwapang, A. and Yadav, A. *Global Climate Change and Environmental Refugees. Nature, Framework and Legality*. Cham: Springer.
- United Nations (2015) The Paris Agreement. Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf, [accessed March 17 2023].
- Wendler, F. (2022) *Framing Climate Change in the EU and US After the Paris Agreement*. Cham: Palgrave Macmillan.
- Wyns, T. and Khandekar, G. (2019) Industrial Climate Neutrality in the EU: Outline of an Integrated Industrial Green Deal. *Intereconomics*, 6 (1), pp. 325-332.
- Xiang, J. (2022). *Climate Change, Sustainable Development and Cleantech*. Cheltenham: Edward Elgar Publishing.