REVISITING THE GLOBAL CLIMATE AGENDA: TIME FOR A U-TURN? / ¿NECESITA LA AGENDA CLIMÁTICA GLOBAL UN GIRO DE 180 GRADOS?

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Abstract

International agreements negotiated under the UN Framework Convention on Climate Change have not changed greenhouse gas emission trends. From a critical ecological economics perspective, this article pursues to further stimulate the debate on whether the current Global Climate Agenda (GCA) is being effective or, in contrast, needs a U-turn, as suggested by researchers on climate policy and governance who critically point to a GCA fueling capitalism as the cause behind its failure. In other words, these authors argue that the rules driving the world capitalist economy are also shaping the GCA. Such rules build on the growth imperative benefitting an elite minority while entailing an ever-expanding socioeconomic metabolism being responsible for the planetary socioecological crisis. The paper underlines the occurrence of a shift in the guiding principles of climate politics from the 1980s onwards when economic growth became an unquestionable global political objective at the international governance level. In a context of climate emergency where evidence shows a positive correlation between global GDP and emissions, critically analyzing the GCA due to its promotion of a growth-oriented green economy under the umbrella of sustainable development (SD) becomes an unavoidable task.

Keywords: *Greenhouse gas emissions, climate agenda, technological solutions, green growth, sustainable development*

Resumen

Los acuerdos internacionales negociados bajo la Convención Marco de las Naciones Unidas sobre el Cambio Climático no han modificado la tendencia al alza de las emisiones de gases de efecto invernadero. Desde la economía ecológica crítica, este artículo busca estimular el debate sobre si la actual Agenda Climática Global (ACG) está siendo eficaz o, por el contrario, necesita un giro de 180 grados, como sugieren investigadoras e investigadores críticos sobre política y gobernanza climáticas, que señalan a una ACG que alimenta el capitalismo como la causa de su fracaso. En otras palabras, estas autoras y autores sostienen que las reglas que rigen la economía capitalista mundial también están moldeando la ACG. Estas reglas se fundamentan en el imperativo del crecimiento económico que beneficia a una élite minoritaria al tiempo que estimula un metabolismo socioeconómico en constante expansión, responsable de la crisis socioecológica planetaria. El artículo subraya el cambio ocurrido en los principios rectores de la política climática a partir de la década de 1980, cuando el crecimiento se convirtió en un objetivo político global incuestionable en la esfera de la gobernanza internacional. En un contexto de emergencia climática donde la evidencia muestra una correlación positiva entre el PIB mundial y las emisiones, analizar críticamente la ACG dado su empeño en promover una economía verde pro-crecimiento bajo el paraguas del desarrollo sostenible se convierte hoy en una tarea ineludible.

Palabras clave: *Emisiones de gases de efecto invernadero, agenda climática, soluciones tecnológicas, crecimiento verde, desarrollo sostenible*

INTRODUCTION

Climate change (CC) is one of the world's biggest socio-ecological challenges (Ash *et al.*, 2013; McNutt, 2013). Since the Study of Critical Environmental Problems conference held half a century ago, many scientists have warned about the serious consequences of CC and their cumulative impacts on ecosystems and their dependent human systems (Ripple *et al.*, 2017; Rockström *et al.*, 2009). Higher temperatures, eutrophication, ocean acidification, lower precipitation rates, sea level rise or more frequent and intense extreme events among others are expected to affect terrestrial and aquatic ecosystems as well as water and energy facilities, infrastructures, human health, the economy, human rights and social justice (IPCC, 2014, 2018, 2022).

To face this challenge, a Global Climate Agenda (GCA) was initiated with the creation of the Intergovernmental Panel on Climate Change (IPCC) in 1988 and the UN Framework Convention on Climate Change (UNFCCC) in 1992. However, the political commitments derived from the UNFCCC-related international agreements have not changed greenhouse gas (GHG) emissions trends and global emissions have continued to increase (Kuyper *et al.*, 2018; Wamsler *et al.*, 2020). From 2000 to 2010, they grew on average by 2.2% per year, almost doubling the mean annual growth rate for the 1970-2000 period (IPCC, 2014). Friedlingstein *et al.*(2020) show that total CO_2 emissions went from an annual mean of 4.5 $Gtyr^{-1}$ for the decade of the 1960s to one of 10.9 $Gtyr^{-1}$ during 2010-2019, a rise of 149%. Emission trends have only been interrupted during global economic recessions (e.g. aftermath of World War II, oil crisis of the late 1970s, 2008 financial crash). The dramatic 8.8% fall in global CO_2 emissions in the first half of 2020 (compared to the same 2019 period) due to the COVID-19 pandemic (Liu *et al.*, 2020) is the latest example. Nevertheless, this drop is likely to be temporary as it does not reflect structural economic, transport or energy systems changes (Le Quéré *et al.*, 2020). Global emissions actually restarted growth in 2021 (JCR, 2022). So evidence shows that the international CC mitigation efforts made during the last thirty years have not been sufficient to reduce emissions, thus signalling the failure of global climate policies (Stevenson, 2021; Stevenson & Dryzek, 2013). From the Berlin Mandate resulting from the first 1995 Conference Of the Parties (COP) (which formed the starting point for the negotiations toward the Kyoto Protocol) to the Paris Agreement, Global North countries have been reluctant to undertake ambitious climate action and have yet

to enhance support to Global South countries in finance technology and capacity (Bailey, 2017; Dryzek *et al.*, 2013; Helm, 2008; Kuyper *et al.*, 2018; Nieto *et al.*, 2018).

The question of why has so little been achieved in terms of global climate agreements is an issue of ongoing concern within the literature. Important contributors to climate policy failure include the complex nature of CC, the difficulty to bring on board aviation and shipping, the focus on carbon production (rather than consumption), the voluntary nature of agreements, the free-rider problem, the lack of willingness by governments to compromise national interests (or by corporations to solve the problem), the increased participation of non-state actors under a consensus-based system, the doubtful UNFCCC's ability to deliver a truly inclusive and deliberative space, and high future discounting (Bailey, 2017; Helm, 2008; Kuyper *et al.*, 2018). Implicitly, such analyses point to the "flexibility" of the current climate policy as one of the main drivers of its ineffectiveness. Kuyper *et al.* (2018) show how climate policy has shifted from Kyoto's targeting emissions from advanced capitalist countries to the requirement of intended nationally determined contributions (NDC) by all Paris Agreement's signatories. This has led the UNFCCC to focus more on coordinating a high number of state, substate and nonstate actors to reach global agreements than setting targets and emission allocation among countries, thus watering down the emission reductions responsibility of the enriched ones. Beyond the fact that the NDCs are not legally binding, Nieto *et al.* (2018) point to other reasons evidencing policy's flexibility: the non-existence of any control, monitoring and penalization system; the low quality and scarce clarity of the provided information; the need of a high amount of external funding for Global South countries to comply with NDCs; and the fact that most funding has to be channelled through individual projects, carbon markets and private initiatives. Accordingly, they conclude that, in the best case scenario, global emissions would increase by about 19%, thus making it impossible to meet the 2ºC Paris target.

In this field, critical research works on climate policy and governance point to specific economic and political factors as the cause behind the "flexibility" of the GCA (Ciplet & Roberts, 2017; Fremstad & Paul, 2022; Lohmann, 2017). In particular, and despite they are heterogeneous in terms of their fundamental concepts, logical analysis, and proposed solutions, these works argue that the current socioeconomic system, capitalism, is at the root of policy failure. So their analyses go beyond presenting CC as a human induced phenomenon, as mostly done in the literature, and build on capitalism and class conflicts' issues (Huber, 2020; Malm, 2016). According to this, critical authors state that this system is governed by an elite minority having a stranglehold over the economy, the political process and most of the major media outlets (Klein, 2014), consequently, allowing it to define the rules of the world economy. Put it another way, they recognize that the mechanisms governing the world serve transnational corporations eagerly searching for new profit-making opportunities on the basis of an ever-expanding economic growth. These mechanisms, which build on a blind faith in capitalist free trade ideas benefiting the wealthiest, have also permeated climate policy (Fremstad & Paul, 2022). Weiss *et al.* (2017) show evidence that, in the late 1990s, in comparison with civil society organizations, transnational corporations increased their access to nation-states and UN agencies, thus leading to changes in UN documents towards a corporate global environmental framework. The contemporary UNFCCC regime, Ciplet & Roberts (2017) remind us, has thus institutionalized neoliberal reforms in climate governance. The Paris Agreement's "intended nationally determined contradictions" (Spash, 2016) well exemplify this, thus leading some authors to qualify Paris as a major success of neoliberal climate politics (Lohmann, 2017) .

Altogether feeds a socioeconomic metabolism (represented by the material and energy flows between nature and society) being highly dependent on accelerated, intense extractive activities and hence responsible for important planetary socioecological impacts (Boulding, 1966; Haberl *et al.*, 2019; Krausmann *et al.*, 2018; Pauliuk & Hertwich, 2015; Schandl *et al.*, 2018). So critical authors call for changing the rules of the game in the global economy as they grant privileges to the wealthiest at the cost of Earth's ecological degradation and people's lifes (Malm, 2016; Newell, 2011, 2012). They all claim there is a need to replace the dominant

societal objectives, based on profit and capital accumulation, and to shift the balance of political-cultural power in society to ensure a real path toward sustainability (Bailey, 2017; Foster & Clark, 2012; Klein, 2020; O'Brien, 2017; Pelling, 2011; Piketty, 2022). Their heterogeneity regarding basic conceptualization and reasoning towards a radical change does not seem to be an obstacle to reach consensus on the real cause underlying the actual socioecological crisis. Instead, such a heterogeneity emerges as an opportunity to enrich the current discussions on the need to reverse a GCA fueling capitalism for the sake of an ecologically and socially healthier future. From this collective critical research work, we have thus importantly learnt not only that capitalism is at odds with stopping CC, but also that pro-capitalist interests have great influence over the GCA, thus interfering with the possible deployment of agreements and policies that are actually effective.

Through a literature review, and from a critical ecological economics perspective, this article aims to further contribute to the above-mentioned research. Based on a climate-related discourse analysis, it documents a shift in the guiding principles of climate politics from the 1980s onwards when economic growth became an unquestionable global objective at the international governance level. To better fit its purpose, the paper divides the discussion into two parts. First, it offers a general picture of the current GCA by briefly presenting its goal, pillars and main characteristics as well as argues why it represents a shift in climate governance compared to the period before its creation. A short description of the political-historical features of the international context where the GCA was conceived is also given to show that the GCA took off when the logics of capital became dominant in both thought and practice throughout much of the world (Harvey, 2005). Second, it discusses the weaknesses and inconsistencies of the GCA through research which further helps to understand the shift in climate politics occurred in the 1980s. In a context of climate emergency where evidence shows a positive correlation between global GDP and emissions (Kallis *et al.*, 2018), critically analyzing the GCA due to its promotion of a growth-oriented green economy under the umbrella of sustainable development (SD) (Moreno, Speich, & Fuhr, 2016) becomes an unavoidable task.

SHAPING THE CURRENT GLOBAL CLIMATE AGENDA: AN OVERVIEW

The background

The current GCA was initiated at the beginning of an era characterized by privatization, commodification and financialization processes together with international trade liberalization which has come to be labelled as "neoliberal" (Dorninger *et al.*, 2021; Harvey, 2005). The multidimensional crisis in the 1970s, linked to energy, economic, monetary, fiscal and sociopolitical issues as well as North-South and West-East disparities, and the resulting decline in economic growth, allowed the election victories of Margaret Thatcher in the UK (1979) and Ronald Reagan in USA (1981) (Fernández-Durán, 2010; Fernández-Durán & González-Reyes, 2018; Fontana, 2011). This gave way to an important world political and cultural change which weakened the labor movement and reduced the strength of social mobilizations emerged from the 1968 uprisings (Fontana, 2018; Hobsbawm, 1994). The privatization of public enterprises and services and the lower taxation of corporations, in addition to their tax evasion, alongside the cuts to public spending, led to a gradual dismantling of the welfare state and rising inequality (Piketty, 2022) at the time the planetary socio-ecological problems including CC were further exacerbated (Newell, 2011).

Moved by the neoliberal discourse, the advanced capitalist countries enshrined economic growth as a global political objective which would not be questioned anymore at the international governance level. Their drive to present growth as a major ingredient for development (Redclift, 1987) was aided by the relatively low prices of raw materials and oil as well as their stronger bargaining position at the global level (Naredo, 2006). In this context, the growth-fuelled intensive resource consumption led the enriched nations to

significantly increase their waste and emissions, thus shifting the global attention from resource scarcity to waste and climate issues[1].

The goal, the pillars and the carbon agenda

The analysis of the work done by the institutions shaping the GCA including their publications (e.g. IPCC reports) and policy recommendations reveals that the goal of a growth-based SD as defined in the 1987 Brundtland Report dominates the climate policy (Torres *et al.*, 2022)[2]. In line with the discourse adopted by the world central governance institutions built on the emerging neoliberal ideology, the IPCC recognizes mainstream SD, termed by some authors as Brundtland-as-usual development (Hall, 2019), as the overarching context for climate action. Likewise, the UNFCCC, the key international treaty to reduce global warming and cope with CC impacts on the basis of the IPCC work (Le Treut *et al.*, 2007), states its ultimate goal (Art. 2) is to stabilize GHG concentrations in the atmosphere to prevent dangerous anthropogenic CC in such a way that enables sustainable economic development[3]. Consequently, the agreements of overall targets and GHG emission allocation negotiated in the annual two-week COPs (Dryzek *et al.*, 2013) under the UNFCCC auspices, from the Berlin Mandate (COP 1) to the Kyoto Protocol (COP 3) and the Paris Agreement (COP 21), pursue mainstream SD which views growth as a key component for development and protection of nature, thus supporting growth over the long-term (WCED, 1987).

Accordingly, investment in renewable and low carbon/non-carbon technologies as well as in energy efficiency measures have become some of the pillars of mitigation[4], as a review of the reports and proceedings of the major climate conferences since the Brundtland report reveals[5]. Understanding CC as a result of fossil fuel burning-generated emissions, as clearly stated at the 1988 World Conference on the Changing Atmosphere: Implications for Global Security (WMO, 1988), the Brundtland report presented solutions to CC in the form of energy choices for the environment and development. Though it recognized the reduction of energy consumption as crucial to achieving a sustainable future, it considered improvements in energy efficiency and transforming the energy mix towards a major share of renewables was more urgent (WCED, 1987). Following neoclassical economics reasoning, the report viewed CC as a market failure to be corrected through the monetary valuation of GHG emissions and market-based environmental policy tools. Since then, the economic valuation of energy's external damage costs and carbon markets have become the policy mechanisms most recommended by the world central climate institutions to deal with CC .

In this context, information about climate variables is also considered a key tool for the countries to better plan for social and economic development, as argued at the 1990 II World Climate Conference (WMO, 1990)[6]. The role of climate information to achieve sustainable energy based on more efficient production

[1] As it will be seen later, such a shift was very convenient for capitalists interests.

[2] The Brundtland report-based SD principle was strongly defended by Margaret Thachter at the World Conference on the Changing Atmosphere: Implications for Global Security, her 1988 foreword to "Our common future" and her speeches to both the Royal Society in 1988 and the UN General Assembly in 1989 (see documents 107302, 107346 and 107817, respectively, at https://www.margaretthatcher.org/document/, accessed 25 May 2020).

[3] Signed at the 1992 UN Conference on Sustainable Development held in Rio de Janeiro, the UNFCCC became operational before the signature of the Marrakesh Agreement (1994), which marked the end of the Uruguay Round of Multilateral Trade Negotiations (1986-1994) and established the World Trade Organization (1995). Since the Rio Summit, the UN has played a very active role in spreading the goodness of mainstream SD, as shown by the UN World Conferences on Sustainable Development held in 2002 (Johannesburg Summit), 2012 (Rio+20) and 2015, as well as the adoption, at the latter, of the 2030 Agenda and its 17 Sustainable Development Goals. See Torres *et al.* (2022) for further information.

[4] In line with the gradual flexibilization process undergone by the global climate policy, adaptation and finance have also become additional goals to mitigation (UNFCCC, 2015), thus highlighting the importance attributed to technological solutions to fight against CC.

[5] See Torres *et al.* (2022) for further information.

[6] This conference both stressed the need for further scientific research by supporting, among others, the World Climate Programme and recommended the urgent development of a Global Climate Observing System (Zillman, 2009).

and use of traditional non-renewable energy forms, as well as on designing and operating renewable energy infrastructures and facilities, was especially emphasized at the 2009 III World Climate Conference (WMO, 2009a). Under the theme "Climate Prediction and Information for Decision Making", this conference recognized climate science and information were key not only to create carbon markets but also to adapt to climate-related risks through climate services and tools[7]. Research and monitoring are then viewed as essential for green technology development and investment to become a new path for growth which can be decoupled from emissions. In consequence, a carbon agenda in the form of carbon budgets, carbon goals, carbon prices and carbon markets has become today a key tool to both design and assess climate policies as the IPCC reports evidence[8].

The shift

The way CC is understood within the current GCA framework represents a shift regarding the way it was considered before the 1980s. Originally, climate researchers concerned with anthropogenic CC viewed the large scale of the human-induced geophysical transformation of Earth as the mechanism through which concentrated organic carbon stored in sedimentary rocks over hundreds of millions of years was released into the atmosphere and oceans (Revelle & Suess, 1957). They expected the continuous exponential rise in fuel combustion derived from an economic growth-oriented metabolism would have a significant impact on the radiation balance thus raising the average global temperature (Plass, 1956). So CC was considered as another global environmental effect from the expansion of human technology and activities—either from the advanced capitalist countries or the countries of real socialism (Steffen *et al.*, 2007), as a review of the publications related to the first climate conferences shows[9]. Indeed, the 1970 Study of Critical Environmental Problems (SCEP) and the 1971 Study of Man's Impact on Climate (SMIC) conferences drew attention to CC as a global environmental problem, thus playing a significant role in visualizing it. Unlike the 1965 Causes of Climate Change Conference (MacDonald, 1966), which was the first scientific conference on the CC causes, the SCEP and SMIC recognized that postponing policies due to scientific uncertainty was unfeasible thus calling not only for further research but also for action (Hammond, 1972; Kellogg, 1987; SCEP, 1970; SMIC , 1971; Wilson & Matthews, 1971). Likewise, under the theme "A Conference of Experts on Climate and Mankind", the 1979 I World Climate Conference (WCC-1) emphasized the interrelated nature of atmospheric processes and expressed increased concerns about the growth-derived ecological effects. This conference pointed out that the continued expansion of human activities could cause important regional and global climate changes which could become significant before the middle of the 21st century, thus opening the door to redirect the world economy to ensure the coevolution of nature and society and hence mankind's long-term survival (WMO, 1979)[10].

Research on the anthropogenic influence on climate was originally developed in a context where the public environmental debate revolved around the structural causes of ecological disruption and the purposes of growth. Indeed, this research gained strength after the World War II when unprecedented, continuous exponential economic growth was happening, thus leading to a societal discussion on the

[7] Under recognition that CC should be addressed through a mitigation/adaptation balance, the conference supported the development and implementation of the Global Framework for Climate Services (WMO, 2009b).

[8] See the IPCC reports at https://www.ipcc.ch/reports/ for further information.

[9] See Torres *et al.* (2022) for further information on the main climate conferences held before the 1980s. The authors analyze the climate-focused events considered to be more representative to explain the development of climate politics together with the main international events focusing on economic/ecological issues which characterized the political-historical context where the former took place as they are expected to have played a role in the GCA construction.

[10] The WCC-1 also called on the World Climate Programme (WCP) to act as an authoritative international scientific scheme to improve understanding of the climate system so that societies could better cope with climate variability and change.

global environmental effects from the expansion of human activities and their consequences on the Earth's ecological balance[11]. The concerns about this expressed at the 1955 monumental "Man's Role in Changing the Face of the Earth" Symposium held in Princeton (Naredo & Gutiérrez, 2005) are a good example of the social atmosphere that prevailed at the time[12]. Such a societal debate was further stimulated by increased social awareness about the ecological limits to growth in a finite planet which the energy crisis in the 1970s and the publication of the influential Meadows (1972)'s report contributed to. So research on anthropogenic CC nourished a broader scientific approach concerned with the disturbance of the planetary ecological balance by the industrial civilization metabolism. Such an approach, built on Verdnasky (1926), considered both the interrelated nature of atmospheric processes and industrial metabolism, pointing out that the volume of materials produced by human industry was approaching the scale of geological forces (Weart, 2008). Concerns about resource scarcity and ecological impacts as constraints to economic growth raised the need to alter growth trends and to establish a sustainable condition of ecological and economic stability (Meadows *et al.*, 1972). Interestingly, despite growth's political hegemony was taking shape since the mid-twentieth century (Schmelzer, 2016), rethinking the purposes of growth was viewed as necessary (UNCHE, 1972). In other words, questioning growth was still politically accepted in the face of the empirical evicence about its consequences, and it was not uncommon to hear voices against it as well exemplied by the president of the European Comission (1972-1973), Sicco Mansholt, who even advocated for a non-growth policy (Martínez-Alier, 2014). The 1974 Cocoyoc Symposium also openly challenged mainstream theories of growth and development (UNEP/UNCTAD, 1974). However, the gradual adoption of the neoliberal doctrine by the world central governance institutions led to finally enshrine growth as a global political objective that would not be questioned anymore at the international level. To this end, they spared no effort to create a narrative according to which growth would be viewed as the solution to all social and environmental problems rather than a driver of socio-ecological decline (Gómez-Baggethun & Naredo, 2015). This shift was evidenced at the 1987 "The Earth as Transformed by Human Action" Symposium, as denounced at the 2005 "Man's Role in Changing the Face of the Earth" Symposium held in Lanzarote to commemorate the 50th anniversary of that held in Princeton (Naredo & Gutiérrez, 2005).

FROM MANKIND'S IMPACTS ON THE EARTH TO GHG EMISSIONS INTO THE ATMOSPHERE: A CRITICAL DISCUSSION.

The focus on the carbon metric

The emerging neoliberal discourse led to create a congruent narrative within the CC framework thus shifting attention from the planetary ecological disruption (due to increasing resource extraction and global environmental problems) caused by the growth-driven expansion of human activities (Schandl *et al.*, 2018) to the fossil fuel burning-derived gases unintendedly put into the atmosphere. The themes of the climate conferences held since the mid-twentieth century, which moved the focus from mankind's metabolism and its derived impacts on the Earth to GHG emissions into the atmosphere, are good proof of it[13].

Redefining CC as a negative externality from certain forms of growth has been said to be useful to multinational corporations and financial capital as it stimulates an emerging green capitalism which views nature as a new frontier of capital accumulation (Bryant, 2018; Cavanagh & Benjaminsen, 2017; Smith, 2007). The mainstream SD concept is argued to have served as a wake-up call to initiate a climate agenda serving capital's interests. The critical literature on climate policy and governance states that focusing

[11] Accordinlgy, the events discussed in this paper are the ones taking place after the World War II.

[12] The Symposium, organized by the influential historical and institutional geography 'school' of the University of Berkeley, brought together scholars from all over the world working in a wide range of fields.

[13] See Table 1 in Torres *et al.* (2022) to see this "curiosity" at a glance.

on the need to "decarbonize" the economy has contributed to developing a climate commodification and financialization process (Bailey, 2017; Bridge, Bulkeley, Langley, & van Veelen, 2020; Lohmann, 2006, 2012; Paterson, 2001) where carbon emissions can be added, subtracted, moved or compensated through projects supported by green finance (Castree & Christophers, 2015). In this sense, information is said to play an important economic and social role in developing climate commodification and financial mechanisms to function as socio-ecological fixes to the 2008 financial crash (McCarthy, 2015).

From this perspective, the fact that the GHG emissions accounting has been converted into a key tool to design and assess climate policies, which are consequently considered good if providing a reduction or net reduction of CO_2 emissions, has led to short process analyses overlooking the rest of realities and their links (Moreno *et al.*, 2016). Within the critical climate literature it is argued that focusing on emission accounting runs the risk to limit the policy debate on energy demand reduction to discussions on both end-of-pipe technological solutions, which in turn are those that capital can take advantage of and extract profits from (O'Brien, 2018), and the need to change individual lifestyles (Roy & Pal, 2009). In contrast, policies implying radical social transformations are simply set aside from the GCA (Malm, 2021). The conventional economics approach is said to treat GHG emissions only as a technical question of correcting for market failures ignoring the social and political aspects involved in mitigation and adaptation (Bailey, 2017). As Moreno *et al.* (2016) state, proposing solutions based on low carbon/renewable technologies and market-based instruments do not question the capitalist order but reassert it. Even more, the existing optimism towards technological solutions also helps to explain why adaptation has also become a priority climate policy, as stated by the IPCC (2001), thus further diverting the attention away from the debate on the need to change the rules driving the world economy and therefore transcend capitalism. However, this debate is essential especially in a context where supply risks for some of the raw materials required to develop green technologies are high (Valero *et al.*, 2021). A risk which has even been recently recognized by the International Energy Agency (IEA, 2022).

The hybrid membership of the IPCC

The hybrid nature of the members of the IPCC (consisting of government representatives and scientists) is also viewed as a signal of a GCA serving a self-interested elite within the critical literature on climate policy and governance. Indeed, Margaret Thatcher became the first major political leader to take a determined stand on CC and invest new funds in related research thus promoting the creation of the IPCC (Weart, 2008). But at the time she promoted the creation of the IPCC, she also initiated a "Thatcherism" process fed by radical capitalist policies (Edgerton, 2018). While closing coal mines and weakening miners' unions in the country (Milne, 2014), she was initiating intensive oil and gas drilling projects in the North Sea, trying to reactivate the nuclear power and arms sectors and starting to import coal from the rest of the world (Fernández-Durán, 2010). This shows, critical authors state, how Thatcher opportunistically raised the banner of climate activism[14], as the current climate governance institutions do today as well. They remember that the creation of the IPCC also received support by the conservatives and CC sceptics in the US administration who aimed to tame climate politics. Indeed, they argue conservatives and sceptics considered it would be easier to control an IPCC created under the UN scheme, which would lead to more moderate statements, than independent scientists and their structures (Weart, 2008). Besides, having a UN body for assessing CC related science would convert the work of IPCC into the official and soundest CC knowledge this serving as a way of silencing critical voices of environmental NGOs and scholars (Hulme, 2020). By continuously stressing the need for further scientific research, climate action could be easily postponed thus ensuring the expansion of global capitalism.

[14] However, concerned about anti-capitalist arguments which the campaigners against global warming were deploying, she later abandoned the CC cause and consequently her arguments that growth had to be environmentally sustainable (Thatcher, 2020).

So despite being the authoritative source of CC knowledge (Zillman, 2009), the hybrid membership of the IPCC has led to some controversies around its work. Disputes have been said to normally involve its economic and policy aspects rather than its scientific results which although having to be negotiated are considered quite robust (Helm, 2008). However, some authors state that the IPCC's consensus approach leads to the underexposure not only of political but also of scientific dissent, thus leading to the politicization of climate science (van der Sluijs *et al.*, 2010). The last episode that exemplifies this has been the publishing in 2022 of the WGII and WGIII contributions to the IPCCs' Sixth Assessment report. For the first time, the Adaptation and Mitigation reports mentioned the term "degrowth" (about 30 times), although it seems that the term conveniently disappeared from the related Summary for Policymakers and Technical Summary reports (Parrique, 2022; Scientific Rebellion, 2022).

The impossibility of decoupling GDP from GHG emissions

Within the critical literature on climate policy and governance, many researchers state that the faith in technology which the GCA's carboncentric perspective builds on has led to believe we can grow unlimitedly (Bailey *et al.*, 2011; Cavagnaro & Curiel, 2012) through investments in green technologies (e.g. renewable energy, energy efficiency, low carbon/non-carbon transport) and emission compensation mechanisms (Paterson, 2001). On the basis of an ecological modernization discourse, this faith leads to believe green growth is possible and the solution to CC. Even more, the social and technical progress virtues which have been usually attributed to growth help to explain why the growth-based SD advocated for by the central sustainability governance institutions is viewed not only as possible but also as desirable (Valladares *et al.*, 2019).

However, the Brundtland report-based idea that continued economic expansion is compatible with planet's ecology, which was formalized at the Rio+20 Summit (Hickel & Kallis, 2020) through the concept of green growth (Brand, 2012), has been proved to lack empirical support. The belief that technology and substitution can improve resource efficiency with the help of market-based environmental policy tools have been refuted by empirical data. Evidence shows that GDP cannot be decoupled from material and energy use (Haberl *et al.*, 2020; Vadén *et al.*, 2020; Ward *et al.*, 2016; Wiedenhofer *et al.*, 2020) as it requires the appropriation and transformation of physical resources (Cavagnaro & Curiel, 2012), thus a continued GDP growth will necessarily involve an increased use of materials and energy. Besides, physical limits governing efficiency gains make permanent decoupling (absolute or relative) impossible for essential, non-substitutable resources (Ward *et al.*, 2016). Although global historical trends show some relative decoupling, no evidence exists of absolute decoupling, the beginning of the 21st century showing worse efficiency and re-coupling occurring (Hickel & Kallis, 2020). The Kuznets Curve-inspired hypothesis of dematerialization with GDP growth has happened in developed countries via, among others, outsourcing industrial activity to developing ones with cheaper labour force and softer environmental regulation standards (Gómez-Baggethun & Naredo, 2015; Hardt *et al.*, 2017; Özokcu & Özdemir, 2017).

Empirical data also show a positive correlation between global GDP and CO_2 emissions (Tapia *et al.*, 2012). This supports former concerns about the fact that CC is another global environmental problem derived from the growth-oriented metabolism of capitalism (Schandl *et al.*, 2018). Indeed, such a metabolism makes unlikely decoupling emissions from resource use and hence from growth at a planetary scale. Data evidence that this impossibility also applies to the advanced capitalist countries in spite of some recent examples of absolute GDP decoupling from emissions. Analyses show energy transition has resource requirements which will lead to rising energy demand in a context of technical limitations and rebound effects (Wiedmann *et al.*, 2020). Hickel and Kallis (2020) argue that, while absolute decoupling is happening in some regions, it is unlikely to happen fast enough to reach the 1.5°C/2°C Paris goals if growth continues as it stimulates energy demand. Emission reduction efforts will have to be not only maintained but strengthened to support a global peak in emissions followed by global emissions falls (Le Quéré *et al.*, 2019).

CONCLUSIONS

This article has pursued to further stimulate the debate on whether the current GCA is being effective or, in contrast, needs a U-turn, as suggested by critical researchers on climate policy and governance who point to a GCA fueling capitalism as the cause behind its failure. The analysis shows how the pursuit of economic growth has guided the GCA's construction under the umbrella of SD. Such a growth orientation has limited the political debate to the need for both "decarbonizing" the economy through the energy transition and CC adaptation. This has resulted in a policy architecture highly reliant on technological solutions and market-based instruments which views emissions as easy to handle "puzzle" pieces which can be added, subtracted, moved or compensated.

Taken together, this leads us to believe that green growth is possible and the solution to CC. However, under continued GDP growth evidence shows no absolute decoupling from resource use on a global scale and the impossibility to achieve absolute decoupling from carbon emissions at the rate required by the Paris Agreement (Hickel & Kallis, 2020). The fact that global emissions have kept growing since such an agenda took off thirty years ago seems to increase such an evidence. Even more, the lack of interest in moving beyond growth in spite of this evidence seems to prove what the critical literature on climate policy and governance has long stated: that the GCA is shaped by the rules of capital. Indeed, these rules build on the search of an ever-expanding growth benefitting an elite minority while fueling an extractivist socioeconomic metabolism being responsible for the world socio-ecological crisis. Then the current legal CC regime seems to legitimize the onslaught on the atmosphere (Borràs, 2019). In fact, the agenda was initiated at the beginning of neoliberalism, thus leading to change the guiding principles of climate governance. We underline a shift in the CC understanding from the 1980s onwards according to which CC was not viewed anymore as a growth-derived global environmental problem but as an economic and political failure that had to be technologically fixed.

So the growth-orientation of the GCA seems to evidence a policy architecture subject to the plans of advanced capitalist countries and consequently to the goodwill of both the signatory governments and the major polluters –fossil capital corporations-. It is worth noting that, as their emissions remain outside the bounds of the national jurisdiction (Ivanovich *et al.*, 2019), aviation and shipping have not been directly included in the Paris Agreement, neither in the COP 27 hold in Egypt in 2022. This further exacerbates the ineffectiveness of the climate policy especially in a context where all GHG emissions from aviation have been recently found to warm the climate at approximately three times the rate of that associated with aviation CO_2 emissions alone (Lee *et al.*, 2021). Altogether helps to explain why, in spite of no evidence of absolute decoupling between GDP and emissions, the European Green Deal (EGD), which includes the European Climate Pact and will receive substantial NextGenerationEU funding (one third of the €1.8 trillion investments) in addition to funds from EU's seven-year budget, stills considers a new growth strategy is needed for the EU to overcome all environmental challenges. Even more so, the European Commission's proposal for the first European Climate Change Law, aims to write into law the EGD goal. It also helps to explain why the 17 Sustainable Development Goals (SDG) of the 2030 Agenda express the belief that growth is needed for development (8 SDG), thus overlooking the contradictions between growth and sustainable resource use (Eisenmenger *et al.*, 2020; Hickel, 2019). Indeed, power dynamics and interactions between injustices underlying the SDGs are not questioned (Wiedmann *et al.*, 2020). Even worse, the International Monetary Fund reports that global growth was 3.9% in 2022 and expects it will drop to 2.9% in 2023 to rise again to 3.1% in 2024 (IMF, 2023).

By the end of 2019 more than 11,000 scientists from all over the world declared that the planet Earth is facing a climate emergency and called for urgent action (Ripple *et al.*, 2020). In the second half of 2018,

new youth-led global movements such as Fridays for Future and Extinction Rebellion[15] have emerged claiming for an immediate and convincing climate action to avoid the 1.5ºC temperature increase. Other social movements such as the Degrowth Movement, the Green New Deal for Europe or the International Progressive are also gaining strength in the actual context of socio-ecological crisis. Together with many critical researchers who have long been denouncing the capitalist world disorder, all these movements claim for scaling down aggregate energy use to move towards a different socioeconomic system respecting the planetary boundaries. They have put again on the table the public debate on the limits to growth and justice. The European Environment Agency recently warned about the fact that Europe will not live well with the planet's limits by continuing to promote economic growth (EEA, 2019).

In the Anthropocene era of human activities shaping the face of Earth (Elhacham *et al.*, 2020), where CC acts as a synecdoche for their derived ecological impacts (Hulme, 2017), the GCA needs a U-turn. Evidence suggests that we need to move beyond growth (Capellán-Pérez *et al.*, 2015; Kuhnhenn *et al.*, 2020; Millward-Hopkins *et al.*, 2020), thus transcending capitalism. A finite planet with limited resources seems not to allow for other policy options. It seems that we will not be able to reverse the socio-ecological problems if at the same time we keep the capitalist growth machine running at full speed (Trantas, 2021). The COVID-19 pandemic should serve as a wake-up call to tackle the climate crisis even more urgently and move toward a better future (Perkins *et al.*, 2020). The structural imperative for growth then needs to be challenged (Wiedmann *et al.*, 2020). Urgent, transformative action is required (Díaz *et al.*, 2019; Dryzek, 2016; Mastini *et al.*, 2021; Torres & Moranta, 2020 ; Wamsler *et al.*, 2020). The beginning of an era of severe limits and scarcity seems to make non-negotiable the transitions to a more sustainable and just society (Trainer, 2019). In this regard, CC should be repoliticized (Liverman, 2015). Considering the role of politics and power in perpetuating business as usual is essential to ensure coherent transformative responses which question existing thought paradigms and patterns (O'Brien, 2017). Planet Earth keeps warming. The global surface temperature for 2022 was the sixth highest since record keeping began in 1880, and NASA ranks 2022 as the fifth-warmest year on record, tying with 2015 (NOAA, 2022). If CC continues, future projections point to a potentially catastrophic global biodiversity loss (Trisos *et al.*, 2020). So no matter how big the challenge of moving beyond growth will be, the CC challenge is undoubtedly much bigger. It then seems that the time has come for a U-turn in the GCA.

BIBLIOGRAPHY

Ash, Caroline; Culotta, Elizabeth; Fahrenkamp-Uppenbrink, Julia; Malakoff, David; Smith, Jesse; Sugden, Andrew & Vignieri, Sacha (2013). Once and future climate change. *Science*, *341*(6145), 472–473. https://doi.org/10.1126/science.341.6145.472

Bailey, Ian (2017). Climate change policy. *The International Encyclopedia of Geography*, 1–12. https://doi.org/10.1002/9781118786352.wbieg0537

Bailey, Ian; Gouldson, Andy & Newell, Peter (2011). Ecological modernisation and the governance of carbon: a critical analysis. *Antipode*, *43*(3), 682–703. https://doi.org/10.1111/j.1467-8330.2011.00880.x

Borràs, Susana (2019). Colonizing the atmosphere: a common concern without climate justice law? *Journal of Political Ecology*, *26*(1), 105–127. https://doi.org/10.2458/v26i1.21817

Boulding, Kenneth E. (1966). The economics of the coming spaceship earth. In H. Jarrett (Ed.), *Environmental Quality in A Growing Economy: Essays from the Sixth RFF Forum* (pp. 1–20). Johns Hopkins Press.

[15] See the website of the movements for further information (https://fridaysforfuture.org/ and https://rebellion.global/about-us/, respectively, accessed on February 1st, 2023).

Brand, Ulrich (2012). Green Economy – the next oxymoron? No lessons learned from failures of implementing sustainable development. *GAIA - Ecological Perspectives for Science and Society*, *21*(1), 28–32. https://doi.org/https://doi.org/10.14512/gaia.21.1.9

Bridge, Gavin; Bulkeley, Harriet; Langley, Paul; & van Veelen, Bregje (2020). Pluralizing and problematizing carbon finance. *Progress in Human Geography*, *44*(4), 724–742. https://doi.org/10.1177/0309132519856260

Bryant, Gareth (2018). Nature as accumulation strategy? Finance, nature, and value in carbon markets. *Annals of the American Association of Geographers*, *108*(3), 605–619. https://doi.org/10.1080/24694452.2017.1375887

Capellán-Pérez, Íñigo; Mediavilla, Margarita; de Castro, Carlos; Carpintero, Óscar & Miguel, Luis Javier (2015). More growth? An unfeasible option to overcome critical energy constraints and climate change. *Sustainability Science*, *10*(3), 397–411. https://doi.org/10.1007/s11625-015-0299-3

Castree, Noel & Christophers, Brett (2015). Banking spatially on the future: capital switching, infrastructure, and the ecological fix. *Annals of the Association of American Geographers*, *105*(2), 378–386. https://doi.org/10.1080/00045608.2014.985622

Cavagnaro, Elena & Curiel, George H. (2012). *The three levels of sustainability*. Greenleaf Publishing.

Cavanagh, Connor Joseph & Benjaminsen, Tor Arve (2017). Political ecology, variegated green economies, and the foreclosure of alternative sustainabilities. *Journal of Political Ecology*, *24*(1), 200–216. https://doi.org/10.2458/v24i1.20800

Ciplet, David & Roberts, J. Timmons (2017). Climate change and the transition to neoliberal environmental governance. *Global Environmental Change*, *46*, 148–156. https://doi.org/10.1016/j.gloenvcha.2017.09.003

Díaz, Sandra; Settele, Josef; Brondízio, Eduardo S.; Ngo, Hien T.; Agard, John; Arneth, Almut; Balvanera, Patricia; Brauman, Kate A.; Butchart, Stuart H. M.; Chan, Kai M. A.; Garibaldi, Lucas A.; Ichii, Kazuhito; Liu, Jianguo; Subramanian, Suneetha M.; Midgley, Guy F.; Miloslavich, Patricia; Molnár, Zsolt; Obura, David; Pfaff, Alexander, … Zayas, Cynthia N. (2019). Pervasive human-driven decline of life on Earth points to the need for transformative change. *Science*, 366(1327), 1–12. https://doi.org/10.1126/science.aax3100

Dorninger, Christian; Hornborg, Alf; Abson, David J.; von Wehrden, Henrik; Schaffartzik, Anke; Giljum, Stefan; Engler, John-Oliver; Feller, Robert L.; Hubacek, Klaus & Wieland, Hanspeter (2021). Global patterns of ecologically unequal exchange: Implications for sustainability in the 21st century. *Ecological Economics*, *179*, 106824. https://doi.org/10.1016/j.ecolecon.2020.106824

Dryzek, John S. (2016). Institutions for the Anthropocene: governance in a changing Earth system. *British Journal of Political Science*, *46*(4), 937–956. https://doi.org/10.1017/S0007123414000453

Dryzek, John S.; Norgaard, Richard B. & Scholsberg, David (2013). *Climate-challenged society* (169th ed.). Oxford University Press.

Edgerton, David (2018). *The rise and fall of the British nation: a twentieth-century history. 01 edition.* Allen Lane.

EEA (European Environment Agency). (2019). *The European environment – state and outlook 2020 (SOER 2020)*.

Eisenmenger, Nina; Pichler, Melanie; Krenmayr, Nora; Noll, Dominik; Plank, Barbara; Schalmann, Ekaterina; Wandl, Marie-Theres & Gingrich, Simone (2020). The Sustainable Development Goals prioritize economic growth over sustainable resource use: a critical reflection on the SDGs from a socio-ecological perspective. *Sustainability Science*, *15*, 1101–1110. https://doi.org/10.1007/s11625-020-00813-x

Elhacham, Emily; Ben-Uri, Liad; Grozovski, Johnatan; Bar-On, Yinon M. & Milo, Ron (2020). Global human-made mass exceeds all living biomass. *Nature*. https://doi.org/10.1038/s41586-020-3010-5

Fernández-Durán, Ramón (2010). Fin del cambio climático como vía para "salvar todos juntos el planeta". *Boletín CF+S*, *46*.

Fernández-Durán, Ramón & González-Reyes, Luis (2018). *En la espiral de la energía. Volumen I. Historia de la humanidad desde el papel de la energía (pero no solo)* (2nd edition). Libros en Acción and Baladre.

Fontana, Josep (2011). *Por el bien del imperio. Una historia del mundo desde 1945*. Ediciones de Pasado y Presente, SL.

Fontana, Josep (2018). *L'ofici d'historiador*. Càtedra Ferrater Mora de Pensament Contemporani, Universitat de Girona, and ATMARCADIA, SL.

Foster, John Bellamy & Clark, Brett (2012). The planetary emergency. *Monthly Review*, *64*(7).

Fremstad, Anders & Paul, Mark (2022). Neoliberalism and climate change: How the free-market myth has prevented climate action. *Ecological Economics*, *197*, 107353. https://doi.org/https://doi.org/10.1016/j.ecolecon.2022.107353

Friedlingstein, Pierre; O'Sullivan, Michael; Jones, Matthew W.; Andrew, Robbie M.; Hauck, Judith; Olsen, Are; Peters, Glen P.; Peters, Wouter; Pongratz, Julia; Sitch, Stephen; Le Quéré, Corinne; Canadell, Josep G.; Ciais, Philippe; Jackson, Robert B.; Alin, Simone; Aragão, Luis E. O. C.; Arneth, Almut; Arora, Vivek; Bates, Nicholas R.; … Zaehle, Sönke (2020). Global carbon budget 2020. *Earth System Science Data*, *12*(4), 3269–3340. https://doi.org/10.5194/essd-12-3269-2020

Gómez-Baggethun, Erik & Naredo, José Manuel (2015). In search of lost time: the rise and fall of limits to growth in international sustainability policy. *Sustainability Science*, *10*(3), 385–395. https://doi.org/10.1007/s11625-015-0308-6

Haberl, Helmut; Wiedenhofer, Dominik; Pauliuk, Stefan; Krausmann, Fridolin; Müller, Daniel B. & Fischer-Kowalski, Marina (2019). Contributions of sociometabolic research to sustainability science. *Nature Sustainability*, *2*(3), 173–184. https://doi.org/10.1038/s41893-019-0225-2

Haberl, Helmut; Wiedenhofer, Dominik; Virág, Doris, Kalt, Gerald; Plank, Barbara; Brockway, Paul; Fishman, Tomer; Hausknost, Daniel; Krausmann, Fridolin; Leon-Gruchalski, Bartholomäus; Mayer, Andreas; Pichler, Melanie; Schaffartzik, Anke; Sousa, Tania; Streeck, Jan & Creutzig, Felix (2020). A systematic review of the evidence on decoupling of GDP, resource use and GHG emissions, part II: synthesizing the insights. *Environmental Research Letters*, *15*(6), 065003. https://doi.org/10.1088/1748-9326/ab842a

Hall, C. Michael (2019). Constructing sustainable tourism development: The 2030 Agenda and the managerial ecology of sustainable tourism. *Journal of Sustainable Tourism*, *27*(7), 1044–1060. https://doi.org/10.1080/09669582.2018.1560456

Hammond, Allen L. (1972). Inadvertent climate modification. Report of the Study of Man's Impact on Climate (SMIC). M. I. T. Press, Cambridge, Mass., 1971. xxiv, 308 pp., illus. Paper, $2.95. *Science*, *176*(4030), 38–38. https://doi.org/10.1126/science.176.4030.38.a

Hardt, Lukas; Barrett, John; Brockway, Paul; Foxon, Timothy J.; Heun, Matthew K.; Owen, Anne & Taylor, Peter G. (2017). Outsourcing or efficiency? Investigating the decline in final energy consumption in the UK productive sectors. *Energy Procedia*, *142*, 2409–2414. https://doi.org/https://doi.org/10.1016/j.egypro.2017.12.175

Harvey, David (2005). *A brief history of neoliberalism*. Oxford University Press.

Helm, Dieter (2008). Climate-change policy: why has so little been achieved? *Oxford Review of Economic Policy*, *24*(2), 211–238.

Hickel, Jason (2019). The contradiction of the sustainable development goals: Growth versus ecology on a finite planet. *Sustainable Development*, *27*(5), 873–884. https://doi.org/https://doi.org/10.1002/sd.1947

Hickel, Jason & Kallis, Giorgos (2020). Is green growth possible? *New Political Economy*, *25*(4). https://doi.org/https://doi.org/10.1080/13563467.2019.1598964

Hobsbawm, Eric (1994). *The age of extremes. A history of the world, 1914-1991*. Vintage Books.

Huber, Matthew T. (2020). Ecology at the point of production: climate change and class struggle. *Polygraph*, *28*, 23–43.

Hulme, Mike (2017). Climate change, concept of. *The International Encyclopedia of Geography*. https://doi.org/10.1002/9781118786352.wbieg0343

Hulme, Mike (2020). Intergovernmental Panel on Climate Change (IPCC). *The International Encyclopedia of Geography*. https://doi.org/10.1002/9781118786352.wbieg0254.pub2

IEA (International Energy Agency). (2022). *The role of critical minerals in clean energy transitions. World Energy Outlook Special Report*. https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf

IMF (2023). *World Economic Outlook Update, January 2023: Inflation peaking amid low growth*.

IPCC (Intergovernmental Panel on Climate Change). (2001). *Climate change 2001: Synthesis report. A contribution of Working Groups I, II, and III to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Robert T. Watson & the Core Writing Team (eds.)]. Cambridge University Press*.

IPCC (Intergovernmental Panel on Climate Change). (2014). *Climate change 2014: Synthesis report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team; Rajendra K. Pachauri & Leo Meyer (eds.)]*.

IPCC (Intergovernmental Panel on Climate Change). (2018). *Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change* [Valérie Masson-Delmotte; Panmao Zhai; Hans-Otto Pörtner; Debra Roberts; Jim Skea; Priyadarshi R. Shukla; Anna Pirani; Wilfran Moufouma-Okia; Clotilde Péan; Roz Pidcock; Sarah Connors; J. B. Robin Matthews; Yang Chen; Xiao Zhou; Melissa I. Gomis; Elisabeth Lonnoy; Tom Maycock; Melinda Tignor & Tim Waterfield (eds.)].

IPCC (Intergovernmental Panel on Climate Change). (2022). *Climate change 2022: impacts, adaptation, and vulnerability. Summary for policymakers. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press [Hans-Otto Pörtner; Debra C. Roberts; Melinda M. B. Tignor; Elvira Poloczanska; Katja Mintenbeck; Andrés Alegría; Marlies Craig; Stefanie Langsdorf; Sina Löschke; Vincent Möller; Andrew Okem & Bardhyl Rama (eds.)].

Ivanovich, Catherine C.; Ocko, Ilissa B.; Piris-Cabezas, Pedro & Petsonk, Annie (2019). Climate benefits of proposed carbon dioxide mitigation strategies for international shipping and aviation. *Atmospheric Chemistry and Physics*, *14949–1496*. https://doi.org/https://doi.org/10.5194/acp-19-14949-2019

Joint Research Centre (European Commission) (2022). CO_2 emissions of all world countries. EUR 31182 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-55803-3. https://doi.org/10.2760/730164, JRC130363

Kallis, Giorgos; Kostakis, Vasilis; Lange, Steffen; Muraca, Barbara; Paulson, Susan & Schmelzer, Matthias (2018). Research on degrowth. *Annual Review of Environment and Resources*, *43*, 291–316. https://doi.org/10.1146/annurev-environ-102017-025941

Kellogg, William W. (1987). Mankind's impact on climate: the evolution of an awareness. *Climatic Change*, *10*, 113–136.

Klein, Naomi (2014). *This changes everything*. Penguin Books Ltd.

Klein, Naomi (2020). *On Fire: the burning case for a Green New Deal*. Penguin Books Ltd.

Krausmann, Fridolin; Lauk, Christian; Haas, Willi & Wiedenhofer, Dominik (2018). From resource extraction to outflows of wastes and emissions: The socioeconomic metabolism of the global economy, 1900–2015. *Global Environmental Change*, *52*, 131–140. https://doi.org/https://doi.org/10.1016/j.gloenvcha.2018.07.003

Kuhnhenn, Kai; Costa, Luis; Mahnke, Eva; Schneider, Linda & Lange, Steffen (2020). *A societal transformation scenario for staying below 1.5°C*. Volume 23 of the Publication Series Economic & Social Issues. Heinrich Böll Foundation and Konzeptwerk Neue Ökonomie 2020.

Kuyper, Johnathan; Schroeder, Heike & Linnér, Björn-Ola (2018). The evolution of the UNFCCC. *Annual Review of Environment and Resources*, *43*(1), 343–368. https://doi.org/10.1146/annurev-environ-102017-030119

Le Quéré, Corinne; Jackson, Robert B.; Jones, Matthew W.; Smith, Adam J. P.; Abernethy, Sam; Andrew, Robbie M.; De-Gol, Anthony J.; Willis, David R.; Shan, Yuli; Canadell, Josep G.; Friedlingstein, Pierre; Creutzig, Felix & Peters, Glen P. (2020). Temporary reduction in daily global CO_2 emissions during the COVID-19 forced confinement. *Nature Climate Change*, *10*, 647–653.

Le Quéré, Corinne; Korsbakken, Jan Ivar; Wilson, Charlie; Tosun, Jalen; Andrew, Robbie; Andres, Robert J.; Canadell, Josep D.; Jordan, Andrew; Peters, Glen P. & van Vuuren, Detlef P. (2019). Drivers of declining CO_2 emissions in 18 developed economies. *Nature Climate Change*, *9*, 213–217. https://doi.org/10.1038/s41558-019-0419-7

Le Treut, Hervé; Somerville, Richard; Cubasch, Ulrich; Ding, Yihui; Mauritzen, Cecilie; Mokssit, Abdalah; Peterson, Thomas & Prather, Michael (2007). Historical Overview of Climate Change. In Susan Solomon; Dahe Qin; Martin Manning; Melinda Marquis; Kristen Averyt; Melinda M. B. Tignor; Henry LeRoy Miller, Jr. & Zehnlin Chen (eds.), *Climate change 2007: the physical science basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.

Lee, David S.; Fahey, David W.; Skowron, Agnieszka; Allen, Myles R.; Burkhardt, Ulrike; Chen, Qi; Doherty, Sarah J.; Freeman, Sarah J.; Forster, Piers M.; Fuglestvedt, Jan S.; Gettelman, Andrew; De León, Rubén Rodríguez; Lim, Ling L.; Lund, Marianne T.; Millar, Richard J.; Owen, Bethan; Penner, Joyce E.; Pitari, Giovanni; Prather, Michael J.… Wilcox, Laura J. (2021). The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018. *Atmospheric Environment*, *244*(117834). https://doi.org/https://doi.org/10.1016/j.atmosenv.2020.117834

Liu, Zhu; Ciais, Philippe; Deng, Zhu; Lei, Ruixue; Davis, Steven J.; Feng, Sha; Zheng, Bo; Cui, Duo; Dou, Xinyu; Zhu, Biqing; Guo, Rui; Ke, Piyu, Sun, Taochun; Lu, Chenxi; He, Pan, Wang, Yuan; Yue, Xu; Wang, Yilong, Lei, Yadong… & Schellnhuber, Hans Joachim. (2020). Near-real-time monitoring of global CO_2 emissions reveals the effects of the COVID-19 pandemic. *Nature Communications*, *11*(5172). https://doi.org/10.1038/s41467-020-18922-7

Liverman, Diana (2015). Reading climate change and climate governance as political ecologies. In Tom Perreault, Gavin Bridge & James McCarthy (Eds.), *The Routledge Handbook of Political Ecology*. Routledge. https://doi.org/10.4324/9781315759289.ch23

Lohmann, Larry (2006). Carbon trading. A critical conversation on climate change, privatization and power. *Development Dialogue*, *48*.

Lohmann, Larry (2012). Financialization, commodification and carbon: the contradictions of neoliberal climate policy. *Socialist Register*, *48*(85), 107.

Lohmann, Larry (2017). Toward a political economy of neoliberal climate science. In David Tyfield; Rebecca Lave; Samuel Randalls & Charles Thorpe (Eds.), *The Routledge Handbook of the Political Economy of Science* (pp. 305–316). Routledge.

MacDonald, Gordon J. F. (1966). Weather and climate modification—problems and prospects. *Bulletin of the American Meteorological Society*, *47*(1), 4–20.

Malm, Andreas (2016). *Fossil capital: the rise of steam power and the roots of global warming*. Verso.

Malm, Andreas (2021). *How to blow up a pipeline. Learning to fight in a world on fire*. Verso Books.

Martínez-Alier, Joan (2014). *"Growth below zero": in memory of Sicco Mansholt*. http://www.ejolt.org/2014/03/growth-below-zero-in-memory-of-sicco-mansholt/

Mastini, Riccardo; Kallis, Giorgos & Hickel, Jason (2021). A Green New Deal without growth? *Ecological Economics*, *179*, 106832. https://doi.org/10.1016/j.ecolecon.2020.106832

McCarthy, James (2015). A socioecological fix to capitalist crisis and climate change? The possibilities and limits of renewable energy. *Environment and Planning A: Economy and Space*, *47*(12), 2485–2502. https://doi.org/10.1177/0308518X15602491

McNutt, Marcia (2013). Climate change Impacts. *Science*, *341*(6145), 435–435. https://doi.org/10.1126/science.1243256

Meadows, Donella H.; Meadows, Dennis L.; Randers, Jorgen & Behrens III, William W. (1972). *The limits to growth*. Universe Books.

Millward-Hopkins, Joel; Steinberger, Julia K.; Rao, Narasimha D. & Oswalda, Yannick (2020). Providing decent living with minimum energy: A global scenario. *Global Environmental Change*, *65*. https://doi.org/https://doi.org/10.1016/j.gloenvcha.2020.102168

Milne, Seumas (2014). *The enemy within. The secret war against the miners* (4th ed.). Verso.

Moreno, Camila; Speich, Daniel & Fuhr, Lili (2016). *Carbon metrics. Global abstractions and ecological epistemicide. Volume 42 of the Publication Series Ecology*. Heinrich Böll Foundation.

Naredo, José Manuel (2006). *Raíces económicas del deterioro ecológico y social. Más allá de los dogmas*. Siglo XXI de España Editores, S.A.

Naredo, José Manuel & Gutiérrez, Luis (2005). *La incidencia de la especie humana sobre la faz de la Tierra (1955-2005)*. Universidad de Granada and Fundación César Manrique.

Newell, Peter (2011). The elephant in the room: capitalism and global environmental change. *Global Environmental Change*, *21*(1), 4–6. https://doi.org/10.1016/j.gloenvcha.2010.11.011

Newell, Peter (2012). *Globalization and the environment: capitalism, ecology and power*. Polity Press.

Nieto, Jaime; Carpintero, Óscar & Miguel, Luis J. (2018). Less than 2C? An economic-environmental evaluation of the Paris Agreement. *Ecological Economics*, *146*, 69–84. https://doi.org/https://doi.org/10.1016/j.ecolecon.2017.10.007

NOAA (National Oceanic and Atmospheric Administration). (2022). *Global Climate Report - Annual 2022*.

O'Brien, Karen (2017). Climate change adaptation and social transformation. *The International Encyclopedia of Geography*. https://doi.org/10.1002/9781118786352.wbieg0987

O'Brien, Karen (2018). Is the 1.5°C target possible? Exploring the three spheres of transformation. *Current Opinion in Environmental Sustainability*, *31*, 153–160. https://doi.org/10.1016/j.cosust.2018.04.010

Özokcu, Selin & Özdemir, Özlem (2017). Economic growth, energy, and environmental Kuznets curve. *Renewable and Sustainable Energy Reviews*, *72*, 639–647. https://doi.org/https://doi.org/10.1016/j.rser.2017.01.059

Parrique, Timothée (2022). *Degrowth in the IPCC AR6 WGIII*. https://timotheeparrique.com/degrowth-in-the-ipcc-ar6-wgiii/

Paterson, Matthew (2001). Climate policy as accumulation strategy: the failure of COP6 and emerging trends in climate politics. *Global Environmental Politics*, *1*(2), 10–17.

Pauliuk, Stefan & Hertwich, Edgar G. (2015). Socioeconomic metabolism as paradigm for studying the biophysical basis of human societies. Ecological Economics. *Ecological Economics*, *119*, 83–93. https://doi.org/10.1016/j.ecolecon.2015.08.012

Pelling, Mark (2011). *Adaptation to Climate Change: From Resilience to Transformation*. Routledge.

Perkins, Krystal M.; Munguia, Nora; Ellenbecker, Michael; Moure-Eraso, Rafael & Velazquez, Luis E. (2020). COVID-19 pandemic lessons to facilitate future engagement in the global climate crisis. *Journal of Cleaner Production*, *In Press*. https://doi.org/https://doi.org/10.1016/j.jclepro.2020.125178

Piketty, Thomas (2022). *A brief history of equality*. Harvard University Press.

Plass, Gilbert N. (1956). The carbon dioxide theory of climate change. *Tellus*, *VIII*(2), 140–154.

Redclift, Michael (1987). *Sustainable development. Exploring the contradictions*. Taylor & Francis e-Library.

Revelle, Roger & Suess, Hans E. (1957). Carbon dioxide exchange between atmosphere and ocean and the question of an increase of atmospheric CO_2 during the past decades. *Tellus*, *9*(1), 18–27.

Ripple, William J.; Wolf, Christopher; Newsome, Thomas M.; Barnard, Phoebe; Moomaw, William R. & Altere. (2020). World scientists' warning of a climate emergency. *BioScience*, *70*(1).

Ripple, William J., Wolf, Christopher; Newsome, Thomas M.; Galetti, Mauro; Alamgir, Mohammed; Crist, Eileen; Mahmoud, Mahmoud I. & Laurance, William F. & Altere (2017). World scientists' warning to humanity: a second notice. *BioScience*, *67*(12), 1026–1028. https://doi.org/10.1093/biosci/bix125

Rockström, Johan; Steffen, Will; Noone, Kevin; Persson, Åsa; Chapin, F. Stuart III; Lambin, Eric; Lenton, Timothy M; Scheffe, Marten; Folke, Carl; Schellnhuber, Hans Joachim; Nykvist, Björn; de Wit, Cynthia A.; Hughes, Terry; van der Leeuw, Sander; Rodhe, Henning; Sörlin, Sverker; Snyder, Peter K.; Costanza, Robert; Svedin, Uno; … Foley, Jonathan (2009). Planetary boundaries: exploring the safe operating space for humanity. *Ecology and Society*, *14*(2), 32 (online).

Roy, Joyashree & Pal, Shamik (2009). Lifestyles and climate change: link awaiting activation. *Current Opinion in Environmental Sustainability*, *1*(2), 192–200. https://doi.org/10.1016/j.cosust.2009.10.009

SCEP (Study of Critical Environmental Problems). (1970). *Man's impact on the global environment: assessment and recommendation for action (Cambridge, MA: MIT Press)*.

Schandl, Heinz; Fischer-Kowalski, Marina; West, James; Giljum, Stefan; Dittrich, Monika; Eisenmenger, Nina; Geschke, Arne; Lieber, Mirko; Wieland, Hanspeter; Schaffartzik, Anke; Krausmann, Fridolin; Gierlinger, Sylvia; Hosking, Karin; Lenzen, Manfred; Tanikawa, Hiroki; Miatto, Alessio & Fishman, Tomer (2018). Global material flows and resource productivity: forty years of evidence. *Journal of Industrial Ecology*, *22*(4), 827–838. https://doi.org/10.1111/jiec.12626

Schmelzer, Matthias (2016). *The hegemony of growth: the OECD and the making of the economic growth paradigm*. Cambridge University Press.

Scientific Rebellion. (2022). *IPCC WGIII Summary for policymakers watered down*. https://scientistrebellion.com/wp-content/uploads/2022/04/Press-Release-Scientist-Rebellion-IPCC-WGIII-Comparison.pdf

SMIC (Study of Man's Impact on Climate). (1971). *Inadvertent climate modification. Report of the Study of Man's Impact on Climate (SMIC)*.

Smith, Neil (2007). Nature as Accumulation Strategy. *Socialist Register*, *43*.

Spash, Clive L. (2016). The political economy of Paris Agreement on human induced climate change: a brief guide. *Real-World Economics Review*, *75*, 67–75.

Steffen, Will; Crutzen, Paul J. & McNeill, John R. (2007). The Anthropocene: are humans now overwhelming the great forces of nature*? Ambio-Journal of Human Environment Research and Management, 36*(8), 614–621.

Stevenson, Hayley (2021). Reforming global climate governance in an age of bullshit. *Globalizations*, *18*(1), 86–102. https://doi.org/10.1080/14747731.2020.1774315

Stevenson, Hayley & Dryzek, John S. (2013). *Democratizing global climate governance*. Cambridge University Press. https://doi.org/10.1017/CBO9781139208628

Tapia, José A.; Ionides, Edward L.,& Carpintero, Óscar (2012). Climate change and the world economy: short-run determinants of atmospheric CO2. *Environmental Science & Policy*, *21*, 50–62. https://doi.org/10.1016/j.envsci.2012.03.008

Thatcher, Margaret (2020). *Statecraft. Strategies for a changing world*. HarperCollins.

Torres, Cati & Moranta, Joan (2020). La emergencia climática en economías turistizadas: la necesaria transición económica, ecológica y social como base para una mitigación efectiva. *Revista de Economía Crítica, 30*: 120-135 (available at http://www.revistaeconomiacritica.org/sites/default/files/7-CatalinaFiguerola-JoanMoranta_Emergencia-climatica-en-economias-turistizadas_0.pdf).

Torres, Cati; Moranta, Joan & Murray, Ivan (2022). The construction of a growth-oriented global climate agenda: a critical historical analysis. *Investigaciones Geográficas, 77*: 161-180. https://doi.org/10.14198/INGEO.19351

Trainer, Ted (2019). Entering the era of limits and scarcity: the radical implications for social theory. *Journal of Political Ecology*, *26*(1), 1–18. https://doi.org/10.2458/v26i1.23057

Trantas, Nikos (2021). Could "degrowth" have the same fate as "sustainable development"? A discussion on passive revolution in the Anthropocene age. *Journal of Political Ecology*, *28*(1), 224–245. https://doi.org/10.2458/jpe.2362

Trisos, Christopher H.; Merow, Cory & Pigot, Alex L. (2020). The projected timing of abrupt ecological disruption from climate change. *Nature*, *580*, 496–501. https://doi.org/10.1038/s41586-020-2189-9

UNCHE (United Nations Conference on the Human Environment). (1972). *Report of the United Nations Conference on the Human Environment*. 81.

UNEP/UNCTAD (United Nations Development Programme/United Nations Comission on Trade and Development). (1974). *Patterns of resource use, environment and development strategies*.

UNFCCC. (2015). *Paris Agreement. December 12th 2015. United Nations Framework Convention on Climate Change (available on https://unfccc.int/es/process-and-meetings/the-paris-agreement/el-acuerdo-de-paris)*. https://unfccc.int/es/process-and-meetings/the-paris-agreement/el-acuerdo-de-paris

Vadén, Tere; Lähde, Ville; Majava, Antti; Järvensivu, Paavo; Toivanen, Tero; Hakala, Emma Sofia & Eronen, Jussi Tuomas (2020). Decoupling for ecological sustainability: A categorisation and review of research literature. *Environmental Science & Policy*, *112*, 236–244. https://doi.org/10.1016/j.envsci.2020.06.016

Valero, Alicia; Valero, Antonio & Calvo, Guiomar (2021). Material limits of the energy transition. In *The Material Limits of Energy Transition: Thanatia* (pp. 147–187). Springer.

Valladares, Fernando; Magro, Sandra & Martín-Fores, Irene (2019). Anthropocene, the challenge for "Homo sapiens" to set its own limits. *Cuadernos de Investigación Geográfica*, *45*(1), 33–59. https://doi.org/https://doi.org/10.18172/cig.3681

van der Sluijs, Jeroen P.; van Est, Rinie & Riphagen, Monique (2010). Beyond consensus: reflections from a democratic perspective on the interaction between climate politics and science. *Current Opinion in Environmental Sustainability*, *2*, 409–415. https://doi.org/10.1016/j.cosust.2010.10.003

Verdnasky, Vladimir (1926). *La Biosphère*. Alcan.

Wamsler, Christine; Schäpke, Niko; Fraude, Carolin; Stasiak, Dorota; Bruhn, Thomas; Lawrence, Mark; Schroeder, Heike & Mundaca, Luis (2020). Enabling new mindsets and transformative skills for negotiating and activating climate action: Lessons from UNFCCC conferences of the parties. *Environmental Science & Policy*, *112*, 227–235. https://doi.org/10.1016/j.envsci.2020.06.005

Ward, James D.; Sutton, Paul C.; Werner, Adrian D.; Costanza, Robert; Mohr, Steve H. & Simmons, Craig T. (2016). Is decoupling GDP growth from environmental impact possible? *PLOS ONE*, *11*(10), e0164733. https://doi.org/10.1371/journal.pone.0164733

WCED (World Commission on Environment and Development). (1987). *Our common future*.

Weart, Spencer R. (2008). *The discovery of global warming*. Harvard University Press (revised and expanded edition).

Weiss, Joseph S.; Dajian, Zhu; Enríquez, Maria Amélia; May, Peter H.; Pinheiro do Nascimento, Elimar; Pengue, Waltert A. & Shmelev, Stanislav (2017). UN environmental policy: non-state actors, trends, and the regulatory role of the state. *Journal of Political Ecology*, *24*(1), 1013–1037. https://doi.org/10.2458/v24i1.20980

Wiedenhofer, Dominik; Virág, Doris; Kalt, Gerald; Plank, Barbara; Streeck, Jan; Pichler, Melanie; Mayer, Andreas; Krausmann, Fridolin; Brockway, Paul; Schaffartzik, Anke; Fishman, Tomer; Hausknost, Daniel; Leon-Gruchalski, Bartholomäus; Sousa, Tania; Creutzig, Felix & Haberl, Helmut (2020). A systematic review of the evidence on decoupling of GDP, resource use and GHG emissions, part I: bibliometric and conceptual mapping. *Environmental Research Letters*, *15*(6), 063002. https://doi.org/10.1088/1748-9326/ab8429

Wiedmann, Thomas; Lenzen, Manfred; Keyßer, Lorenz T. & Steinberger, Julia K. (2020). Scientists' warning on affluence. *Nature Communications*, *11*(3107), 1–10.

Wilson, Carrol L. & Matthews, William H. (1971). *Inadvertent climate modification: Report of the Conference, Study of Man's Impact on Climate*.

WMO (World Meteorological Organization). (1979). *Proceedings of the World Climate Conference: A conference of experts on climate and mankind*.

WMO (World Meteorological Organization). (1988). *World Conference on the Changing Atmosphere. Implications for Global Security (Toronto Conference)*.

WMO (World Meteorological Organization). (1990). *Second World Climate Conference. Conference statement*.

WMO (World Meteorological Organization). (2009a). *World Climate Conference-3. Conference statement. Summary of the expert segment. 31 August – 4 September 2009*.

WMO (World Meteorological Organization). (2009b). *World Climate Conference-3. Global framework for climate services. Brief Note. 31 August-4 September 2009*.

Zillman, John W. (2009). A history of climate activities. *WMO Bulletin*, *58*(3), 141–150.

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