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Progress report

Financial geography II – green finance and climate transition

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Karen PY Lai
Durham University, UK

Abstract

This second progress report on financial geography focuses on green finance and research on financing climate transition and environmental challenges. It explores theoretical approaches to green finance, with Marxist perspectives on shifting capital-nature relations in broader regimes of capitalist accumulation that are complemented with a Foucauldian lens on biopolitical governmentality. It then examines specific forms of green financial markets and instruments, with financial geographers focusing most strongly on carbon markets, green bonds and catastrophe bonds/insurance-linked securities and the reconfiguration of risks. The final section covers governance and regulation of green finance through a growing assemblage of organisations and programmes, and the evolving roles of state actors and central banks in just climate transition.

Keywords

financial geography, green finance, climate finance, sustainable finance, climate change, environment

1 Introduction

While green finance is increasingly presented in industry and policy circles as an effective solution to global environmental problems and challenges of climate change, there are many critical debates that question this market-led approach. Much of the work done by geographers speaks to interdisciplinary debates about human-environment interactions and how those are being influenced by financial instruments, logics, and concerns. These include the financialisation of nature, conceptualisation of risks, construction of new financial markets, and the shifting logics of private and public interests and responsibilities in financing and supporting green transition. There are also critical questions directed at various forms of financial (ised) interventions (such as carbon markets, green bonds, and catastrophe bonds) and how these could reshape or entrench geographies of inequalities, difference, power, and socio-environmental justice. At a systemic level, there are also reflections on the ways in which climate change is presenting new risks to the financial system itself, and what new forms of risk governance may be required in response, especially from public actors.

There is much overlap in definitions and terminology relating to financial activities for

Corresponding author:
Karen P.Y. Lai, Department of Geography, Durham University, Lower Mountjoy, South Road, Durham DH1 3LE, UK.
Email: karen.lai@durham.ac.uk

environmentally friendly goals, with terms such as 'green finance', 'sustainable finance', and 'climate finance' (Knuth and Taylor, 2023) most commonly used but also with different definitions provided by different institutions (Jäger and Schmidt, 2020). More specifically, green finance refers to financial instruments and flows that support the environmental aspects of the United Nations Sustainable Development Goals (SDGs), which include issues such as biodiversity, pollution, and climate change. Sustainable finance is a broader set that includes social as well as environmental dimensions of SDGs. Climate finance is often considered a part of green finance that focuses on addressing specific risks and responses to climate change, having emerged from the Conference of Parties (COP) meetings organised annually by the UN as global climate summits. Many climate finance projects and instruments tend to include wider criteria and objectives that would qualify as green finance, while sustainable financing could also have objectives relating to climate change impacts and mitigation. Given the overlap and operational fuzziness in both academic and grey literature, this report uses green finance as the main terminology, while noting the overlaps with climate finance and sustainable finance in research debates.

II Perspectives on green finance

Many economic and financial geographers have engaged with green finance from the perspective of financialisation of nature and changing conceptualisation of capital-nature relations in broader regimes of capitalist accumulation. Early research in the 2010s focuses on market-based instruments for environmental policy and governance, such as tradeable permit systems for a range of resource and environmental issues including carbon trading, fishing rights, and water quality permits (Bigger, 2018). By reframing non-human nature and environmental elements into banking and financial categories and assets, environmental arenas are being folded into ever expanding forms of financial logics and growth discourses, such as the exhortation of 'green growth' as a new frontier of capital expansion (Bryant, 2018; Sullivan, 2013). Informed by Marxist perspectives, these studies argue that environmental and climate crises are being created as new frontiers for capital investment in ways that privilege capitalist values of price and profit-oriented market exchange over other economic systems with more distributive and sustainable logics. Various qualities of nature and environmental resources are thus translated into a financial value form that enables their trading in specialized markets (Ouma et al., 2018). In this context, capitalist states have opted for market-based mechanisms over other alternatives for environmental governance because these markets promise new opportunities for accumulation, and to secure the conditions for the expanded reproduction of capitalism more broadly (Christophers, 2016; Dempsey and Suarez, 2016).

The power of capitalism's productive frame is also examined through a Foucauldian lens on biopolitical governmentality (Sullivan, 2013). Elements of nature and environmental phenomena are rendered intelligible and governable through insertion into financialised logics, 'through the subordination of all environmental concerns to the market's logic, such that all environmental indices become framed, banked, traded, circulated, and speculated on as forms of capital' (Sullivan, 2013: 212). In examining the neoliberalisation of nature, geographers have addressed the question of market formation and organisation, and processes of co-existence and co-production between financialisation and material commodification (Asiyanbi, 2018; Castree, 2010; Li, 2014). While economic and financial experts are often seen as vital actors in such new domains (Çalışkan and Callon, 2009), a Foucauldian approach has been useful in incorporating the broader spectrum of actors involved in the market-making process. Asiyanbi (2018) unpacks the rationalities and practices through which a Reducing Emissions from Deforestation and forest Degradation in developing countries (REDD+) project in Nigeria is assembled, which includes local community users, transnational civil society, state institutions, material circulations of proposals, reports and workshops, and biophysical elements of timber. Such an approach pays attention to the varied impacts and uncertain configurations of market-making rather than a narrow focus on success and failure. By exploring environmental financialisation beyond the technical domain of finance

experts, this creates more scope for other actors and interests, and wider political response to the current environmental and climate crisis (Bracking, 2015a).

In questioning the strategic significance and suitability of private capital for governing climate change and low-carbon transition, Langley et al. (2021) unpack the actors, codification, and logics of market-making for investments and divestments of carbon assets by emphasising the moralisation of investment capital. Focussing on green bonds and the equities of fossil fuel companies, they show that the qualification of assets as 'high-carbon' or 'low-carbon' is shaped not only by quantitative evaluations and calculations of climate risks and financial impacts but also ethical framings and moral reasonings to qualify and standardize what counts as 'green'. This helps to explain how and why green investors and impact investors make certain ethical choices and place particular values on green bonds despite lack of clarity and weak governance standards. These moral modalities, however, could also run up against mainstream mandates and practices that continue to prevail (e.g. risk management in conventional portfolio theory), which limit divestment strategies and decarbonising impacts. In a similar vein, García-Lamarca and Ullström (2022) examine the affective mechanisms at work in constructing a discursive fantasy of green bonds in Gothenburg, drawing upon city-level and national feelings of 'doing good' and the desire to promote Sweden as a role model for sustainability. While the launch of this municipal green bond was a success in terms of oversubscription and capital raised, details are lacking in terms of who actually benefitted from the investments, and whether it served to reinforce the existing socio-ecological status quo rather than leading to deeper transformations to address urban political and social inequalities.

Others have picked up on the enduring importance of mainstream calculative practices, financial logics, and local social and political conditions, which limit the decarbonising and climate impacts of new forms of green finance and technologies. In studying a green financial instrument issued by a multinational dairy company, Van Veelen (2021) shows that flows of green finance are not necessarily directed at economic activities where the greatest carbon reduction could be achieved. Instead, they are commonly used to refinance projects with more limited impacts due to the agency of powerful agricultural actors. This form of assemblage thinking highlights the intersections between international financial markets and local social, natural, and political conditions, and how they shape the green forms of finance enacted and their environmental implications. Campbell-Verduyn (2024) highlights a 'technological turn' in global sustainability solutions whereby emergent technologies like blockchains are supposed to address various limitations of market-based climate finance. However, while there are some improvements for market access and efficiencies of tracking and reporting, these blockchain climate finance projects are ultimately confined within existing forms of market-based climate finance and distract from the urgent needs for more drastic changes and alternative visions. Similarly, the development of green sukuk (often referred to as Islamic green bonds) is supposed to improve the current green bond regime by incorporating Islamic values to boost 'green' credentials. However, Liu and Lai's (2021) research in Malaysia found that the green sukuk framework closely resembles the internationally adopted Green Bond Principles (GBP). While this has enhanced recognition and successful fundraising from domestic and international investors, green sukuk has arguably inherited existing critiques of greenwashing and weak governance levelled at the GBP.

The reorientation of capital switching to green finance has been conceptualised as a 'socioecological fix' for climate change, seen as crisis-laden capitalism trying to negotiate new ways to reproduce itself and ensure systemic survival within capitalist logics (Castree and Christophers, 2015). An emphasis on 'repair' has emerged more recently in thinking through these contradictions. In a collective intervention, Cohen et al. (2022) and contributors to a symposium offer critical reflections on how the social and environmental role of finance capital could shift from an extractive process to a reparative one through the modalities of 'responsible finance', which includes impact investing, ESG ratings, philanthropic foundations, and other forms of green finance and social finance. However, this form of

'reparative' accumulation is ironic; the remaking of socionatures to fit financial logics ultimately serves to reproduce the power of finance capital at the expense of other priorities and socioecological futures. However, some of the contributors highlight how reparative capital is mobilised by various state and civil society actors for progressive ends especially in the context of general austerity. In another intervention, Webber et al. (2022) combine the ideas of 'repair' and 'capital switching' as they evaluate how financialised responses to the climate crisis might be harnessed to rework socio-political relations for more decommodified and reparative outcomes. Their pragmatic approach still recognises the challenges and limitations of private capital and neoliberal market formations but point towards progressive possibilities of climate finance and identify possible pathways towards justice and repair. In a similar vein, the unique position of philanthropic foundations is highlighted by Liu and Monier (2024) as they stretch across policy, financial, and charity sector networks, supporting their call for a 'hybridity' approach to researching such institutions as both financial and philanthropic actors in sustainable finance.

III Green financial markets and instruments

The intersections of financial markets and climate risks concerns are first noted in the weather derivatives market that mitigate the occurrences of weather events (e.g. wetter than average summer, warmer winter) that could affect businesses that are more weather sensitive (e.g. hotels, energy companies) (Pollard et al., 2008; Pryke, 2007; Randalls, 2010). With expectations of greater weather variability and uncertainty under conditions of climate change, financial geographers have engaged with broader calculative challenges of managing environmental change through climate finance. Bracking (2019) offers a useful overview of the various phases of climate finance from the 1990s onwards. Phase 1 is marked by experiments in carbon markets from the early 1990s; Phase 2 turns to ecosystem services and biodiversity conservation in the late 1990s; Phase 3 involves distinctive capital markets intervention through derivatives and green bonds from the 2000s onwards; and Phase 4 focuses on index insurance and insurance linked securities from 2010s onwards. Of the above phases, research by financial geographers have focused most strongly on carbon markets, green bonds and catastrophe bonds/insurance-linked securities, with studies on ecosystem services and biodiversity concerns more prevalent from geographers working in political ecology (e.g. Dempsey, 2016; Nelson and Bigger, 2022).

Studies on carbon markets have examined the pricing and trading of carbon emission rights (Knox-Hayes, 2010, 2013; Lo and Howes, 2013), the politics and social construction of carbon markets as financial practice (Bryant, 2018; Descheneau and Paterson, 2011; Knox-Hayes and Levy, 2011), and the impacts of carbon markets for local economic geographies and financial centres (Knight, 2011; Knox-Hayes, 2009). More recently, this focus has shifted to carbon finance as a broader logic in decarbonising capital and as new accumulation strategy (Bridge et al., 2020; Bryant, 2019; Langley et al., 2021). This now includes investments in 'natural capital' to enhance carbon sequestration capacities (Kay, 2018; Sullivan, 2013), green loans, and investments that fund low-carbon initiatives (such as in renewable and 'clean tech' sectors) (Bracking, 2015b; Christophers, 2017; García-Lamarca and Ullström, 2022; Knuth, 2018), and divestment from high carbon sectors (Knuth, 2017). The latter is most prominent in fossil fuels and energy sectors (Ducastel, 2024; Nelson and Ramana, 2023), but also attracting increasing attention in the decarbonising of farming and agriculture sectors (Ouma, 2020; Van Veelen, 2021), and urban assets (Knuth, 2019; Wainwright and Demirel, 2023). This framing of carbon finance changes the focus from the commodification of carbon (into credits and tradeable assets) to wider logic of carbon (or more specifically, decarbonising) as asset and as accumulation strategy, by leveraging debt against an expected future income stream (Bridge et al., 2020). Extraction of financial value is enabled through secondary trading and securitisaton (to manage further risks from price instability of those assets), which also draws in a wider range of financial actors including institutional

investors, sovereign wealth funds, and private equity that constitute a 'shadow banking' sector (Bryan et al., 2016; Dörry, 2017).

Green bonds constitute another significant topic, with promises of using proceeds to fund low carbon projects or contribute to certain sustainability projects (which may also incorporate social and governance dimensions of ESG); as such, green bonds and sustainability-linked bonds overlap in many aspects. These green financing instruments have been issued by various actors including private companies and municipal governments (Bigger and Millington, 2020; Christophers, 2018; García-Lamarca and Ullström, 2022; Hilbrandt and Grubbauer, 2020; Van Veelen, 2021). The green label is supposed to alert market participants that the debt issuers have considered the environmental and sustainability dimensions of their operations, with an array of definitions and taxonomies of what constitutes 'green'. Jones et al. (2020) provide a useful overview of green bonds, their structures and development over time, and associated practical and political concerns. Many have criticized the requirements of the GBP and other green taxonomies as being vague and too lenient. 'Green bond' is not a legal category, with no authority to revoke the 'green' labelling even if the reporting and green credentials are later found to be questionable (Bigger and Carton, 2020; Christophers et al., 2020). This has led to substantive criticism about the credibility of green-labelled products and how meaningful they are for actual climate action (Bracking et al., 2023; Liu and Lai, 2021; Perkins, 2021), especially with regards to 'greenwashing', that is, making false or misleading claims about an organisation or project's positive environmental impacts (Dörry and Schulz, 2018; Harlan, 2020; Jones et al., 2020). Based on research in Hong Kong and Singapore, Liu et al. (2019) observed that different state traditions and forms of business organisation could limit transferability and effectiveness of such a voluntary disclosure-based system. Research into the promises, uncertainties, and limitations of green bonds have also extended into the emerging issuance of blue bonds, which seek to finance marine and ocean-based projects that would have environmental and climate benefits (Christiansen, 2021, 2024; Thompson, 2022).

Catastrophe bonds and other insurance-linked securities (ILS) that address extreme weather and disaster events constitute another distinctive strand of research, examining how events ranging from earthquakes to hurricanes and pandemics could become constituted and circulated as financial instruments (Christophers et al., 2020; Johnson, 2013a, 2013b). Studies highlight the securitisation process, whereby the environmental vulnerabilities of place-bound capital are transformed through catastrophe bonds into an asset class capable of generating future income streams, often bought by pension funds and institutional investors as part of diversifying risks. Pension funds occupy a particularly interesting role in this space as pensioners profit from such investments, while also themselves constituting 'longevity risks' in the ILS market (Johnson, 2013a). Weather-related index insurance is also reshaping the ways in which agricultural producers in the Global South are being articulated as new financial subjects by being persuaded to transfer their production risks to financial institutions and global financial circuits (Johnson, 2013b). The vulnerability of cities and large populations to weather related catastrophe due to changing climate is particularly notable in research on the growing insurance crisis for populations living in increasingly high risks areas, and whether ILS constitutes a provisional fix that offsets such environmental barriers to property-led accumulation (Colliers and Cox, 2021; Taylor, 2020; Wagner et al., 2024). This is particularly concerning for local municipal governments reliant on the local property tax regime, which is at risk of devaluation or even collapse if property value continues to decline due to increasing risk of weather-related disasters and difficulties with mortgages and insurance (Knuth et al., 2023). The impacts of such fallouts also require attending to the racialised legacies and practices of municipal finance (Cox, 2023; Grove et al., 2020).

A core thread that runs through the above studies on carbon finance, green bonds, and catastrophe insurance is the reconfiguration of risk from environmental and social dimensions to specific calculations of financial risks, and how that in turn shapes economic and political response. These studies identify various actors, calculative devices, mechanisms, and powerful rhetoric that have worked to

produce specific vulnerabilities, fictions, risk registers and financial solutions (Christiansen, 2021; Schmidt, 2024; Webber, 2013). Despite claims of using financial tools to address environmental challenges and impacts of climate change, geographers argue that the relationships usually work in the reverse. The derivative socio-natures created by green finance are concerned only with 'exposure to risks that have a financially material impact on investment outcomes' (Cohen et al., 2022: 2366). Rather than seeking normative goals through finance, in practice, the mobilisation of green/climate finance is arguably about insuring capital against social and environmental risks, such that the beneficiaries tend to be financiers and investors rather than populations and governments actually experiencing the environmental challenges (Bigger and Carton, 2020; Bracking 2019; Christophers et al., 2020).

IV Green finance and governance

Green finance has played an increasing role in shaping modes of governance in urban contexts, national policies, and international arena. Cities and urban areas account for a significant portion of global emissions and resource consumption, while also being more susceptible to climate hazards due to population density; these present particular challenges for urban governance and resource allocation (Bigger and Millington, 2020; Broto et al., 2015; Bulkeley et al., 2014; Chu, 2018; Cox, 2023). A significant volume of research on green finance has emerged from urban geography and urban studies on investments into green infrastructure, renewable energy, sustainable transport, and climate resilience projects (Christophers, 2018; Ernstson and Swyngedouw, 2024; Taylor and Knuth, 2023; Teferi and Newman, 2018), especially as the development of 'climate-resilient' cities become prioritised (Long and Rice, 2019). Under the framing of climate risks and resilience, urban infrastructure becomes increasingly fundamental to the ways in which climate politics is played out in the city, especially in the Global South (Bulkeley et al., 2014). Access to international finance for climate change adaptation is reshaping urban governance, with some noting a new form of development dependency as urban sites (especially in the Global South) as being produced as investable enclaves through urban climate finance frameworks (Broto et al., 2015; Chu, 2018). Bigger and Carton, 2020, for instance, chart the emergence of a World Bank discourse that cities must be 'reformatted' in more investment friendly and financially legible ways to harness private investment and address the urban infrastructural crisis – a form of 'Green Structural Adjustment'.

Within research on urban climate finance (see Parish, 2023 and https://www.urbanclifi.com/), there is particular emphasis on the growing global assemblage of investment and consulting networks, policy institutions, and development agencies, and the increasing power of non-state actors, such as consultants, finance experts, private regulators, institutional investors, development corporations, multilateral banks, and philanthropic organisations in the governance of urban climate finance (Grafe et al., 2023; Hilbrandt and Grafe, 2024; Webber et al., 2020). The blurring of boundaries between climate finance, development finance, and philanthro-capital has also been noted, with important implications for how local agency and governance mechanisms are being reshaped and limited (Chu, 2018; Bigger and Millington, 2020; McElvain, 2024; Webber et al., 2020; see also Mitchell and Sparke, 2016). The importance of institutional investors (especially as major investors in fossil fuel companies) is also noted in terms of how they could shape meaningful transition to a low- or zero-carbon world (Christophers, 2019; Parish, 2023).

The regulation of green finance instruments, markets, and schemes is another important area. These range from emissions trading and carbon offsetting schemes (Bigger, 2018; Bryant, 2018; Knight, 2011; Lo and Howes, 2013) to REDD+ programmes (Dixon and Challies, 2015; Asiyanbi, 2018) and the Green Climate Fund (Bracking, 2015b; Brunn, 2017; Bulkeley and Newell, 2015). Perkins (2021) argue that the imperative for 'green growth' has led to taxonomies and standards that tend to prioritise protecting green bonds from stigmatising iterations, and creating a lenient zone of qualification. This has led to pressing concerns about greenwashing as 'green' financed projects and certifications could be used to mislead investors or the

public who are concerned about climate impacts and environmental sustainability. Koch (2022) argues that corporate and government leaders in oil-rich nations could make use of the symbolic capital derived from 'greening' oil money by using green finance to invest in sustainability and energy transition activities, which would in turn allow them to continue dominating global energy systems and prolong the benefits of oil money. The risk of greenwashing could also be spatially differentiated due to gaps in governance and power relations, as demonstrated by Harlan (2020) showing how green finance projects under China's Belt and Road Initiative are contributing to green development in higher-income countries but more resemble greenwashing in lower-income countries.

Other recent interventions on the governance of green finance have focused on reimagining the state's role in just climate transition. Bracking and Leffel (2021) argue that current structures of climate finance governance and predominance of neoliberal governance norms (such as voluntary disclosure, voluntary reporting standards, and profit maximisation) are akin to a 'New Washington Consensus', which subsidises investors in order to leverage private capital for climate governance. This calls for better public accountability and state action to make climate finance 'fit for purpose'. State actors are starting to foreground the threats of climate change for economic stability, with a former governor of the Bank of England calling it a 'climate Minsky moment' as the next great financial crisis could be climate-induced and pose a major threat to future global financial stability (Christophers, 2017). The changing role of central banks has become a recent topic of debate, as measures such as asset purchase, quantitative easing and emergency liquidity lending that were prominent during the 2008 financial crisis and COVID-19 crisis drew attention to central bank leadership in the governance of an arguably more fundamental planetary crisis: the climate crisis (Langley and Morris, 2020). One of the most common climate initiatives used by central banks is climate stress testing to model and govern future climate tail risks, which Morris and Collins (2023) argue constitutes a new macroprudential approach. Given the emergent nature of green central banking, Bryant and Webber's (2024) book provides a particularly useful overview of the range of tools being used (e.g. climate stress testing, green capital requirements, changes to collateral frameworks, and green quantitative easing) to encourage transition of economic activities and financial flows towards low-carbon solutions and climate action. These are being trialled by the European Central Bank, the Bank of England, the People's Bank of China, and the US Federal Reserve. However, increasing state action in green finance governance can still be problematic. In Knuth's (2021) study of US state-led investment in renewable energy through tax subsidies, this has resulted in the dominance of a handful of US major banks and their ability to extract rents, gatekeep what projects get built and by whom, and even stall US renewables development. There are emergent debates about empowering the role of the state and public finance in the green transition, such as the potential and limitations of a 'Green New Deal' in the US, or a 'Big Green State' that would involve public direct investments away from fossil fuels and into renewables and other green industries for the purpose of decarbonisation (Bryant and Webber, 2024; Gabor and Braun, 2023; Golka et al., 2024).

V Conclusion

From embryonic literature around the 2010s, research by economic and financial geographers on the intersections of finance, climate change, and environmental sustainability has grown very rapidly with particular surge of publications from 2018 onwards. As climate concerns permeate ever more areas of economic, social, and political lives, attention towards the role of finance in addressing the challenges of climate transition will only continue to grow (Wójcik et al., 2023). In debates regarding the role of public versus private actors in financing sustainability and climate transition, there has been some cautious optimism from a few geographers (e.g. Castree and Christophers, 2015; Cohen et al., 2022), but the majority of research has been highly critical of the largely market-led mechanisms and neoliberal logics of green finance so far.

Critical geographers have been also examined the uneven geographies of green finance, with particular

emphasis on a North–South divide in terms of the need for green finance in vulnerable regions in the Global South and the sources of green finance capital often coming from banks, institutional investors, and development funders in the Global North. Some have questioned whether climate finance under existing terms and networks actually advances climate justice or reproduces relationships of dependency (Ciplet et al., 2022). If climate finance becomes just another vehicle for increased surplus extraction through heightened indebtedness and restricted policy space, it would worsen climate injustice for a significant portion of the Global South. Others have raised how climate finance deals and green investments continue to privilege Anglo–American priorities that fail to adequately consider the distinctive implications of race in 'green' capitalist development (Perry, 2021). For instance, Bigger and Millington (2020) and Knuth et al. (2023) have examined how new forms of green municipal finance, mortgage finance and home insurance reinscribe existing urban inequalities especially in terms of race and class, which could become new forms of climate red-lining. There is also notable attention on the nascent theme of 'climate finance justice' (Gifford and Sauls, 2024), which incorporates postcolonial, poststructural, feminist, indigenous and post-political, and perspectives to inform scholarship on critical climate geography (see also Sultana, 2022). These dimensions of difference and socio-political qualities have become more prominent in financial geography scholarship more broadly, and will feature in part of my next progress report on everyday lives and lived dimensions of finance.

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ORCID iD

Karen PY Lai https://orcid.org/0000-0003-4654-9819

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