Spatial Finance: GI Science, Spatial Data Infrastructures and Green Finance

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Summary

Spatial Finance defines the coupling of GI Science, Spatial Data Infrastructures (SDIs) and Green Finance. This study examines the implications of Spatial Finance on the political-economy of SDIs and the impacts of SDI structures, relationships and institutions on the political-economy and geographies of Green Finance. This research foregrounds the field of Green Finance in SDI research and highlights how GIS is enabling the financing of the low-carbon transition. This places new socio-economic and socio-ecological significance on SDIs and GI Science and opens avenues for Critical GIS studies to inform research on the practice and politics of financialized climate governance.

KEYWORDS: Critical GIS, Fintech, Economic Geography, Green Finance

1. Introduction

Alongside research on technological and methodological engagements in GI Science, there is an emerging research community focussed on the social, political, economic and environmental implications of developments in Geographical Information Systems (GIS). Elwood (2010), in a review of studies on the societal implications of the GeoWeb, called for further examination of changes to the processes and power dynamics that characterise the political economy of spatial data. These implications fall under three broad themes:

- Changes in who conducts GI Science (spatial data production, use, ownership and regulation).
- The emerging politics of GI Science as it engages with broader spheres of life through new models of participation and developments in technologies and methodologies.
- The reframing of spatial data-subjects and the discipline of GI Science.

Following the analytical themes set out by Elwood (2010), this paper outlines the findings of a study of UK based Spatial Finance from 2017–2020. It outlines three aspects of UK Spatial Finance, examining the implications of this strategic coupling between GI Science, Spatial Data Infrastructures (SDIs) and Green Finance (Hendriske *et al.*, 2019). These three aspects are:

- The entrance of new actors and the formation of new stakeholder groups in the political-economies of SDIs.
- The role of SDIs in configuring the political economy and geographies of Green Finance.
- How data integration under Green Finance is reframing spatial data-subjects, placing new socio-economic and socio-ecological significance on SDIs and GI Science.

1.1. Methodology

The study has been conducted from 2017–2020, deploying a mixed qualitative research approach. Data collection included a systematic literature review enriched through participant observation of online roundtable discussions, Spatial Finance and Green Finance Summits and semi-structured interviews with affiliates of the Spatial Finance Initiative. This evidence base was analysed using the political-economy approach to outline developments and implications (Elwood, 2010) of Spatial Finance.

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1.2. Green Finance

Green Finance is an emerging concept in theories of finance and financial-policy debates. It positions financial markets as a key mechanism in the global management of climate-related environmental risks through investment and risk-management services. The theory of Green Finance purports that, given adequate information and climate-smart national policy frameworks, markets are capable of efficiently allocating capital to support mitigative and adaptive actions in the real economy, thereby facilitating an 'orderly' low-carbon transition.

In order to achieve this vision, governments, global financial centres and markets are changing regulation, policies and practices under a 'Greening Finance' agenda. This agenda follows a 'market-fixing' narrative, implementing strategies for increased information disclosure that enable climate-related environmental risks to be internalised within the financial system (Kedward *et al.*, 2020). This strategy is supported by initiatives that back the development and uptake of Green Fintech, which delivers new and enriched information, including spatial data and analytics for financial decision making.

1.3. Spatial Finance

Spatial Finance is a technological development in financial decision making (Fintech) that aims to provide insights relevant to Environmental Social Governance (ESG) on specific commercial assets, companies, parent companies, portfolios or nations (WWF, 2020). Using Geographical Information Systems (GIS), it links asset and observational data to inform accounting and forecasting valuations, as well as screening processes, across financial markets and instruments.

2. The Political Economy of SDIs and Green Finance

SDI research has assessed the structures, relationships and institutions by which spatial data and technology are produced and used, historically focussing on factors of social inclusion and exclusion (Elwood, 2010). These factors include accessing, participation in and decision making with GIS. These are underpinned by administrative and data-sharing practices configured by copyright and privacy law, tiers of government, metadata, data standards and social customs (Elwood, 2010). Research on these social and administrative factors has been enriched by research on the commercialisation of SDIs (Randalls, 2010; 2017) and framing of these political-economies as information regimes that delimit, structure and regulate digital geographic information markets globally (Leon, 2019).

2.1. Spatial Finance and SDIs

This research has highlighted how Spatial Finance is encouraging and intensifying the commercialisation of SDIs. This commercialisation is allied to open-data initiatives, and is driven by calls for data access resulting in a mixed data economy. Data aggregation, linking and analysis is evidenced by growing numbers of mergers and acquisitions, leading to the vertical integration of data value chains, characterising a shift from cooperation to competition between Earth Observation, Data Brokerage, ESG firms and Ratings Agencies. These developments by finance and technology firms have been supported by the state and third-sector (e.g. WWF) aiming to commercialise SDIs in order to maximise data access on commercial terms under a wider 'public good' rationale. This model does not, however, eliminate exclusion from SDIs, but reconfigures them based on commercial interest, paywalls and computational capability and capacity.

2.2. SDIs and Green Finance

Data production, access and use arrangements to SDIs create information asymmetries that underpin emerging divisions of labour in Green Finance. As alluded to, there is competition over the vertical integration of data value chains, reflecting similar competition in other Fintech sectors between finance and technology firms for market share. In efforts to integrate spatial-data stacks, asset registers remain a hard-to-access data layer and core linking field for screening, accounting and forecasting valuations of Spatial Finance data-subjects. Asset registers have historically been state assets and. as such. administrative protocols are less easily commercialised or opened-up given privacy laws and customary practices. In conjunction with this, there is a growing recognition that some data assets are core components of Green Financial policy, such that the information asymmetries associated with these

datasets establish a competitive advantage (Hendriske *et al.*, 2019) that should be considered within a broader Green Finance strategy. These findings highlight the dynamic coupling between information and financial markets and the potential impacts of spatial information regimes on the geographies of Green Finance.

3. Reframing spatial data subjects

Critical GIS research has shown the ways in which individuals and institutions leverage GIS to negotiate social, political and economic processes, often displaying differential outcomes based on technicist forms of knowledge and representation, and how these trends have been intensified with the onset of digital technologies (Elwood, 2010). Efforts of actors to cast themselves as experts can lead to the enhancement or emergence of new politics, the reframing of spatial data-subjects and the discipline of GI Science.

This research project has shows the emerging role of SDIs in compliance, insurance, derivatives and credit allocation through commercial and investment banking instruments including loans, bonds and equity. These activities inculcate SDIs within a broader politics of climate risk, placing new socio-economic and socio-ecological significance and responsibilities (Ryan-Collins, 2017) on SDIs and GI Science. These factors are of increasing importance in Finance and are attracting interest from both scientific and financial regulatory bodies (Fielder *et al.*, 2021). Likewise, Critical GIS studies can inform research on the practice and politics of financialized climate governance (Mazzacato, 2019; Taylor, 2020).

The study outlines an initial theoretical framework for Spatial Finance, its relation to development trends in GI Science and SDIs and highlights the relevance of Digital Geographic Information Policy and associated institutional frameworks to the development of Green Finance encouraging reflection from practitioners and regulators on how to facilitate data access, quality and 'appropriate' applications within financial decision making.

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Biographies

Matthew Kelly is an ESRC and Ordnance Survey funded PhD researcher based in the Swansea University Geography Department. His research interests are in the Geographies of Green Finance and mixed methods approaches to understanding its developing role in natural resource management and land economies.