THEORIZING ENVIRONMENTAL MEDIATION THROUGH IRELAND'S PEATLANDS

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This paper situates the historical resource and conservation landscape of Ireland's peat boglands within their emerging role in datafied "green" revolutions. Emphasizing the stakes of land, resources, technologies, and research institutions within green transitions, the paper theorizes peat bogs an emerging site of digital climate solutionism. In doing so, I offer a framework for understanding resource landscapes in so-called "post-extractive" contexts where networked forms of extraction are innovated through public/private technoscientific research at the intersections of digital technology and ecosystemic interactions between geologies, atmospheres, and cultures. Bringing together literature from environmental media studies, STS, and geography, and performing participant observation and discourse analysis on emerging projects of peatland science in academic and industry settings, I theorize how "environmental mediation" offers an aperture for understanding how digital technologies network landscapes towards "ecosystem services" and other capital-driven climate projects.

Boggy Infrastructure

Whereas Ireland has been a leader in "smart" technologies and infrastructures by facilitating digital multinationals since the 1980s-1990s, the comparatively "dumb" media (Mattern 2017) of muddy peatlands presents a challenge for development. As media theorist John Durham Peters has famously articulated, media constitute more than the devices we use to communicate. Theorizing what he calls "elemental media, "the elements that lie at the taken-for-granted base of our habits and habitat" (2015, 2), he argues that the foundational "natural" elements of networks organize life and nature in increasingly cloudy ways. Until recently, "media" more frequently referred to earth systems than communicative ones (2015, 2), such as peat soils' ability to act as a "medium" for growing, carbon cycles, water cycles, or other ecosystemic processes. Optimized technological utilization of peat as soil media for green development and

climate solutions requires sophisticated digital technologies for mapping, measuring, analyzing, and instrumentalizing the geological and hydrological characteristics of peatlands (Bullock et al. 2012; Rowan et al. 2022). Many have recognized projects of digital sensing and sense-making in the climate and biodiversity science of landscapes like woodlands (see Gabrys 2020), demonstrating their role as a kind of "infrastructural nature" for climate politics (see Bigger and Nelson 2022). Bogs are thus today a medium for capitalist value via entanglements between their "natural" and technological ecologies.

As some have expanded and critiqued the elemental media framework (Furuhata 2022; Jue and Ruiz 2021), the "elemental" must also account for the entanglement of the "material and semiotic" (Jue and Ruiz 2021) within violent regimes of material accumulation - from colonialism to contemporary extractive capitalism (Voskoboynik and Andreucci 2021). A critical analysis of elemental media, if we are understanding the elemental frameworks of soil and water that make up bog landscapes, requires intersectional analyses including material histories of colonial capitalism and the material violence often *enacted through* the semiotic functions of technoscientific territory and resource-making. The ways that bogs blur "nature" and "society" make them especially strategic resource landscapes towards different developmental and technoscientific frameworks. The datafied dynamics of peatland science demonstrates peatlands' increasing and continuous instrumentalization for transformative material and epistemological projects of technological modernization across history, most recently in their networking via these technologies within land use, ecosystem services, and natural capital frameworks.

From Energetic Resource to Natural Capital
The Irish Free State, established as a dominion of Britain in the early-1920s after a long revolutionary period, inherited ways of seeing Irish peatlands as "wastelands" in need of "improvement" (Ruuskanen 2018), drawing upon colonial maps to learn how to develop them for large-scale industry like agriculture and energy. Through semi-state Bord na Móna (BnM), these rationalities fuelled national electrification and modernization through large-scale extraction and burning of "turf" in power plants. But across history, Irish boglands have been situated within different cultural imaginaries and projects of colonial and state mediation. Their extent (20% of Ireland's landmass) and material properties (waterlogged, treacherous to cross, ability to preserve organic matter, biodiverse) have variously been observed for their sanctity and inaccessibility as well as their often conflicting status as wilderness, fuel for households, fuel for the nation, material archive, biodiversity stronghold, or commons (e.g. Feehan et al. 2008; Gladwin 2016). Today, and in tension with these intersecting legacies, the most visible projects on BnM's peatlands remain in the energy sector, transferring industrial-scale carbon to renewable energy in their rebranding as a "climate solutions" company in 2021. In planned "Energy Parks," BnM will facilitate circular sites on which interlocking

infrastructures of data centers (huge energy users), renewable energy, and battery storage will be administered by private companies on "post-extractive" peatlands (Bresnihan and Brodie forthcoming).

However, similar to prior forms of development, these activities require that bogs remain drained, complicating their climate mission. Peatlands are an efficient carbon store when left intact, but when disrupted - for example, through large-scale drainage for development - they emit carbon reserves into the atmosphere, reversing their "natural" function as carbon sinks. The Irish state and its corporate partners are thus searching for ways to optimize carbon storage value via technological solutions. Recalling above legacies of cartographic governance, the Microsoft and publicly co-funded Terrain AI project has developed a petabyte-scale cloud-based platform for mapping and identifying carbon sequestration potentials within strategic "green" landscapes including peatlands (Terrain-AI, n.d.). Similarly, Intel has partnered with the Irish National Parks and Wildlife Service on a bog restoration project in the Wicklow Mountains, to protect the "natural assets" of Ireland's water supplies towards its own water sustainability goals (Intel PR 2021). Beyond directly tech-funded work, a consortium of state-funded researchers at Irish universities are combining British Bog Commission maps from the early-1800s - designed to map agricultural potential to supply imperial endeavor - with present "cloud-based geospatial platforms such as Google Earth Engine" to build knowledge of precise carbon stores and sequestration potentials of degraded peatlands (Darmody 2022).

In each of the above cases, a snapshot of dozens of collaborations between peatland and data science happening in Irish universities and funded by public and private research institutions, bogs are strategic opportunities towards industry-driven goals and policies, which ostensibly also serve the Irish state's sustainability targets. As opposed to their "intrinsic" value, these frameworks value boglands for "ecosystem services" and "natural capital," a land medium to deliver climate solutions such as green energy and carbon sequestration (see Bresnihan and Brodie forthcoming).

This is not to unduly critique scientific research around peatlands – in fact, I want to recognize how essential it is to fund research into these landscapes amid climate crisis. However, in this paper, I am offering a framework for understanding how the blurring of "nature" and "society" through the emerging institutional and technological frameworks of ecosystem services *infrastructuralizes* the landscapes of peatlands towards capitalist climate adaptation through taken-for-granted technoscientific orthodoxies and research funding partnerships. The proliferating networks of sensors, measuring devices, machine-learning systems, and digital imaging of the bogs, comprehensively dissecting their geological, hydrological, and atmospheric processes and interactions, demonstrates the entanglement of cloud-enabled digital technology with the material pasts and futures of landscapes as they are being shaped during climate change (see

Gabrys 2020; Goldstein and Nost 2022). Technological mediation, as a form of environmental mediation (Chang et al. 2019; Shriver-Rice and Vaughan 2020), is a vital representative tool for the transformation of land into value for climate solutions, survey devices for a coming peatland "green grab" (Fairhead et al. 2012).

Conclusion

The "prehistory" of the digital bog traced above (see Hu 2015) foregrounds the entangled legacies of colonial technoscience within the development and application of systems which maintain the expanding presence and infrastructures of privatized digital technology in green development. While alternative and insurgent elemental bogland politics exist in Ireland, like in other contexts contesting the encroachment of privatized digital futures (Estrada and Lehuedé 2022), this paper offers an urgent call for a more radically democratic land and resource politics surrounding digital technologies and platforms in environmental science, aligning with communities struggling for more careful futures and presenting a material template for a "digital bog" that furthers a truly "just" transition during climate change.

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