



Environmental consulting as experimental system: Uncertainty and emergence in Ecuador's oil sector, 1988–2001

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ABSTRACT

This article uses the case of environmental consulting in Ecuador's petroleum sector to highlight unintuitive dynamics of institutional change precipitated by characteristically neoliberal conditions. Amidst economic crisis, counterpoised pressures between state, industry and civil society in Ecuador in the 1980s and 1990s allowed private consultants to treat the means and ends of petroleum reform as 'uncertain', to be explored via 'experiments' in mitigation and scientific research. 'Experimentation' in petroleum development practices was, at once, a symptom of socioeconomic crisis; an ethos prized by consultants for the freedom they enjoyed; an engine for the production of new norms; and a source of profit in a new business field focused on legitimizing petroleum extraction. Attuning to uncertainty and experimentation helps us to diagnose emergent forms of governance in contexts riven by economic crisis and radical social change such as those typically studied by scholars of neoliberal reforms. This orientation complements analyses of neoliberalism focused on capitalist coercion, or the deliberative uptake of expert plans and tools, which otherwise risk painting overly rational and volitional portraits of institutional change.

1. Introduction

As oil became the engine of Ecuador's economy from the early 1970s through the mid-1980s, the risk-sharing agreements that governed the consortium between Ecuador's state oil company, U.S.-based Texaco and Gulf Oil lacked any equivalent to contemporary environmental protections. Such agreements referenced avoiding undue damage to 'natural capital' in the extraction process, but failed to define natural capital, specify what level of damage was unacceptable, identify who were the affected parties, or describe how damage might be mitigated or compensated (Kimerling, 1990, 1994, 1995; Martz, 1987).

Yet, amidst ongoing liberal reforms and some of the worst economic crises in the country's history during the 1980s and 1990s, environmental due diligence began to make an appearance. As controversy enveloped oil development, foreign firms turned to an emerging cadre of environmental consultants to reform their development practices, salvage their legitimacy and preserve access to Ecuadorian petroleum blocks. Feedback from consultants to their oil company clients in the late 1980s might have taken the form of one-page memos, or 10–20 page field reports more resembling white papers or scientific manuscripts than technical reports on major petroleum development projects. By the mid-1990s, consultants' reports had expanded to hundreds of pages in length, included numerous standardized components, and increasingly resembled reports generated in the field of environmental impact assessment (EIA) then in ascendance in much of the world (Kennedy, 1999).

How should we conceptualize the advent and growth of consultant-guided environmental due diligence in Ecuador's oil sector during this period of intense socioeconomic crisis? Political economic approaches to neoliberalism have often analyzed it as a top-down imposition of market-oriented policies and institutional structures by international financial institutions (IFIs) on debt-ridden developing countries, with varying degrees of private industry pressure and state complicity (e.g. Harvey, 2007; Veltmeyer et al., 2016). Studies of neoliberalism and the environment have tended to focus specifically on enclosures of common pool resources and the devolution of already-established state regulatory power in natural resource sectors (Liverman & Vilas, 2006; McCarthy, 2005). More recently, scholarship on neoliberalism has attended to the movement and transformation of neoliberal techniques and rationalities targeting specific domains for intervention (Collier, 2011; Higgins & Larner, 2017; Ong & Collier, 2008). The present article draws from all of these approaches, but they do not offer a wholly adequate toolkit for understanding ad hoc, industry-initiated due diligence in a context with no pre-existing state environmental regulation. And while private consultancies now play some role in environmental governance in much of the world, they have been marginal in empirical studies of neoliberal environmental governance (but see Barry, 2013; Choy, 2011; Li, 2009; Tironi & Barandiarán, 2014).

This case study is intended to relativize institutional change under characteristically neoliberal conditions: by attending to the details of environmental consulting's ascendance in Ecuador in the late 1980s and 1990s, my hope is that our conceptions about the possible pathways of

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institutional change may be expanded, and our ability to analyze neoliberal conditions improved. The article's two core claims are that i) environmental consulting exploited uncertainty resulting from the balance of powers between state, industry and civil society to sell the reform of petroleum development practices; and that ii) within this newly-emergent field, consultant-guided experimentation with due diligence, mitigation and scientific research practices was an important source of legitimacy for extractive interests.

A focus on mid-level consultants is an unusual starting point for thinking through petroleum politics, but one that lets us understand how oil sector insiders conceptualized their own responses to, and role in, institutional change occurring in the 1980s and 1990s. To understand those responses, the article uses a model of “experimental systems” (Rheinberger, 1992, 1997, 2015) drawn from the history of science and inspired by assemblage thinking. The model theorizes the relationship between uncertainty, as an open-ended subjective orientation to the future (prompted in this case by sociopolitical chaos), and experimentation, understood as iterative attempts to produce the “new” (in this case, examples of due diligence intended to legitimize oil extraction). For scholars with an interest in “voluntaristic” technologies of capitalist legitimation like corporate social responsibility (CSR), the approach taken here enables us to understand TNC-initiated due diligence in systemic, longitudinal terms, and to see how consultants operated across – and helped to construct – shifting paradigms of governance. For research on policy mobilities, the case theorizes one pathway whereby ad hoc practices, rather than deliberative design, contributed significantly to policy mutation, by preempting coherent state-enforced due diligence and defining in advance what became the formally recognized technical details of petroleum governance beginning in the late 1990s. And in subtle contrast with how the notion of “assemblage” is often used in studies of neoliberalism, the analytical lens used here helps us to understand emergent frameworks of petroleum governance, in part, as products of a “bottom-up”, *self-organizing* system.

After describing the study context and methods, I sketch the mixture of economic crisis, oil dependence and socio-environmental activism that characterized Ecuador from the late 1980s to the turn of the millennium. The article then uses the example of resistance to Conoco's proposed development beginning in 1988 to highlight the challenges posed by the case for contemporary scholarship on CSR and policy mobilities. I use Rheinberger's “experimental system” to think through these challenges. The article then examines the development of petroleum consultancies, arguing that petroleum consulting constituted an experimental system for reform through ad hoc, trial-and-error, and project-by-project approaches to development. This pattern spanned an early period of informal consulting and a later period of increasingly obligatory and formal EIA that drew on precedents set by earlier work. Subsequently, the article turns to the role of environmental actors in consulting, noting the importance of environmental scientists and biodiversity conservation non-governmental organizations (NGOs) for designing and executing environmental impact assessments (EIAs). An ethos of experimentation was as pervasive in EIA “baseline studies” and mitigation activities as it was in petroleum engineering and helped to reconcile oil sector and environmental actors. I close by highlighting the utility of studying uncertainty and experimentation for understanding normative change in extraction and the ramifications of neoliberal policy.

2. Methods: Ethnography, oral history interviews and archival research

This article emerges out of a research project focused on the role of expertise in creating institutions for biodiversity conservation in Ecuador. My research pivoted to study Ecuador's environmental consulting industry when it became clear that there was no way to understand present-day environmental management and science without

reference to the consulting industry in which many conservationists currently work and have historically participated, and that some even helped to initiate in the late 1980s and early 1990s. My original working hypothesis was that multilateral demands drove the creation of environmental regulation in the 1990s, to which the consulting field responded. Yet, I found no evidence to support this in archival research, and the timing of high-profile IFI influence in the country did not accord with changes in Ecuador's environmental policy in the oil sector. Consultants I interviewed or spoke casually with were routinely unable to name the laws or regulations to which their work responded in the 1990s, or to describe substantive standards they took into consideration when designing projects. Furthermore, I was surprised to find that long-time consultants consistently reflected on the 1990s as a “golden period” of freedom and experimentation in the oil sector, despite the obvious ascendance of environmental norms in the petroleum sector during that time. To better understand environmental consulting I relied on a combination of ethnography, oral history interviews and archival research.

In 2013–2014 I spent 14 months participating with, and observing petroleum consultants in a variety of contexts, including the home offices of one Ecuadorian and one U.S.-based company, biological laboratory work, and two trips observing petroleum environmental impact assessment baseline studies. Timing of the ethnography coincided with ongoing protest regarding high-profile oil extraction in the country's northern Amazon (Bass et al., 2010; Finer et al., 2009; Larrea & Warnars, 2009; Rival, 2011).

Ethnographic fieldwork was complemented by formal interviews with consultants working in various capacities within the industry (n = 53). Of the interview sample, 41 individuals were Ecuadorian by birth, with most of the remaining individuals being U.S. expatriates. To characterize the interview sample, I distinguish between individuals who had experience in consulting as early as the late 1980s and 1990s (‘early’ experience; n = 21); those whose experience began after the turn of the millennium (‘medium-term’ experience; n = 16); and those whose EIA experience entirely postdated the election of former president Rafael Correa in 2006 (‘recent’ experience; n = 15). All of the non-Ecuadorian consultants interviewed had either ‘early’ experience (n = 11) or ‘medium-term’ experience (n = 1) in consulting, which accords with consultants' general observations that foreign-born individuals had a greater proportional role in the still-nascent field in the 1990s. A special effort was made to identify ‘early’ consultants in order to conduct more intensive oral history interviews with them.

The documentary evidence examined included archival materials and formal petroleum environmental impact assessments. Most archival materials analyzed came from Ecuador's National Herbarium, a biological research institution that bridged the worlds of biodiversity conservation and bilateral aid and was directly involved in the advent of Ecuadorian petroleum consulting in the late 1980s. Documents reviewed included reports to petroleum companies, contracts, budgets, and scientific and NGO correspondence. Formal petroleum environmental impact assessment reports, spanning from the early 1990s to the 2010s, were collected from private firms, the Ministry of the Environment, and online repositories, and examined to understand changes in consulting practices and documentation. These resources were the basis for triangulating the historical dynamics of the consulting industry from its advent in the late 1980s to the creation of the country's most important petroleum law in 2001.

3. Oil dependence, economic crisis and socio-environmental activism

In this section, I sketch Ecuador's oil economy and the sociopolitical chaos that enveloped it from the late 1980s into the early 1990. I draw particular attention, first, to the treadmill of oil dependence and debt on which the state found itself; and second, to civil society's response as the devastating legacy of Texaco's field operations in the 1970s and

1980s was being exposed and U.S.-based Dupont subsidiary Conoco planned oil extraction in previously undeveloped sections of the Ecuadorian Amazon. These historical dynamics motivate the article's theoretical approach, as I clarify in the section that follows.

Commercial quantities of oil were discovered in Ecuador's Amazon in 1967. The Ecuadorian state's reliance on foreign capital and expertise has historically meant that oil development unfolds through what [Watts \(2005\)](#) refers to as "oil complexes", or hybrid public-private structures that minimally include a state oil company, oil TNC, and mechanisms for taxation and revenue distribution. Ecuador's first oil complex was initiated when commercial extraction began in 1972 through a consortium involving U.S.-based Texaco and Gulf Oil, and the Ecuadorian State Petroleum Corporation (CEPE).

Ecuador's state came to depend on oil revenues in the 1970s, coupling the country's fortunes to international oil prices. As the market collapsed in the early 1980s, Ecuador found itself with public foreign debt equivalent to about 20% of GDP in 1980. Cycles of oil market volatility and foreign borrowing brought that to roughly 84% of GDP by 1999 ([Weisbrot et al., 2017](#)).¹ Liberal policy prescriptions progressed from short-term measures under President Oswaldo Hurtado beginning in 1982 to IMF-guided changes that reduced the size of the state, deregulated the banking sector and removed controls on trade under subsequent administrations ([Hey & Klak, 1999](#)).

Neoliberal pressures impacted Ecuadorian oil extraction primarily through the liberalization of foreign investment and shifting of oil complex contract terms ([Bebbington, 2011](#); [Bebbington & Bury, 2013](#); [Bridge, 2004](#); [Gordillo, 2003](#); [Martz, 1987](#); [Valdivia & Lyall, 2019](#)). Significant measures were taken to create a "friendly investing environment", for example by reducing taxes on foreign firms' oil revenue and abandoning the OPEC-mandated cap on production in 1992. By the mid-1990s, the state oil company's dwindling profits were being funneled entirely into external debt repayments, hampering its ability to maintain or expand state-owned oil operations ([Fontaine, 2004](#)).

Despite little initiative from the state, grassroots activism and international and domestic NGOs began drawing attention to the harms caused by oil development. Under the aforementioned petroleum consortium, Texaco had operated an oil concession roughly the size of the U.S. state of Rhode Island from 1972 to 1990. The consortium extracted an estimated 1.4 billion barrels of crude while discharging untreated liquid toxic waste equivalent to nearly twice the volume of the Exxon Valdez spill into the lower Amazonian environment ([Environmental Justice Organizations, 2015](#)).

As further Amazonian oil extraction was planned in the late 1980s a variety of formal actions began to chip away at the impunity of the Ecuadorian oil sector, such as a petition filed with Interamerican Court of Human Rights protesting development in an Amazonian protected area; and EIA as a condition on a World Bank loan in 1988 ([Kimerling, 1990](#)). Legislative reforms in the 1980s and 1990s referenced a due diligence process without specifying what it should consist of. It was not until the mid-1990s that "terms of reference" began to be worked out within a shifting array of ministries involved in oil development.²

As Conoco prepared for oil extraction in an undeveloped portion of the northern Amazon, a 1988 position paper by the Ecuadorian conservation NGO Fundación Natura on "the current problematic of the Ecuadorian Amazon region" spelled out a number of issues, such as informal settlement; land speculation; and a lack of local input in conservation planning.³ In response, Conoco presented its

¹ 1999 was the year of a banking crisis in the country, leading to a major World Bank loan and the adoption of the dollar as national currency ([Jácome, 2004](#)).

² For one prominent example see "Términos de referencia de los estudios de impacto ambiental (EIA) para las actividades de prospección sísmica". INEFAN, Quito 1994.

³ Posición de la Fundación Natura sobre la problemática actual de la Región

'Environmental Management Plan for Block 16' to critics at a high-profile meeting on the luxury ecotourism riverboat Flotel Orellana in 1990. The plan highlighted accommodations like close grouping of wells to reduce their footprint; re-injection of contaminated production fluid into the well; and assurances about avoiding disturbing indigenous Waorani and Kichwa peoples in the area.⁴ The discordance between the two agendas shows the enormous space that existed to define what the problems and solutions of oil extraction were.

Moreover, the Flotel Orellana meeting's list of attendees indicates oil controversy's ballooning complexity. Participants included: 9 Conoco representatives; 11 state employees, including two from the Ministry of Agriculture and one from the state's colonization agency (who might have advocated for due diligence), along with four from the state firm Petroecuador and one military commander; eight scientists from research organizations ranging from New York Botanical Garden to Quito's Catholic University to an Ecuadorian consultancy; and 23 individuals from other organizations ranging from USAID to the World Wildlife Fund to the Ecuadorian NGO Acción Ecológica, and one representative of the Waorani.⁴ There was little chance of Conoco winning consensus support from meeting participants.

Finally, Conoco's interactions with state agencies illustrate how regulatory enforcement throughout this period was inconsistent or nonexistent. The General Directorate of the Environment (Dirección General de Medio Ambiente; DIGEMA) within the Ministry of Energy and Mines (MEM) demanded an EIA from Conoco prior to operating in its petroleum concession. Yet DIGEMA's protocols were discarded by the MEM in 1990 in favor of voluntary, undisclosed terms ([Kimerling, 1995](#)). Critics could rightly point out the existence of public norms prescribing some minimal environmental considerations in oil work. Yet, indications from the state that compliance was voluntary empowered foreign firms to undertake due diligence on their own terms.

In summary, the pressures of economic crisis, oil dependence and environmental and social activism created a highly volatile political situation. The state was dependent on oil and under significant pressure to enact liberal policies, resulting in an inability and lack of political will to environmentally regulate the petroleum sector. A "post-Texaco generation" of petroleum companies formed Ecuador's only major source of foreign investment and held a monopoly on the technology used to extract oil, but sought to avoid the negative publicity, litigation, and audits Texaco seemed headed for. The timing, costs and broader implications of stricter state oversight were thus unknowns in terms of which their operations needed to be managed, and which they sought to influence.

4. Assembling petroleum governance: Uncertainty and experimentation

I turn now from the historical context to relevant work on corporate social responsibility (CSR) and policy mobilities, using the case of Conoco to aid in theorization. I note that the CSR literature's community-based case studies provide valuable insight into the local politics of corporate-initiated governance but have not leant themselves to longitudinal accounts of normative change in the petroleum sector. And while this gap could seemingly be addressed via the policy mobilities literature, I highlight difficulties posed by the present context for an approach to understanding institutional change strictly in terms of deliberative policy-making. This article complements insights from those literatures with a model of "experimental systems" ([Rheinberger 2015](#)) in which *uncertainty* resulting from Ecuador's political economic situation formed the enabling context for *experimentation* (understood

(footnote continued)

Amazonica Ecuatoriana (RAE)', Fundación Natura, Sept 1988.

⁴ 'Flotel Orellana Meeting Itinerary and Environmental Management Plan', Conoco, May 1990.

as trial-and-error attempts at due diligence) aimed at legitimizing oil extraction.

Given the imbrication of state and industry in oil complexes, scholars have noted the often informal character of hydrocarbon governance and the prevalence of “self-regulation”, “voluntaristic” or “soft” governance, in which corporate actors have significant latitude to “govern” their own activities (e.g. the arrangement reached between the MEM and Conoco; [Bebbington & Bury, 2013](#); [Kimerling, 1990, 1994, 1995, 2001](#); [Sawyer, 2004](#); [Watts, 2004, 2005](#)). Oil TNC autonomy often manifests in technologies of legitimation like corporate social responsibility (CSR) programs, in which companies monitor the impacts of their own activities and enact state-like entitlement programs for communities living near their operations.

Perspectives on CSR are mixed. Some view it as inevitably obfuscatory and exploitative ([Gilberthorpe & Banks, 2012](#); [Kirsch, 2015](#)) and a poor substitute for state entitlements ([Billo, 2015](#)). Others note real benefits of community participation and development initiatives (especially in regions historically treated as marginal to the body politic; [Valdivia, 2008](#)), while acknowledging that such programs also serve to dampen resistance and manage the labor force for extractive projects ([Collard et al., 2016](#); [Himley, 2013, 2014](#); [Welker, 2009](#)).

Three interrelated limitations of the existing CSR literature should be noted. First, community-focused case studies may not capture the full range of audiences that such corporate strategies are intended to appease. Thus, [Billo's \(2015\)](#) study of Repsol in Ecuador focuses on how the company's CSR program garners the “social license” to operate from the community, without extensive discussion of the performance of corporate virtue for local NGOs or provincial state offices. In the Conoco case, the Flotel Orellana meeting highlights that community organizations were only one, albeit important, piece of a much larger legitimation puzzle that Conoco was trying to solve. Second, the interaction of CSR with other forms of governance is not often interrogated in-depth. For example, [Sydow \(2016\)](#) describes the mining firm Newmont's CSR efforts while its EIA was under evaluation without discussing, e.g. how CSR might have dampened dissent during the EIA's vulnerable public comment period. Third, contemporary case studies tend to leave CSR under-historicized, with little indication of how such programs develop over time in tandem with the larger political milieu in which they are embedded. Greater attention is given to changes in the overall structure of the petroleum sector ([Valdivia, 2008](#)), financial regulation and investment ([Bebbington and Bury, 2013](#)), or community and labor history ([Himley, 2013](#); a powerful exception is offered by [Walter & Urkidi's \(2017\)](#) work on prior informed consent in mining).

Are companies' powers to “voluntaristically” administer social life in the oil patch partially predicated upon their commitments to the state elsewhere, such as the “technical fixes” ([Li 2009](#)) formulated in documents like Conoco's management plan? Do techniques or strategies generated in CSR ever find their way into other paradigms of governance, or vice versa? Lacking a view of corporate technologies of legitimation as responsive to diverse, mutually impacting pressures, we are poorly positioned to theorize their historical tendencies, despite scholarly recognition that long-term institutional change is an important consequence of the militant resistance to extraction for which Ecuador is famous ([Bebbington, 2010, 2012a, 2012b, 2015](#); [Sawyer, 2004, 2015](#); [Silva et al., 2018](#)).

Normative frameworks like CSR are unlikely to be created de novo or transplanted from old contexts into new without changes to their mechanics and politics. The literature on policy mobilities explicitly recognizes these complexities. Informed by regulationist economic geography and Deleuzian assemblage thinking, this scholarship approaches policy as “politically constituted and sociologically complex”, “embedded within networks of knowledge/expertise... as well as within more ‘localized’ socioinstitutional milieu” ([Peck and Theodore 2015: xxiv](#)). Policy is understood to be rapidly mutating as it is taken up in new contexts, exceeding or betraying the intentions of its originators while tending toward transitory “fixes” that ameliorate the tensions of

capitalist economies ([Fry et al., 2015](#); [Gotham, 2014](#); [Inverardi-Ferri, 2017](#); [Peck, 2002, 2011](#); [Peck & Theodore, 2012](#); [Prince, 2017](#)). This literature offers a sophisticated approach of great value to studying how EIA and CSR have functioned in the Ecuadorian context.

Nonetheless, there is one limitation to a policy mobilities approach highlighted by the case of Ecuadorian petroleum consulting. To appreciate this limitation, it is useful to put ourselves in the position of someone pursuing oil extraction on behalf of an oil TNC in late-1980s or 1990s Ecuador. On a week-to-week or month-to-month basis, an oil field manager might not have known if a given state office was being phased out or who headed it; if a permit for a specific process existed or was being enforced; if work in a particular watershed might set off a wave of protests; or what news from Ecuador's petroleum sector would make its way into environmental NGO newsletters, the media, or the agendas of shareholders. What would be the most effective way to respond in such a situation?

In Conoco's case, we know that a clearly spelled-out management plan demanded by DIGEMA served as a rallying point for Conoco's detractors. We know that Conoco quickly jettisoned that plan upon DIGEMA's demise. And we know that in its place Conoco committed to do an undisclosed *something*. The lesson we might derive from this (as it seems Conoco's contemporaries did) is that, given the MEM's clearly telegraphed disinterest in reform, the most expedient response to calls for social and environmental justice was not for TNCs to declare detailed normative commitments before the public and the state, but rather to make vague commitments to future ameliorative action – *something* – which, when it was realized (preferably late in the development process) could be pointed to as a novel exemplar of conscientious development. Notwithstanding their ad hoc, potentially tokenistic nature, we can intuit that those *somethings* might have a cumulative impact on the norms of development over time. And we can intuit that *the cumulative dynamics of ad hoc attempts at legitimation might be poorly captured by the approach of the policy mobilities literature, which understands change primarily as an outcome of deliberative expert design of explicit normative frameworks, however earnest or cynical, and however rapidly mutating they may be.*

I refer to the general orientation of the imaginary oil field manager above as confronting “uncertainty”; and I refer to the various *somethings* attempted by firms like Conoco, Arco, Petro-Canada, Repsol, Maxus and others at the time as “experiments”. Scholarship on uncertainty understands it as a subjective orientation to a future imagined as fundamentally unquantifiable, unknowable and unprecedented ([O'Malley, 2004](#); [O'Malley, 2000, 2012](#); [Samimian-Darash & Rabinow, 2015](#); [Whittington, 2019](#)). Negotiating uncertainty under this definition demands “experienced judgment, shrewd guesswork, [or] rules of thumb” ([O'Malley 2012: 13](#)). This vision of uncertainty features in scholarship on actors that are motivated to produce the “new” in contexts such as entrepreneurial capitalism or scientific research. Thus, in trying to formulate a realistic theory of economic action, [Beckert \(2003\)](#) sketches an iterative model of entrepreneurial design in which both “vaguely understood problems and solutions become clearer until a solution has been reached” (780; see also [Knight, 1921](#)). Similarly, liberal reasoning about entrepreneurial liability and whether a firm has exercised “reasonable foresight” has historically involved imagining the practical work of entrepreneurship; how precedents that existed prior to an innovation had some partial or tangential bearing on the case at hand; and how “common sense” informed the conduct of the firm ([O'Malley 2000](#)).

For explicit theorization of the link between uncertainty and experimentation I turn to historian of science Hans-Jörg [Rheinberger's \(2015\)](#) model of the “experimental system”. Derived from the history of experimental biology, Rheinberger's experimental systems consist of “technical objects” that manage or minimize the variability of reality so that particular parameters can be deliberately manipulated to learn something new. This focal point of inquiry Rheinberger refers to as an “epistemic object”. Against an overly rational portrait of

experimentation, Rheinberger emphasizes a vision of experimenters groping their way toward *something*. They operate under a condition of “ignorance at one remove” (170), lacking not just the answers to already-specified questions, but also a clear sense of what the proper questions to ask might be. Experimental systems, then, are “devices for the creation of unprecedented events” (Rheinberger 2015: 168). Experimental results retrospectively reconfigure experimenters’ understandings of what the experiment was “about”, recasting what was previously known and what the right questions would have been, while simultaneously creating the conditions for inquiry into new epistemic objects.

To be clear, some notion of “experimentation” is a recurring feature of much of the most interesting literature on neoliberal decentralized governance (e.g. Haughton & McManus, 2012; Overdevest & Zeitlin, 2014; Peck & Theodore, 2015; Schneiberg & Bartley, 2008; Shamir, 2008, 2010). Thus, Brenner et al. (2010) envision a model of neoliberalization predicated on regulatory experimentation that iteratively reconfigures settings via the production of novel “rule regimes” (185). Peck and Theodore (2015) view “experimentality”, or “continued mutation at the level of policy and practice”, as central to the legitimation of neoliberal conditional cash transfer programs (141). Himley (2014) views a mining company’s participatory environmental monitoring program as an experiment productive of new forms of expertise that structure how development may be contested. And yet, perhaps because experimentation is only one small facet of these research programs, its dynamics are not extensively remarked upon, leaving open at least two important questions: Do experiments have a characteristic structure? And, given their rapid turnover in the context of neoliberalization (Peck and Theodore, 2015), what are their lasting effects?

Rheinberger’s model offers an explicit temporal structure of experiments; a characteristic subjective orientation of experimenters; and a prediction about the accretive, self-stabilizing longitudinal tendencies of experimental systems. In the context of late 20th century Ecuadorian oil extraction, this model highlights how the situated reasoning of oil sector interests amidst political uncertainty resulted in ad hoc, trial-and-error *practices* intended to legitimize specific projects; how iterative efforts produced a gradually accruing repertoire of legitimating forms of due diligence without being grounded in any coherent paradigm of governance; and how this broader infrastructure was nonetheless available to be mobilized under the banner of EIA when that paradigm came to be elaborated and enforced by the state in the mid- and late-1990s.

Like Rheinberger’s research, this study takes inspiration from assemblage thinking (Anderson & McFarlane, 2011; Braun, 2006; DeLanda, 2016; Higgins & Larner, 2017; Li, 2007a, 2007b; Marcus & Saka, 2006; McGuirk & Dowling, 2009; Mitchell, 2002; Ong & Collier, 2008; Prince, 2017; Rabinow, 2009; Rheinberger, 1997; Robbins & Marks, 2010). Of particular interest is what Anderson et al (2012) term the “exteriority of relations”, the idea that an assemblage is a provisional effect of relations between its constituent parts (Bennet, 2005; Higgins & Larner, 2017). Such a view encourages us to problematize the boundedness of social forms that might otherwise be perceived as “natural” or organic wholes; and conversely to problematize the properties of their component parts, which may behave quite differently when recontextualized elsewhere. EIA as it was eventually practiced in Ecuador’s petroleum sector bore structural resemblances to environmental governance in other parts of the world. Yet, its internal dynamics can best be described as a self-organized system founded on the work of private consultants whose stock-in-trade was ultimately not a set of due diligence protocols or engineering techniques, but rather experimentation, itself.

5. An experimental system: From informal consulting to environmental impact assessment

In Ecuador’s capital city of Quito, a small but eclectic elite culture

spanning development specialists, expatriate travelers, foreign oil firm managers and Ecuadorian technocrats was central to the initiation of the consulting field. Actors with a foothold in this culture were well positioned to offer their services when oil companies confronted resistance to their development plans. One such individual was U.S. expatriate Douglas McMeekin. McMeekin formed a consultancy called DTM Limited that initially gained notoriety for his work with Conoco. He described a typical intervention designed by his consultancy thus:

You have to basically floor a pretty big area [with] big thick timbers where the well equipment’s going to sit on the ground and the traditional way of doing things [was] they go out, they find a big tree, they cut it down... they take a bulldozer... load up the boards and pull it back. Well, the impact of the bulldozer going through everywhere there’s a tree around was humongous... so I got one of the companies to try heli-transporting the boards and it worked so successfully that that became the norm... The company’s well aware of the environmental impact, well aware of their image, and to be able to say ‘Yeah, we’re cutting the tree down but the three hundred meters between the well and the tree’, or ‘the five hundred meters is still pristine...’ So as I said, I established the norm, but it took experimentation, we were the first ones to do that...

McMeekin’s example offers an archetypical consulting “experiment”. He approached the construction site as an unfamiliar object requiring intervention to mitigate environmental damage. The type of intervention he would arrive at was unknown to him before his firsthand examination of the construction process, analogous to Rheinberger’s epistemic objects. McMeekin eventually “established the norm” of heli-transport, “but it took experimentation”, as he put it, to find what would be feasible given the material conditions at job sites and what the company would be willing to pay for. New practices like this contributed to a growing repertoire of legitimating forms that could be integrated into subsequent work protocols depending on the sensitivity of a given project.

DTM enjoyed a run contracting with seven more foreign oil firms after Conoco. Yet, by the early 1990s the consulting field had changed sufficiently that McMeekin was eager to get out:

The international oil companies were so gun-shy that they basically didn’t want to work with me. They wanted to work with big-name environmental companies from the U.S., who came in with all of their doctorados [PhDs], who didn’t know shit about the region, and who would all call me and try to take me out to lunch and try to get as much information as they could... The reports [in the late 1980s and early 1990s] were basically very simple, and that was another thing that the companies wanted a lot more, just, a lot, like professional Spanish, the bullshit that goes into these things. What I prepared was short, to the point: “Here’s what needs to be done, here’s what’s here”. And that’s not what all the companies wanted, that’s why I got out of the business...

As McMeekin noted, by the early 1990s Ecuador’s petroleum controversy was attracting attention from established international consultancies. For instance, Colorado-based Walsh Environmental’s first project in the country was in 1992. California-based Cardno-ENTRIX opened a small Quito office in 1995. Walsh, ENTRIX and a handful of other international firms brought EIA protocols and reporting formats with them that they already used elsewhere.

One individual who preferred to remain anonymous emphasized that Walsh’s strategy at the time was to reach out to Ecuadorian scientists and U.S. expatriates who already had experience in the country’s oil sector, or working and traveling in the lower Amazon. With an advanced natural science degree and attachment to a large international firm, this individual could easily have been one of the “doctorados” that so vexed McMeekin. The interviewee waxed nostalgic about Walsh’s early period in the mid-1990s, describing it as an era of “million dollar conversations”. At the time, expensive project modifications like new ways of transporting materials, novel engineering techniques to deal with landforms that posed engineering challenges, or

minimizing the footprint of construction equipment during specific phases of construction could be proposed and settled on over lunch at an elite Quito hotel. Like others I spoke to, this individual described the petroleum sector at the time as a “frontier”, emphasizing the leverage that consultancies had with their clients, and their consequent ability to do creative and costly engineering. An Ecuadorian consultant with long-term experience similarly referred to the oil sector as a “laboratory”, noting consultancies’ significant freedom to try new engineering strategies, which in turn engendered the creation and industry acceptance of “best practices”.⁵

By the turn of the millennium, environmental firms and the reports they had been generating were being consulted by the state as it sought to formalize and rationalize its due diligence policies. Thus, some of the norms and “best practices” designed by consultants found their way into the country’s most important petroleum regulation, Law 1215, in 2001, as well as the ministry-level regulation that preceded it. Methods for working in inundated forest, pipeline technical specifications, or the use of “canopy bridges” to facilitate species movement across linear features that might otherwise fragment habitat (Thurber & Ayarza, 2005) were interventions designed by profit-motivated consultants, transformed into publicly endorsed norms in a rapidly consolidating regulatory framework. In this respect, environmental consulting exhibited self-stabilization via the accretion of new forms that Rheinberger views as characteristic of experimental systems. Far from finding themselves ensnared in regulatory demands imposed “from above” by the state or multilaterals, oil TNCs and their consultants formed a vanguard, actively defining due diligence by example in advance of meaningful state oversight, eventually finding those examples taken up in an increasingly obligatory and elaborate state-centered framework of EIA.

EIA is an important example of a mobile environmental policy (Brenner, Peck, & Theodore, 2010; Peck, 2011; Peck & Theodore, 2015) institutionalized in Ecuador at roughly the same time that it became prevalent in other parts of the world (Goldman, 2006; Kennedy, 1999; Modak & Biswas, 1999). It might thus be tempting to focus analysis on circulation of the policy framework itself, envisioning its diffusion into national legislation as driven “from above” by bilateral and multilateral organizations (for one such attempt see Hironaka, 2002). Alternatively, one could imagine the uncoerced uptake of EIA within state ministries by technocrats attempting to ameliorate the socio-environmental damage incurred by the Ecuadorian petro-state (Collier, 2011; Hoffman, DeHart, & Collier, 2006). Indeed, in its uncoerced mimicking of available forms, the case of Ecuadorian petroleum EIA resembles what Peck (2011: 788) describes as ‘mimetic isomorphism’ under conditions of uncertainty (see also DiMaggio & Powell, 1983; Jamali & Neville, 2011; Matten & Moon, 2008).

Yet, these dynamics do not tell the whole story of the development of environmental due diligence in Ecuador’s petroleum sector in the 1980s and 1990s. Oil TNCs’ use of environmental consultants preceded formal EIA in Ecuador; informal consulting was intended to demonstrate goodwill through expedient, ad hoc changes to projects, rather than conformity to clearly spelled-out public norms; and EIA’s arrival seems to have been driven more by a desire to use an already-legitimated form of due diligence conducted by high-profile international consultancies than by enforceable demands of the Ecuadorian state. We could say that the practices and norms resulting from consultants’ work beginning in the late 1980s formed preemptive, legitimating “content” to which a generic EIA process was eventually fitted that structured

negotiations between oil firms, civil society “stakeholders” and the state.

It is worth re-emphasizing that norms, themselves, were of less interest to oil TNCs than legitimacy. Consultants’ services were purchased ultimately not because oil firms wished to generate rules, but because this seemed an expedient way to establish TNCs’ good intentions so as to facilitate ongoing, state-sanctioned access to the oil field. For their part, consultants had an obvious incentive to treat each petroleum engineering project as unique, requiring technical, context-specific interventions, as opposed to approaching their work as an application of generalizable (and thus easily copied and appropriated) principles. Perhaps for these reasons, *practices* tended to precede norms in early Ecuadorian environmental consulting.

Finally, we should note that precedents for minimizing the damage of oil development existed elsewhere in the world, and that importing and adapting engineering standards should have theoretically been possible. Moreover, early consultants routinely asserted that the most important modifications to development projects were often matters of common sense: designing infrastructure to keep contaminants out of the water and minimizing the footprint of construction operations, for example. And yet, consultants felt themselves to be producing genuinely new practices. Consulting exploited the political volatility of the moment, transmuting a contentious confrontation of interests in the petroleum sector into a problem of practical knowledge and open-ended exploration. In this sense, the consulting field was involved in the *enactment* of uncertainty about what might constitute adequate due diligence, enabled by Ecuador’s sociopolitical chaos.

6. Environmental actors in petroleum consulting

EIA brought with it the practice of “baseline studies” as a regular, formally designated component of petroleum development projects. Such studies describe the social and environmental context of planned work in terms of categories (soils, hydrology, flora, macrofauna, etc.) that became increasingly standardized over the period in question. Simultaneously, environmental organizations proliferated in Ecuador. These were often focused on biodiversity conservation and included programs of academic research and NGOs ranging from small, grassroots-driven actors, to large organizations that functioned as agents of de facto governance (Lewis, 2016; Taber, 2016). Environmental actors had connections with communities in the oil field, environmental interests abroad, arms of the Ecuadorian state like its agriculture and forestry department and, when it was formed in 1996, the Ministry of Environment (Ministerio de Ambiente del Ecuador; MAE). Involving environmental interests, then, was not merely a matter of soliciting technical information from specialists, but a political matter of securing the assent of an increasingly influential sector of organizational activity beyond the state. Baseline studies were thus integral to the value of consultants’ services. In this section I examine the development of project components that involved environmental actors, noting that they embodied the same ethos of experimentation as the engineering side of environmental consulting.

Informal consulting at the turn of the 1990s lacked clearly defined project components like management plans or baseline studies, which came only with formal EIA. Yet, consultants were quick to recruit natural and life scientists to offer input on their activities. McMeekin, for example, recruited botanists from USAID and Kew Botanical Gardens, as well as geologists, mammalogists and other scientists from Quito’s Polytechnic University. Amidst the controversy surrounding Conoco botanists had the opportunity to collect specimens in out-of-the-way places and even proposed longer-term research:

The seismic testing lines and the helipads offer 2 very interesting possibilities for scientific study in a virgin tropical forest environment. First, some of the seismic lines are still open enough to be walked along without major additional clearing. They are already set out on a grid pattern of

⁵ Large-scale projects, which tended to provoke comparably large-scale public resistance, were often pointed to by interviewees as the most important contexts for innovation. These included the Maxus road (1993–96), a pipeline segment near the cloud-forest town of Baeza (1997), and the country’s most important trans-Andes pipeline, the heavy crude pipeline (oleoducto de crudos pesados, or OCP; 2001–03).

which a detailed map exists. The lines offer a wonderful opportunity for [vegetation] transect studies in the area... Second, the helipad clearings represent approximately 10 years of tropical forest succession. Information from a study of the species of plants that return most quickly would add scientific data on regeneration...⁶

When controversy enveloped road construction by the Spanish company Maxus in an ostensibly protected part of the northern Amazon, consultants facilitated the participation of institutions like Quito's Catholic University, the Danish Aarhus University and Missouri Botanical Garden. The development quickly became a context for basic scientific knowledge production about the region, for example through botanical inventory at a globally unprecedented scale (Taber, 2017), and studies of lowland forest regeneration (Woodward, 1996) or the return of fauna after construction (Canaday & Rivadeneyra, 2001).

It was only with the entrance of major international firms that baseline studies and other clearly delineated project components appeared. While these large firms brought with them an established format, they nonetheless had to adapt to the exigencies of specific projects and local technical capacities. Thus, when ENTRIX entered the country in the mid-1990s, its contract was to conduct due diligence in an area of roughly half a million hectares. The company's protocols demanded a baseline study describing biotic and abiotic components at a level of detail infeasible for an entire petroleum block. The same botanists McMeekin had involved in his consulting were hired to do "overflights" of Block 16, characterizing forest composition and inferring soils and hydrology from many meters above the canopy with binoculars and topographic maps. Similarly, specialists from Quito's Polytechnic, Central and Catholic Universities that had worked in informal consulting were drawn into the work of Walsh and other large-scale consultancies, forming an enduring technical infrastructure for EIA.

David Neill, the former director of Ecuador's National Herbarium and an important figure in the development of the country's environmental institutions, reflected on his own involvement in these processes. He highlighted the reliance of field science on extractive development at the time:

Frankly, these development things are what allow us to get specimens and that's basically what we do as field botanists. And so we deplore what happens as a result of these developments, but we take advantage of them too. And so a lot of our fieldwork has been following destruction, picking up the pieces... So I always have had a sort of ambiguous relationship to the forest destroyers, to the development activities.

An Ecuadorian former consultant observed that much of this work was conducted under the auspices of a permitting system designed to regulate specimen collecting by foreign natural historians or field scientists. His remarks affirmed the orientation of the consulting field toward facilitating basic environmental research, and underscored the lack of dedicated state infrastructure for due diligence at the time.

Baseline studies and mitigation seem to have blended together in practice, involving the same experts and exhibiting similarly ad hoc approaches. One U.S. expatriate biologist's memories of mitigation work along the Maxus road in Yasuní National Park are illustrative of the lack of oversight and exploitation of oil development by environmental researchers at the time:

The [consulting firm that subcontracted the interviewee] had no understanding of what we were doing. The people from the oil company, less so. And even the people from [Ecuador's forestry institute] – who the reports had to go to and needed to be approved, whatever – didn't really understand what we were doing either. So it was kind of frustrating because there wasn't really any... incentive to actually monitor impacts

of the road. And so a lot of the people were just doing other stuff. Because what [the consulting firm and oil company] were mainly just watching were, 'Oh okay, there's a mammologist and he's there X number of days. And he's doing something. Great.' [...] So there were people working on bats, looking for [species] range extensions, collecting blood samples for DNA, ecological data on the bats. Nothing to do with the impacts on the road. [laughs]

The development of Ecuador's heavy crude pipeline (oleoducto de crudos pesados; OCP) coincided roughly with the ratification of Law 1215 in 2001. Both the severe controversy that the OCP confronted, and the highly complex engineering and mitigation strategies employed mark it as the apex of high-cost Ecuadorian EIA (Widener, 2011). ENTRIX's EIA work on the OCP reflected project components that were well-established in Ecuador at that point. But specialists from the natural and life sciences attached to the baseline component were involved in an expansive array of activities, collecting biological specimens along the project right-of-way, and conducting ecological restoration guided in part by knowledge of species composition that was produced in the course of the project.⁷

Research on the anti-politics of development tends to emphasize how political problems are reformatted to make them amenable to experts' a priori technical solutions (Barry, 2013; Ferguson, 1990; Li, 2009; Li, 2007a, 2007b; Mitchell, 2002; Sydow, 2016). In contrast, environmental interests entered the Ecuadorian oil field as a newly available field of open-ended inquiry and experimentation. The involvement of environmental actors was "experimental" in that they formed provisional and politically fraught alliances and "sub-contractor" relationships with petroleum consultants and their clients. Despite what interviewees often described as a conflict of values and the risk of negative public relations, environmental interests in 1980s and 1990s Ecuador were enticed by research opportunities related to their disciplinary interests. Amidst increasing global interest in tropical deforestation, knowledge about the functioning of tropical forests had scientific and social cache, particularly in areas then taken to be scientifically understudied, such as Ecuador's lower Amazon. The activities carried out and scientific products of alliances between environmental actors and petroleum consultants were thus also "experimental", insofar as they represented novel applied and basic field science (e.g. botanical inventory and ecological restoration studies) in an environment made increasingly accessible by the logistics and infrastructures of petroleum extraction.

7. Theorizing petroleum consulting's experimental system

This article analyzes the advent of a locally novel form of governance amidst burgeoning economic crisis and liberal reform in Ecuador. In the 1980s and 1990s, the substance of future environmental due diligence and the state's ability to enforce it were both in question. A consulting field selling input into petroleum field operations took shape, with the aim of mitigating environmental damage and recuperating corporate legitimacy. Large consultancies brought the format of EIA, the recognizability and formality of which constituted a value for foreign oil firms. EIA proliferated in Ecuador in the mid-1990s, roughly concurrent with the launch of *Aguinda vs. Texaco* in 1993. Once adopted, EIA served as a format for negotiating further ad hoc research and mitigation arrangements that allowed projects to move forward. Organizations and individuals were enrolled in the process that brought expertise in e.g. biological inventory, geochemistry or ecological restoration, availing themselves of the affordances of the oil patch for experimental knowledge-production relevant to their fields, and ultimately lending a degree of legitimacy to oil extraction processes.

⁶ "Conoco – Biological Research Cooperation", report and proposal to Conoco, David Neill, no date (1988 or 1989).

⁷ David Neill, personal communication, 2014.

Ratified in 2001, Law 1215 was the most extensive framework for environmental regulation of hydrocarbons Ecuador had seen. It prescribed an EIA process then familiar in much of the world (Kennedy, 1999), in which projects were guided by industry-hired consultants, adhered to a standardized set of components, and were overseen by a state permitting process administered by the National Hydrocarbon Agency and MAE. Simultaneously, much of the law's eleventh chapter on "civil works" derives from interventions proposed by environmental consultants in the course of the preceding decade of contests over petroleum development. Following Robinson (2015), we can note that Law 1215 was "arrived at" via multiple influences: some explicit (e.g. attempts to model multilateral EIA), others tacit (e.g. the embedding of consultant innovations in the Law), and likely some unknowable. And we can distinguish between Law 1215's *formatting* of EIA's organizational dimensions (e.g. jurisdictions, reporting requirements, permitting processes) intended to mobilize an already-legitimated institution; and its codification of *substantive* practices whereby oil would be extracted and the effects of development mitigated, inflected by Ecuador's history of struggle around resource extraction.

To understand this history, the article has deployed two concepts not typically foregrounded in literature on CSR, policy mobilities or neoliberalism. First, an orientation to the future as *uncertain* was enabled by contentious petroleum development amidst an unusual balance of powers between an oil-dependent and economically devastated state; TNCs under pressure to reform their extractive activities; and an expansive field of environmental NGOs and community political organizations. Uncertainty was a product of sociopolitical strife *despite the existence of engineering and mitigation precedents* in other parts of the world that might have been imported to deal with Ecuador's oil-related environmental problems (e.g. Canter, 1996).

Uncertainty facilitated *experimentation* (the article's second main concept; Rheinberger 2015) as consultants used a trial-and-error approach to produce new forms (practices, norms, alliances, research products) intended to mitigate environmental damage and political tensions. Petroleum consulting exhibited the dynamics of an experimental system in five ways: i) the preliminary, informal use of consultants was itself an experiment that rapidly became the norm; ii) consultants had leeway to import or innovate new engineering and mitigation approaches for projects; iii) consultants formed alliances between the petroleum sector and environmental interests that might otherwise have opposed development; iv) those alliances facilitated exploratory environmental mitigation and research efforts of value to environmental interests; v) accumulated products of the preceding decade of petroleum consulting were reflected in Law 1215 and ministry-level terms of reference. In the context of a weak state and rampant political volatility, Ecuador's oil complexes behaved like those institutions characteristically driven by uncertainty: the laboratory or the entrepreneurial firm.

It would be difficult to make sense of consultants' fondly remembered ethos of experimentation if we assumed that the appearance of EIA in Ecuador was a simple matter of transferring rules about "how to do development" from elsewhere and writing them into national legislation. Indeed, if petroleum development had been a matter of rote execution of clearly spelled-out norms, consultants would have had little to sell. The ethos of experimentation, and consultants' attitude toward it, make more sense once we see that they and their clients understood themselves to be actively shaping a nascent regulatory apparatus.

Of relevance to scholars of CSR, this article has used Rheinberger's model to theorize normative change engendered by TNC-initiated due diligence as a *system*. The article first noted the array of forces that produced the "uncertainty" that forms the diagnostic subjective orientation of experimental systems. The article then noted petroleum consulting's evolution from exploratory TNC-initiated due diligence to a condition in which EIA was both increasingly expected, and increasingly elaborated in state regulation. An approach emphasizing the

"exteriority of relations" helps us to see that an era of inchoate, informal consulting provisioned norms that were eventually incorporated into a seemingly more conventional state-centric governance paradigm. Agnosticism about the boundaries between informal, industry-initiated consulting and state-enforced EIA, or between the oil sector and the burgeoning field of biodiversity conservation, is a prerequisite to recognizing the experimental system.

Similarly, the model of an experimental system offers one way of thinking about the relationship between neoliberal policymaking and practices that respond to it. Petroleum sector liberalization and structural adjustment measures throughout the 1990s contributed to a high degree of uncertainty for Ecuadorian society. This article has focused on the "ripple effects" of this high-level neoliberal policy, rather than directly on, e.g. structural adjustment policymaking. Yet, it has shown how those effects redounded upon the Ecuadorian state's implementation of EIA. Consultants' produced a stream of precedents, exemplars, or what, following Peck and Theodore (2015), we might term "demonstration effects" that nonetheless lacked a coherent policy framework that they were "demonstrating". When Ecuadorian lawmakers and ministry-level authorities sought to elaborate and rationalize EIA in the 1990s, they were not required to imagine new substantive technical norms for national regulation or ministerial terms of reference, because consultants' work furnished them with concrete examples. In contrast with policy mobilities literature focused on deliberately enacted "experiments" (which tend to be experiments in deliberative policymaking), and in contrast with studies that envision consultants primarily as conveyors of explicitly conceived plans (Prince, 2012; Prince, 2017), EIA's mutation in Ecuador had more to do with the proliferation of opportunistic, ad hoc practices from which could be derived norms of oil sector due diligence, and in relation to which oil TNCs were conveniently already in compliance. As deployed here, the model of an experimental system highlights unintuitive mechanics of EIA's mutation, sensitizing us to the ways that technical norms may not entirely be products of expert planning.

Finally, this article's focus on experimentation as the engine of a *self-organizing* system differs subtly from much of the literature on development and neoliberalism using assemblage thinking. Work on "global assemblages" (Ong & Collier, 2008), for example, examines experts' political rationalities or "structure[s] of reflection" as these are adapted to specific contexts and problems, an approach suited to analyzing the deliberate fitting-together of programs from eclectic parts under contingent conditions, but which is poorly positioned to understand the emergence of patterns out of uncoordinated activity. For Li (2007a,b), the notion of assemblage highlights "the hard work required to draw heterogeneous elements together, forge connections between them and sustain these connections in the face of tension" (264), a framing that suggests that assemblages are the product of volitional action. For Higgins and Lerner (2017) the emphasis of analysis should be on the "generative capacities of neoliberalism" (311), a phrase that similarly makes an assemblage the consequence of a unitary locus of influence. All of the above work has valuably influenced the approach taken here. Yet, the foregoing descriptions of assemblage thinking underplay its rich resonances with, for example, complexity theory (DeLanda, 2016) and philosophies of becoming (Connolly, 2013; Whitehead, 1957) in their abilities to envision pattern as an immanent product of uncoordinated action. Such a sensibility is required if we hope to understand how, amidst recurring waves of economic devastation and popular opposition to oil extraction in the 1980s and 1990s, a system emerged out of the interactions of oil TNCs seeking to forestall and influence impending regulatory change, and the private consultants who thought they might be able to sell those TNCs *something*.

Declaration of Competing Interest

The author has no conflicts of interest related to this research.

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