

# Scale, shale, and the state: political ecologies and legal geographies of shale gas development in Pennsylvania

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**Abstract** Recent work on legal geographies has arguably paid far too little attention to the environment as both an object of governance and a terrain of struggle with respect to the law. Conversely, political ecology as a field, with its focus on informal and extra-legal dynamics, has arguably engaged too little with the legal geographies that are central to environmental conflicts in many locations. This paper examines and theorizes the legal geographies that have been essential elements of the recent boom in extraction of natural gas from the Marcellus Shale in Pennsylvania. Specifically, it examines the ways in which laws and the authority of the state more broadly have been changed, deployed, and invoked, particularly through the passage of Act 13, to enable the extraction of the gas in the shale and its circulation as a viable commodity. This analysis of the relevant multiscalar legal geographies illustrates the productivity of a more direct engagement between political ecology on one hand, and legal geography on the other.

**Keywords** Political ecology · Legal geography · Natural gas · Hydraulic fracturing

## Introduction

In his 2012 State of the Union address, President Obama celebrated the recent boom in the extraction of natural gas

from shale across the US, promising to “take every possible action” to support the domestic production of natural gas (2012). Our purpose here is to argue that laws, regulations, policies, and other deployments of state authority are critical to establishing the social and legal spaces in which extractive industries operate, and that analyzing such forms of support is essential to a political ecological examination of these activities. Specifically, this paper examines the multiple legal and political geographies that have been essential elements of the recent boom in natural gas from the Marcellus Shale in Pennsylvania. We analyze the ways in which legal and regulatory structures have been changed, reinforced, deployed, and invoked in order to enable the extraction of gas from the shale and its circulation as a commodity.

We begin by providing an overview of the development of the Marcellus Shale in Pennsylvania, demonstrating that it is perfectly suited to a political ecological analysis. We then briefly review the reasons for political ecology's long-standing emphasis on extralegal and informal politics, as well as recent work in legal geographies, to argue that each field would benefit from a closer engagement with the other. We present an array of empirical evidence for our claim that a range of multiscalar legal geographies has been central to the extraction and commodification of natural gas from the Marcellus Shale, with a particular focus on the passage of Act 13 in Pennsylvania. This legislation—and the litigation that has followed—is an example of both legal and regulatory continuities and changes that have facilitated the shale gas boom, and their multiscalar entanglements.

## Natural gas and the Marcellus shale

Natural gas is increasingly heralded as the “fuel of the future” (Yergin 2011, 341). It is celebrated as a “green” fossil fuel; it is more efficient for power generation, emits half the carbon dioxide of coal, and has fewer byproducts of combustion

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(DOE 2009; US EIA 1999). Its flexibility is hailed as complementing the intermittent nature of solar and wind energy, earning it the popular designation as a “bridge fuel” to future, renewable sources of energy. Indeed, somewhat paradoxically, natural gas seems able to both serve the ever-growing demands for fossil fuels and fit in alongside calls for a transition towards greater use of renewable energy. Based on these popular portrayals, economic factors (supply, demand, speculation), and technological advances, the International Energy Agency (IEA) is optimistic about an upcoming “Golden Age of Gas” (IEA 2012).

The IEA's projection depends in part on the ongoing “revolution in unconventional natural gas” in the United States (Yergin 2011, 341). Shale gas production in particular grew by nearly 50 % a year between 2005 and 2010 (IEA 2012). Development of domestic shale plays has been underway since the 1980s, but production has expanded immensely, and today, shale gas makes up about 25 % of the production of the US's total remaining recoverable natural gas resources (DOE 2009; US EIA 2012). Some estimate that it may represent 50 % of total US natural gas production within 20 years (Yergin 2011; EIA 2012).

The technologies of shale gas extraction, namely high-volume hydraulic fracturing and horizontal drilling, render its production both more intensive and more extensive than drilling for conventional natural gas. Briefly, high-volume hydraulic fracturing (known popularly as “fracking”) is a process wherein several million gallons of water, mixed with small amounts of sand and additives, are channeled at high pressures into shale formations underground, releasing natural gas (DOE 2009). In horizontal drilling, one gas well follows the shale layer underground, over an area typically limited to one square mile, although the size depends on geology, regulations, lease agreements, and other factors. While the surface operations are concentrated in a few acres, the driller must obtain the mineral rights for the entire area being drilled.

A geological formation called the Marcellus Shale underlies about half of Pennsylvania and areas of neighboring states. Exploratory wells were drilled in 2003, and about 8,200 wells have been drilled since (DOE 2009; PA DEP 2013; WV Geological and Economic Survey 2012). Pennsylvania is home to the majority of these wells, given its geology and relatively permissive environmental governance. Indeed, the state's activity stands in striking contrast to New York's, where hydraulic fracturing for natural gas has been subjected to lengthy environmental impact reviews and an ongoing moratorium.

Gas development has physically and economically transformed the areas with the most drilling activity. Estimates of economic and employment benefits in Pennsylvania vary widely. One of the most optimistic assessments concludes, “[I]arge-

scale development of the Marcellus is... creating hundreds of thousands of jobs and generating billions of dollars in additional output, income, and tax revenues” (Considine et al. 2011, p. 31–32). Yet, as the literature on extractive industries and regions demonstrates, such claims should be viewed with skepticism: optimistic projections of easy-to-quantify benefits, often based on short- or medium-term timeframes, frequently fail to materialize, or are outweighed by longer-term and harder-to-quantify social and environmental costs (Bridge 2000; Emel and Krueger 2003; Horowitz 2010). Indeed, natural gas prices have fallen precipitously since 2008 (US EIA 2012b). Pennsylvania's natural gas boom has fostered fierce political debate (see Howarth et al. 2011a). Communities are divided about how best to capture the benefits and mitigate the costs, nuisances, and hazards that come with living in a landscape of energy production (Brasier et al. 2011; Christopherson 2011). There is vocal and widespread opposition to hydraulic fracturing, as it is associated with hazards of varying degrees of severity and likelihood, and largely new to the public in the Marcellus Shale region. Environmental groups charge that government agencies are ill-equipped to regulate drilling, and express concern about water contamination, air pollution, regulatory loopholes, and whether drilling is even justifiable in the name of reducing greenhouse gas emissions (Sierra Club 2012; Howarth et al. 2011b). These environmental politics render the recent boom in the extraction of natural gas from the Marcellus Shale perfectly suited to a political ecological examination.

### Political ecology and legal geographies

Political ecology is the analysis of specific environmental issues and conflicts within the context of, and from the perspective of, political economy broadly defined (Blaikie and Brookfield 1987; Peet and Watts 2004; McCarthy 2012). One of political ecology's hallmarks and strengths has been its explication of the often overlooked roles that informal, extra-legal, and tacit relationships and dynamics play in relationships between people and their environments, particularly when those relationships are being reconfigured or contested in contexts of significant power imbalances. These imbalances are often made manifest through the forced imposition of new forms of technical or legal knowledge, administration, and control. Political ecologists have worked for decades to research, explicate, and analyze the ways in which customary patterns of resource use, local knowledges and forms of resistance, micropolitics within communities, and meanings and identities articulated in relationship to local environments constitute a complex whole within which the often narrow or recent strands of environment-related law or policy must be situated. Our work is an extension of this tradition and in no way in conflict with it. Yet, we note that in some cases, both new claims on the environment and resistance to them are

articulated and contested within the realm of formal law and policy, which is sufficiently complex and ambiguous as to offer resources that can be harnessed in the service of multiple parties and goals. Political ecology's emphasis on the fluidities and indeterminacies of environmental politics has led to the neglect of these legal dimensions in some settings. A political ecology that seeks to examine the full range of contestation over human–environment relationships may, in some contexts, need to devote more attention to the formal political and policy arena and specifically legal geographies. Indeed, any adequate analysis of the operations of power must carefully and empirically trace how, where, and by whom power is used. For many cases of concern to political ecologists, that requires a careful, informed engagement with the legal arena. This has been more the exception than the rule in the field, certainly with respect to many extractive regions and industries (Bebbington 2012). Political ecology thus has much to gain from a closer encounter with legal geographies. In a sense, this direction brings the field back to one of the key texts that inspired it, E.P. Thompson's *Whigs and Hunters: The Origins of the Black Act* (Thompson 1975). As Thompson's material so abundantly shows, laws, regulations, and courtrooms can be crucial sites of contestation over human–environment relations. Political ecology took from his work a strong interest in the criminalization of customary uses and informal resistance to the same, but it could as well have taken as a legacy a strong focus on multiscale legal geographies.

Here, we see the potential for a fruitful conversation between political ecology and the subfield of legal geographies. Much recent scholarship has explored the ways in which legal and spatial orders co-produce one another, with a critical focus on the ways in which power operates through the law (e.g., Blomley 1994, 2008; Blomley et al. 2001; Chouinard 1994; Delaney 2003; Holder and Harrison 2003; Staeheli and Mitchell 2007; Benda-Beckmann, Benda-Beckmann, and Griffiths 2009). This rapidly growing field, however, has paid too little attention to the environment both as an object of governance and a terrain of legal struggle in legal arenas, the political economic context in which law and legal contests are embedded and the material outcomes at stake. Jepson (2012, p. 617) argues:

...critical legal geography's primary concern with cultural production and the politics of social difference overshadows how legal demarcations of space and spatial discourses constitute a struggle over the world of things, embedded within a political economy of labor processes, accumulation, dispossession, and regulation (Glassman 2006). The analytical domain is restricted to social constructions of nature with little attention to the political economy in which these legal contests are embedded... absent is an analysis that interrogates how political economic processes frame the cultural legal inscription of nature–human boundaries, or how

the results of legal proceedings impinge, shape, or impact the actual things being “constructed.”

Political ecology excels at precisely the latter task, tracing flows of power through multiple sites, and explicating their consequences for a range of human and non-human entities, systems, and relations. Thus, there is much to be gained by encouraging legal geographers to pay greater attention to the ways in which non-human species, entities, and systems provide the metaphorical and sometimes literal ground for formal legal struggles, and are in turn, profoundly affected by the outcomes of those struggles. Thus, legal geographies could draw much from political ecology.

It is worth noting that political ecology has traditionally relied on deeply empirical and field-based research methodologies, emphasizing grassroots knowledge about environmental conflict that is typically only accessible through intensive, qualitative, often semi-ethnographic research—the type of information that does not appear in official documents. Indeed, one of political ecology's central tasks is to lay out these “unofficial” perspectives. But we contend that the heart of political ecology is not a particular set of methods, and there is no reason to limit its methodological toolkit, as a mix of approaches may serve to advance the field's overall analytical project. Thus, depending on the specific cases and research questions, different methods and evidence may be appropriate. In this case, we have examined court documents, bills and statutes, and secondary sources, such as media coverage of court cases, in order to better understand the legal and political dynamics central to the case that may not be addressed by political ecology's conventional suite of methods. This complements more traditional political ecological research by one of the authors that has focused more on informal political dynamics within and among communities where many Marcellus Shale drilling leases have been signed, investigated primarily via interviews and observation (Andrews 2012).

The natural gas boom in the United States involves complex multiscale relationships among actors with vastly different levels of power and forms of articulation with the global economy, in which patterns of access to and control over resources are (in some instances) being reconfigured through both formal and informal means (for a historical perspective, see Huber and Emel 2009). These processes are being enacted in order to extract, commodify, and circulate fossil fuels that sustain an economy almost entirely dependent on such energy. Questions about the production and distribution of environmental and economic risks and benefits, and how relations of property and power are being reshaped through these processes, are central to understanding the natural gas boom. We will begin with a brief political ecological analysis of the case of the Marcellus Shale, followed by a legal geographical analysis to complement and extend the insights that political ecology provides.

Our attention to the natural gas boom fits in with a wave of attention to extractive industries and energy within political ecology (Bridge 2000, 2004; Watts 2004b; Perreault 2006; Le Billon 2008; Valdivia 2008; Bebbington 2009, 2012; Huber and Emel 2009; Reed 2009; Zalik 2009; Horowitz 2010; Budds et al. 2012). Bridge, in particular, has examined the political economy of natural gas, especially in relation to its materiality and the capital and infrastructural requirements of liquefying natural gas for transport that have slowed the global commodification of gas, despite efforts to re-scale its geographies (Bridge 2004). This is a relatively recent addition to mainstream political ecology, which has historically paid more attention to dynamics and conflicts around biotic resources (e.g., in forestry or agriculture)—a surprising gap, given the economic, social, and environmental significance, even centrality, of extractive industries and energy to environmental politics (Bebbington 2012).

It has long been recognized that extractive industries operating in rural and/or “peripheral” regions frequently produce a host of characteristic ills. Indeed, disputes over whether or not the so-called “resource curse” should be understood in deterministic terms has been a central point of contention between political ecologists and more mainstream literatures (see, e.g., Ross 1999; Sachs and Warner 2001; Bannon and Collier 2003; Watts 2004a; Davis and Tilton 2005; Le Billon 2006; Humphreys et al. 2007; Bridge 2008). Such debates have focused primarily on the global South, but many observers claim to have seen the “resource curse” clearly at work in extractive economies of the global North as well (Gaventa 1980; Gulliford 2003). The reasons for it are well understood: capital requirements for extracting many non-renewable natural resources and transporting them to global markets typically lead to dominance by large, extra-local firms, with profits thus leaving the area. Extracting resources on an industrial scale often entails major environmental disruption and degradation, exposing the region's residents to hazards at the time of extraction and afterwards. Relatively little value is added locally, and workforce development is consequently limited. Primary commodities are especially subject to price volatility and substitution, so the regions that produce them are prone to boom and bust economies, with attendant social problems (Davis and Tilton 2005). Finally, the easy source of revenue reduces incentives for investment towards a more diversified economy and workforce, and provides a “prize” that can be captured by or through the state, which often leads to corruption, repression, or violence (Le Billon 2001). Rural Pennsylvania is, of course, not Nigeria, not least because private property owners can lease their land for royalties and other economic benefits from the extraction of oil, gas, and mineral resources, but weaker versions of the above dynamics are nonetheless quite evident around the ongoing shale gas drilling. In Pennsylvania, they are playing out largely through strategic interventions in the legal realm, including centralization of

regulatory authority (Act 13 2012), tax deals, and subsidies intended to attract and retain investment (Charman 2010), political fights over the distribution of gas revenues in state and local coffers, close ties between government and industry, regulatory capture, government-funded surveillance of environmental activists critical of drilling (Senate Veterans Affairs and Emergency Preparedness Committee 2010), and campaign donations by gas firms to elected officials. Our research on the Marcellus Shale is thus explicitly situated in a global context and in comparative terms (Bebbington 2012), with an emphasis on key commonalities between rural Pennsylvania and extractive regions and economies elsewhere.

Through the following exploration of some of the legal geographies central to the Marcellus Shale boom, we seek to demonstrate the power and potential of such a convergence of political ecology and legal geographies. Our analysis is meant to complement mainstream political ecology in its focus on how key dynamics are playing out in the arenas of formal law, regulation, and policy. Since such legal struggles always unfold in larger political and policy contexts, we address those broader dimensions as well, with an emphasis on direct deployments of governmental power and authority.

### Legal geographies of the Marcellus shale

Here, we will lay out the multiscale legal and political geographies that have been negotiated, remade, or invoked (as continuities) to extract and commodify the Marcellus Shale natural gas. Scales are far from being “pregiven sociospatial containers” in a nested, vertical hierarchy, and much recent work has questioned the analytical validity and utility not only of such frameworks, but of the concept of scale itself, showing how it is produced through material and discursive struggles (Zimmerer and Bassett 2003, 3; Marston et al. 2005; Brenner 2001). Recent work by Huber and Emel has examined the production of scale through legal means, with regard to mineral extraction (Huber and Emel 2009). Yet, we maintain that “while scale should never be treated as easily equivalent to levels of government nor should it be naturalized, many of our most deeply embedded and operative notions of scale do correspond to long-established levels of government” (McCarthy 2005, p. 733). This point is especially relevant as we seek to facilitate and contribute to a conversation between legal geographies and political ecology, inasmuch as the former has often been organized around formal levels of governance (see, e.g., Blomley et al. 2001), and the latter has often been structured as multiscale approach to the analysis of “local” socio-environmental dynamics, using similar scalar categories. Indeed, the interplay among scales is key to understanding the legal geographies at play in the Marcellus Shale region, as actions at one level affect those in others, and actors everywhere debate the appropriate sites and scales

for governance and regulation of different drilling activities. This is particularly contentious in environmental regulation, where the scale of development or hazards or commodification may not correspond with the existing scales of governance.

Domestic production of shale gas has been facilitated by a range of legal and political mechanisms—both changes in the law and invocations of existing law—through legislation and litigation. Most important is the United States' longstanding unique treatment of the subsurface estate and mineral rights, whereby private landowners can own and lease the mineral rights to parcels of land, although specific legal definitions vary by state (Mommer 2002). This distinctive feature of the legal context creates the very conditions of possibility for drilling. Typically, a private landowner leases those rights directly to a drilling company or through a third party agent, for a fixed period of time, in exchange for compensation. Thus, individuals are able to choose for themselves whether drilling is permitted on their property and, to some extent, how it will be done. Many Pennsylvania landowners have eagerly welcomed drilling, and tens of thousands of lease contracts have been signed. Rights to the subsurface have legal precedence over surface rights, as owners or lessees of the former have access to “reasonable use” of the surface. Mineral rights have long been tied up with the technologies and processes of drilling; resolving the “contradiction between property and geology” is an ongoing process (Huber 2011, p. 820). Challenges posed by the technologies of horizontal drilling and hydraulic fracturing further complicate this process (Pierce 2011).

Federal environmental legislation also plays a crucial role in enabling shale gas extraction. The production of natural gas is subject to many separate Acts.<sup>1</sup> Some provisions, however, have been restricted; for example, hydraulic fracturing has never been regulated under the arguably relevant provisions in the Safe Drinking Water Act, and in 2005, the Energy Policy Act clarified the definition of “underground injection” to explicitly exclude “the underground injection of fluids or propping agents... pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities” (2005, §322). The 2005 Energy Policy Act also furthered existing exemptions for the oil and gas industry from stormwater runoff regulations in the Clean Water Act (2005, §323). Other exemptions already existed in the National Emission Standards for Hazardous Air Pollutants, for the non-aggregation of

drilling sites' emissions and for regular controls of hydrogen sulfide emissions (Clean Air Act 1990). These and many other instances have been cataloged elsewhere (see US EPA 2002; Kosnik 2007; “Exemptions from Health and Environmental Protections” 2007; Wiseman 2009). These provisions lessen the responsibility for oil and gas producers, and at the very least, make this development more profitable, alongside weak enforcement measures. In more marginal environments, they may be essential conditions for its profitability and hence economic viability. Of course, the examples provided are not the only formal, legal acts at the national level that serve to facilitate the ongoing development of the Marcellus Shale. Oil and gas drilling regulation in the United States, however, is largely regulated by state governments, which are also the site of many of the associated politics and debates, over environmental regulations, appropriate taxation, property rights—and whether the Marcellus Shale should be developed at all—and so we turn to Pennsylvania.

Nearly all of the approximately 8,200 Marcellus Shale wells drilled since 2003 have been in Pennsylvania (PA DEP 2013). Pennsylvania has long been home to oil and gas activities, including the country's first commercial oil well, but the legislature seemed to be caught by surprise by the pace and extent of the Marcellus development: “despite having some of the country's oldest jurisprudence dealing with oil and gas disputes, Pennsylvania case law regarding oil and gas operations is relatively undeveloped in comparison to states like Texas and Oklahoma” (Abbott and Bagnell 2011, p. 661). Politicians and public interest groups thus continue to wrangle over the legal regime, addressing questions of property rights, such as whether landowners can be required to lease their mineral rights, in a process called compulsory integration (SB355 2012) and the use of eminent domains for natural gas pipelines (Messersmith 2010). There is a long list of ongoing litigation, and case law has played an important role in the evolution of regulation of the Marcellus Shale. Indeed, in the earliest years of the Marcellus Shale's development, there was more activity in the courts than in the legislative system (Pifer 2009). Pertinent cases between 2008 and 2012 covered a gamut of topics: validity and duration of lease agreements, “reasonable use” of surface estates, the definition of mineral rights, minimum royalty payments, etc.

There are debates not just within different levels of government, but also among them. Pennsylvania's 1984 Oil and Gas Act (OGA) mandates that the Department of Environmental Protection (DEP) regulate oil and gas activities (Pennsylvania OGA 1984). One municipality where well water was contaminated by methane after drilling began in 2008 has been a site of struggle between the Pennsylvania DEP and the US Environmental Protection Agency (EPA), with the latter asserting its authority over questions about how the situation was handled. Friction is also evident between the state government and municipalities.

<sup>1</sup> These include the National Environmental Policy Act (1970), the Clean Air Act (1963), the Clean Water Act (1972), the Safe Water Drinking Act (1974), the Resource Conservation and Recovery Act (1976), the Comprehensive Environmental Response, Compensation, and Liability Act (1980), and the Emergency Planning and Community Right to Know Act (1986). The original dates of passage are cited here; many relevant revisions have been enacted.

Questions over who is the relevant polity regarding the production of commodities for a global market and the regulation of any environmental hazards that arise in the course of production, are at the heart of political ecology. This is the case whether such questions are being negotiated within the formal legal and policy arena or outside of it. Here, we will provide an extended example that neatly encapsulates the benefits of the intersecting lenses of political ecology and legal geographies.

Updating Pennsylvania's oil and gas laws has gone hand in hand with centralizing the state's regulatory authority, reinforcing the OGA, which expressly “preempts and supercedes the regulation of oil and gas wells” at the municipal level (1984, §601). In principle, municipalities can dictate some of *how* drilling and associated development activities go forward, but not *whether* they go forward. In practice, of course, those decisions are thoroughly intertwined. Some municipalities have acted to assert more control over drilling, hoping to bear fewer costs and capture more benefits from the natural gas development or, in some cases, to discourage drilling entirely. They have used a range of tactics: zoning ordinances that effectively ban drilling and related processes, regulation of associated hazards and nuisances (e.g., wastewater disposal, traffic), stringent bonding requirements, local moratoria, and symbolic resolutions in support of anti-drilling legislation elsewhere. The ordinances are, in some cases, forthright political statements (see, e.g., City Council of Pittsburgh 2010). Indeed, these tests of the OGA have incurred litigation. In 2009, a Pennsylvania Supreme Court ruling allowed municipalities to use zoning to regulate the location of oil and gas development (Huntley and Huntley, Inc. vs. the Borough of Oakmont 2006). The following year, a case in the Commonwealth Court, between a drilling company and a county government, was decided in favor of the latter, allowing the county ordinance to stand (Penneco Oil Company, Inc. et al. vs. County of Fayette et al. 2010).

In February of 2013, to ensure “strong, uniform, consistent statewide environmental standards,” Governor Corbett signed HB1850 into law (PA DEP 2012). Act 13 (“An Act Amending Title 58 (Oil and Gas) of the Pennsylvania Consolidated Statutes...”) has a number of controversial provisions; here, we will focus only on Section 3304, which seeks “uniformity of local ordinances,” requiring that “all local ordinances regulating oil and gas operations shall allow for the reasonable development of oil and gas resources” (2012, §3304). “Reasonable development” disallows “conditions, requirements, or limitations... that are more stringent” than state regulations on oil and gas construction activities or permanent operations (§3304). Section 3304 also lists the major points of conflict, highlighting the tactics that municipal governments have used to regulate drilling: conditions under which compressor stations might be permitted in residential districts, the length of the permit review process, limits on the hours of operation for

a range of processes, and traffic restrictions. Act 13 mandates that if municipalities' zoning ordinances fall outside this scope, they forfeit funds generated from well fees.

In March of 2012, seven municipalities, along with a local environmental NGO and a Pennsylvania physician, challenged Act 13's Section 3304 (Robinson Township et al. vs. Commonwealth of Pennsylvania et al. 2012). In July of 2012, in a 4–3 ruling, the Commonwealth Court declared Act 13's Section 3304 unconstitutional, as it “violates substantive due process because it allows incompatible uses in zoning districts and does not protect the interests of neighboring property owners from harm, alters the character of the neighborhood, and makes irrational classifications” (Robinson Township et al. vs. Commonwealth of Pennsylvania et al. 2012, 35). The court later ordered that funds worth nearly a million dollars that were being withheld from several municipalities be released.

The Commonwealth Court's decision, however, was swiftly appealed by the state government (namely the Pennsylvania Public Utility Commission (PUC) and the Department of Environmental Protection), with oral arguments made to the Pennsylvania Supreme Court in October of 2012. The appellants maintain:

Act 13 is a legitimate exercise of the General Assembly's broad police power and its ability to expand, or, in this case, retract municipal powers, including in relation to zoning. In striking down the portions of Act 13 related to municipal zoning, including Section 3304, the Commonwealth Court failed to acknowledge and uphold the supreme authority of the Legislature [and] failed to give due deference to the presumption of constitutionality afford to acts of the Legislature... Instead, the Commonwealth Court substituted its wisdom about the merits of Act 13 for that of the General Assembly, an action expressly prohibited by the Pennsylvania Constitution (Pennsylvania PUC et al. 2012, p. 34).

The appeal is largely based on two arguments: first, that “municipalities are established by the Commonwealth and their power derives solely from the creator-state” and second, that Act 13, as a whole, represents the General Assembly's “informed judgment, as a matter of policy choices, on balancing those various and potentially conflicting purposes [of the stated mission of the OGA] in a comprehensive, statewide manner” (Pennsylvania PUC et al. 2012, pp. 14, 16). Furthermore, in substituting its own “policy judgments for those of the General Assembly,” the Court has engaged in “judicial activism” (Pennsylvania PUC et al. 2012, p. 34).

These are arguments being made in courts across the country, in struggles over what scale is most appropriate for regulation. A lawsuit is pending in a Denver suburb over a resolution that “purports to regulate technical aspects of oil and gas operations in a manner preempted by the Colorado Oil and

Gas Conservation Act,” with similar cases/appeals pending in New York (Colorado Oil & Gas Association vs. City of Longmont, Colorado 2012, 1; Cooperstown Holstein Corporation vs. Town of Middlefield; Norse Energy Corp. USA vs. Town of Dryden and Town of Dryden Town Board). At the time of writing, no state Supreme Court decisions have yet been made.

## Discussion

We have provided only a glimpse of the multiscale legal and political geographies that are facilitating the ongoing extraction and commodification of natural gas from the Marcellus Shale. These are comprised of both continuities and changes in the legal context for development, both of which have animated myriad debates. The interplay of rhetoric, politics, economic concerns, and legal acts among widely differing scales reinforces the notion that, for debates over the appropriate level of regulation and environmental governance, “politics *at or about* a given scale are inseparable from politics concerning relationships *among* scales” (McCarthy 2005, 738, emphasis in original).

Many of these dynamics play out in the terrain of formal property rights and legal regimes. The importance of the structural context can hardly be overstated; for example, the simple fact of private mineral ownership in the United States has enormous implications for the broad acceptance of industrial activities on personal property. Similarly, the interplay between legislation and litigation has long been a hallmark of American environmental politics. So too have the legal and political disputes over rights of regulation that continue to entangle multiple scales of governance. These broader legal conditions are essential for the manufacturing of consent for local and specific decisions in the formal legal realm, as individuals weigh their options in leasing their land. They also have an enormous material impact, differentiated by different legal contexts: for example, drilling abruptly stops at the New York–Pennsylvania state border. The political ecological perspective is thus strengthened by a view from critical legal geography.

We also want to examine how insights from political ecology bolster a legal geographical analysis. The causes and effects of formal, legal acts of governance cannot be understood without also addressing political dynamics among and within different levels of governance. The conflicts among different scales briefly described above—turf battles between the US EPA and the Pennsylvania DEP, assertions of municipal authority—enrich an analysis of purely legal geographies, fitting into broader debates about local rights of regulation and appropriate scales for environmental governance. The examples above also show economic-cum-political factors, and the relationship of industry to government, most evident in the wrangling over eminent domain for pipelines. A complete political ecological analysis of decision-making, for individual

landowners as well as the state or industry, would integrate the many possibilities that formal law either closes or opens. Political ecology also reminds us to make space for the role of the biophysical in shaping political and economic structures, evident in many instances above, such as the character of pipelines, the technologies of horizontal drilling and hydraulic fracturing, and feared and actual methane contamination.

The concept of scale in this case acts in some ways as a bridge between the two fields of political ecology and legal geography. Both fields have generated much critical literature on scale, and particularly the effects and realities of produced scales. Broadly speaking, the legal geography literature has addressed how various levels of governance (e.g., national governments) are imagined and produced, and eventually taken for granted with tremendous power to shape material realities, particularly through law and other regulatory structures (Weller 2007; Benda-Beckmann, Benda-Beckmann, and Griffiths 2009; Butler 2009). Political ecology has taken a different tack, beginning with an emphasis on how “local” dynamics cannot be understood without looking at their connections to other places around the globe, and more recently, exploring scalar politics and power relations, the debt to biophysical processes in the production of scale, and the relationality and networking of scales (Zimmerer and Bassett 2003; Neumann 2009). These are, of course, complementary positions, as scale is a central concept to each, but with different emphases and entry points. Indeed, we feel that scale provides a set of debates, concepts, and vocabulary that could bring the fields together in conversation. But it is not the only bridge, and we hope that other scholars will forge new ones.

## Conclusion

In illustrating how political ecology and legal geographies complement each other, we have showed how measures within the formal legal realm, including laws, regulations, policies, litigation, and other instances of state authority, are crucial in facilitating the operation of extractive industries, and that these measures are neither absolute nor neutral, but rather intimately wrapped up in many of the same extralegal and informal concerns that political ecology has long attended to. Indeed, the formal legal realm is sufficiently complex and ambiguous that it offers resources that can be harnessed in the service of multiple parties and goals. Any political ecological analysis of the causes and effects of such extractive activities must take into account these legal geographies as well as the more customary hallmarks of political ecology.

The case of the Marcellus Shale is relevant beyond Pennsylvania, with implications not only for the landscapes of shale gas extraction across the country, but also broader questions about energy production in the US; indeed, we have situated the case within the broader (mostly political ecological) literature on

extractive economies and resource peripheries. Our empirical analysis is limited by space: Act 13 and the other brief examples comprise only a small selection of relevant legal and political geographies in the recent boom in drilling for natural gas. Even by itself, Act 13 deserves many more pages of analysis; we have only been able to provide a glimpse of the conflict it has generated and been generated by. Nonetheless, the example neatly supports our arguments. It is an example of legal work that is being done to facilitate extraction, by restricting municipal ordinances that seek to ban or limit drilling. It demonstrates conflict among different levels of governance, each claiming a right to regulation. Finally, it shows the advantage of blending a legal geographical analysis with a political ecological one, for an understanding of environmental governance across multiple scales.

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