THE MAKING OF A LANDSLIDE: LEGIBILITY AND EXPERTISE IN EXURBAN SOUTHERN APPALACHIA

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ABSTRACT:

This article explores the changing legibility of the 2004 deadly Peeks Creek landslide in mountainous, historically rural, and rapidly urbanizing Macon County, North Carolina. The event is interesting because local media and other residents made it legible as flood, drawing on local historical experience of flooding. Months and years later, however, many of the same residents made Peeks Creek legible as a landslide. In other words, this event was not always explicitly considered a landslide, but instead had to become one. The article first argues that notions of legibility ought to be more thoroughly considered in urban political ecology scholarship. The article next demonstrates that the changing legibilities were driven by the tandem intervention of first, scientific experts in local policy discussions, and second, low-density exurban growth into landslide prone areas. The importance of this discursive shift was that landslides became legible as objects of environmental governance in a hotly contested 2010-11 county ordinance, revealing the changing and contested nature of expertise and regulation in exurbia.

KEYWORDS:

urban political ecology; exurbia; landslides; legibility; southern Appalachia

Landsliding and flooding are closely allied because both are related to precipitation, runoff, and the saturation of ground by water. In addition, debris flows and mudflows usually occur in small steep stream channels and are often mistaken for floods; in fact, these two events often occur simultaneously in the same area.

-United States Geological Survey (2004)

A DRIVE UP FISHHAWK ROAD

We drove up Fishhawk Road in Macon County, North Carolina, on a cold, gray February morning and then walked another half mile up the mountain once the mud and previous night's snow stopped the car. That steep, craggy passage winds its way through the thick rhododendron and hemlocks of US Forest Service land and tracks trickling Peeks Creek, which averages perhaps thirty meters to the southeast of the road. Dennis[1], a county resident and our guide for the day, was showing a colleague and me some of the steep and sublime upslope land above his small neighborhood named after the stream that runs through it. Like many of Macon County's exurbanites, second home owners, and retirees, Dennis is originally from Florida. He frequented this corner of mountainous southern Appalachia in the summers of his childhood. He is now retired and resides there full-time, living in a modest, newly constructed house on another small plot of his family's downslope land toward the bottom of the creek.

Dennis told stories that day about his childhood memories of Peeks Creek and Macon County, swimming through streams, playing in waterfalls, and walking in forested mountains. We heard most, however, about the catastrophic Peeks Creek landslide, regionally infamous for killing five people and damaging dozens of homes in September 2004. At that time, Dennis lived in south Florida where he endured Hurricanes Francis and Ivan only several days apart from one another. Once Ivan cleared Florida, forecasters projected the hurricane's track to move through western North Carolina. Both storms soaked southern Appalachia. One

[1] To protect the identities of my informants, all have a pseudonym or are referred to as Interviewee X.

morning a few days after Ivan vacated Florida, Dennis saw Peeks Creek on cable news with still early reports that the intense rain from Ivan's remnants had initiated a landslide there. He could scarcely believe that Peeks Creek was on television and that the storm that had just passed over him in Florida had hit his family's North Carolina community, too.

Two days after the news report, Dennis found himself with his VHS camera in Peeks Creek, filming with shaky hands and a choked-up narrator's voice the major cleanup effort of not only his neighborhood, but also his own house. Federal Emergency Management Agency (FEMA) and North Carolina emergency crews were present and major media outlets covered the story, too. The landslide swept his and other houses clean off their foundations, making a dramatic enough scene that one severely damaged bungalow from the neighborhood appeared on the front page of *The New York Times* later that week. Dennis dryly noted that not many Maconians have had their residences on the front of the *Times* before. Dennis also specifically remembered the loss of his neighbors Kattie and James Watts, members of a family he knew from his summers in Peeks Creek as a young boy. I discovered during our walk through the woods that the land and the man who owned it still bore scars from the Peeks Creek landslide nine years earlier.

If I had walked the Peeks Creek landslide area without Dennis, I would have missed the landscape features signaling that we were walking through the scene of a devastating geologic event. Only the trained eye of a local or an expert could capture the changes to the landscape because young trees and tall grasses now hide the soil deposits forming the landscape's deep gouge. Seeing the thin, gently gurgling creek that February morning fed by the slowly melting snow, it was hard to imagine that raging and deadly flow of mud and rock shearing buried boulders in half, snapping massive tree trunks, crushing houses and cars while moving at nearly 50 kilometers per hour. Dennis said that at the time he wondered if the area would ever recover. Some of the geologists and state officials said it might be a decade or more before substantial vegetation would regrow.

Contrary to these estimates, though, the landscape is making a comeback. In this way, the ecological processes of invasion, succession, and recovery continue to erase the appearance of the landslide event on the landscape. This article shows how the ecological recovery of landslide landscapes mimics the objectification of landslide events—that is to say, the process through which complex and ambiguous environmental events are categorized, labeled, and simplified, coalescing them into particular environmental objects. These memories and experiences of events are not simply erased. Rather, they are co-opted and tinkered with, and they are enrolled to support political causes, even oppositional causes at the same time. Here, I dissect the historical and political rendering of landslides as objects of environmental governance through the Peeks Creek historical rupture in Macon County's environmental history.

The article unfolds in three main sections. I first introduce a contextual and theoretical framework grounded in urban political ecology (UPE), detailing the ways in which UPE currently considers environmental knowledge. I argue that UPE's primary metaphor of 'urban metabolism' is useful but underdeveloped in its understanding of how urbanization influences the objectification of environmental events. I use the Peeks Creek event to reveal urban metabolism as both a material and immaterial process in which earth and water, memories and categories, and humans and capital, are all transformed by exurban growth and scientific expertise. Secondly, I provide historical context of the political economy and ecology of exurban growth, especially focusing on southern Appalachia. With its low density form, large second home and retiree ownership, and attractive environmental amenities, exurbia is a unique urban formation. Understanding how it unfolds in a particular regional ecological context is important for understanding urban environmental politics.

Thirdly, to begin empirically illustrating this argument, I narrate the political life of the Peeks Creek event as a flooding event. In its immediate aftermath, the event was made legible as a flood event using local experiences and memories of historical flooding events.

During this moment in the history of the narration of the Peeks Creek event, it was politically enrolled to support a revival of a municipal floodplain ordinance. Thus, initially, the narration of Peeks Creek had little to no relationship to previous landslides, even though landslides and other erosive events fundamentally define southern Appalachia's landscape.

Finally, my narrative then shows that months and years later, geological assessments of the Peeks Creek event displaced the previous flood discourse that was based on local knowledge and memories and instead characterized the event as a landslide. Framing Peeks Creek as a landslide allowed local planners and others concerned about exurban growth in the county to craft a steep slope construction ordinance in 2010-11, regulating the amount, place, and slope of exurban residential construction in the county. Taken together, the Peeks Creek event's emergence first as a flood and then as a landslide challenges the assumed objectification of environmental events as existing in permanent, stable categories. The Peeks Creek landslide was not always a landslide. Instead, it became one.

Two factors—the solicitation of geological expertise and exurban residential housing on mountainsides—were drivers of Peeks Creek becoming a landslide. In Macon County, exurban growth in landslide prone areas gave some Maconians new reason to care about landslides. Scientific expertise gave them a discourse and technical vocabulary to articulate this care in the form of a steep slope construction ordinance in 2010 and 2011. It also gave anti-regulation opponents the same vocabulary, though deployed for opposite purposes. Thus, it was only when scientific expertise influenced local non-scientific knowledge at the height of the exurban boom in Macon County did Peeks Creek emerge as a landslide, thereby rendering landslides in general legible as objects of governance. It took the combination of urban growth and scientific expertise to produce Peeks Creek as a landslide, more broadly resulting in landslides as new environmental objects.

ENVIRONMENTAL KNOWLEDGE AND UPE

The primary entry point of environmental knowledge into UPE is through the notion of 'urban metabolism.' Urban metabolism is a central metaphor in UPE scholarship and it describes a framework for understanding the intertwining inseparability of urban and environmental processes. It is especially attuned to the uneven development of urbanization, focusing on the endlessly recombining and "circulat[ing]…physical, chemical, and biological components" that "are never socially or ecologically neutral" (Heynen et al. 2006, 7). Furthermore, for UPE, discourse and knowledge are also implicated in these metabolic circulations: "…the material production of environments is necessarily impregnated with the mobilization of particular discourses and understandings (if not ideologies) of and about nature and the environment" (Heynen et al. 2006, 7).

For UPE, then, urbanization is the process by which widely disparate elements are coalesced and networked into dense and unequal socioecological relationships. Nature is never separate from 'the urban' and instead, the two are constantly co-produced and reproduced with one another, leading to a multiplicity of uneven spatial formations and relationships at a range of scales (e.g., Desfor and Keil 2004, Robbins 2007, Swyngedouw and Heynen 2003, Kaika 2005, Keil 2003, Loftus 2012). To explore these instances of uneven urbanization, much of UPE research primarily 'thinks with' material flows, artifacts, and spaces like water (e.g., Kaika 2005), plastic bags (e.g., Njeru 2006), or urban green space (e.g., Heynen et al. 2006). Practices of environmental knowledge implicitly appear in the shadows of this UPE literature as necessary but understated components of these flows, artifacts, and spaces. Examples include environmental knowledge as a part of urban environmental management and governance (e.g., Rice 2010), as an actor in an urban political ecological network (e.g., Holifield 2009), or as ideology (Swyngedouw 1996). The UPE literature is attuned to the historical development of urban metabolic flows, it nods to environmental knowledge writ large, and some early UPE work (e.g., Gandy 2003, Davis

1998) integrates environmental knowledge into its analyses. On the whole, however, UPE does not yet thoroughly consider environmental knowledge on its own terms—as a set of practices that see the world in particular ways, dividing and re-dividing it into discrete and interrelated objects that become subject to urban metabolic flows. More directly, UPE scholarship tends to treat practices of environmental knowledge in the same way Boyd (2010, 843) critiques environmental law. He notes that the objects of governance are often taken for granted, missing the "scientific and technological investments that go into making such objects." "Such knowledge practices, or ways of seeing," he writes, "are instrumental in shaping regulatory possibilities and must be interrogated directly…" I contend here that knowing how objects become legible, and therefore governable, is quite urgent for UPE's broader project of knowing how urban environments are metabolically produced. As Whitehead et al. (2007), following Scott (1995), note, the state-led centralization of knowledge—the state practices making the complexity of the material world simple for the purposes of governance—necessitates producing particular categories of objects. Accounting for these practices is not yet fully present in UPE. My argument is that without accounting for these practices, the drivers of urban metabolism as currently understood in the UPE literature will continue to be limited to contestations between governments, economic interests, and civil society, thereby missing the ways that urban metabolism depends on the making of particular objects as they are epistemologically rendered legible for urban governance and management. In other words, 'climate,' 'landslide,' or 'water', are not simply entities waiting to be metabolized. Instead, they and any other object must be known, simplified, and constituted using particular forms of technology and expertise as part of its metabolism.

Boyd (2010), as well as other scholars in science and technology studies (STS) considering scientific epistemological practices, notes that this rendering is often done through scientific and technological investment. For instance, scholarship investigating the

co-production of science and society (Jasanoff 2004), the diverse knowledges implicated in state environmental projects (Mukerji 2009), state rationale for improving the human condition (Scott 1995), and colonial technopolitics (Mitchell 2002) all detail ways in which environmental objects become legible to particular regimes and subjects. This is not to say, though, that objectification is bad or false; instead, it is only to note that the creation of objects is first, a function of how human discourse and language works, and second, these objects can be analyzed in terms of how they function and with what political implications.

In urban contexts, Rice (2010) notes that carbon is a particularly legible object for urban climate governance programs because it can be quantified and measured by planners in accordance with particular protocol to achieve desired carbon levels. This shows that urbanization is in part a process of producing urban environments through scientific ways of seeing. Given its emphasis on the process of urbanization, UPE as a subfield is well positioned to draw from these insights to understand the process of urbanization as a process by which new objects become known through the changing practices of seeing the world.

EXURBAN SOUTHERN APPALACHIA

Most broadly, this research targets the socio-environmental consequences of exurban growth in historically rural Macon County. It relies on twenty-two interviews of county officials, developers, concerned citizens, planning board members, county planning staff, and geological and hydrological scientists in Macon County. It also relies on participant observation at public meetings and extensive archival work and document analysis. Wachsmuth (2012) and Angelo and Wachsmuth (2013) urge UPE scholars to move beyond its "methodological cityism," a critique of UPE's limited focus on cities rather than on processes of urbanization that extend into non-city places. By using these particular sources in this site, the research answers this call by focusing on the political ecological unfolding of urbanization in historically one of the most rural places of the United States.

Macon County is a prime example of such an urbanizing, non-city place. Its physical geography, exurban-fuelled political economy, and contentious politics establish the context and critical setting for the context of this theoretical framing. The county is situated in the Piedmont megapolitan region, which includes much of southern Appalachia and regional cities like Birmingham, Knoxville, Atlanta, and Charlotte (Lang 2006). This region is in the midst of a projected 50% population growth from 2000 to 2030. The region stands as a frontier of landscape transformation as flows of capital and humans increasingly metabolize its countryside (Gustafson et al. 2014), contrary to the stereotypes of Appalachia as isolated, culturally backwards, and economically peripheral (see the 1972 film *Deliverance* set in southern Appalachia). These transformations are ecologically alarming especially because of the region's high biodiversity and its status as a 'watertower for the Southeast' (Gragson et al. 2008)

More broadly, exurbanization characterizes vast areas of metropolises and countryside in the United States (Berube et al. 2006), including much of southern Appalachia, but it is only the most recent chapter in that region's historical uneven development. Processes and conditions of uneven development characterize the historical geography of southern Appalachian communities and adjacent urban areas because southern Appalachia has existed at the economic periphery of the eastern US, historically serving as areas of natural resource and labor extraction for eastern and southern US cities, as well as to the accumulation of capital and social power (Billings et al. 1999, Billings et al 2000, Gaventa 1982, Gregg 2010, Mangianiello 2010, Pudup et al. 1995).

Today, like in other areas in North America, the same trends of uneven development between southern Appalachia and the urban centers on its periphery are continued by urban residents fueling exurbanization via amenity migration and second home construction (see Nelson 2009, McCarthy 2008, Darling 2005, Ghose 2004). As Gustafson et al. (2014) demonstrate, the regional metabolism of exurban growth has led to an urbanized landscape in

Macon County and southern Appalachia characterized by increasing social divergence, fractured governance, and environmental pressures. Because of southern Appalachia's temperate climate, relatively inexpensive land, and light development regulations, exurban residential developments constitute much of the economic and demographic growth on southern Appalachian communities' steep mountain slopes. This implies increasing vulnerabilities to disasters and perilous hazards (Wisner et al. 2004 [1994]). It also corresponds to some of the other complex and evolving socioecological conflicts and developments of the urban environmental and UPE literature (Cronon 1991, Gandy 2003, Heynen et al. 2006, Swyngedouw and Heynen 2003, Keil 2003, Glenna 2010, Kaika 2005, Swyngedouw 2004, Swyngedouw 1999).

Southern Appalachia is regionally known for its fiercely conservative politics and land rights ethic, but Macon County's politics are among the most intense. The county's politics are often embroiled in negotiations, heated debate, and even intimations of violence between pro-regulation and land rights activists over the economic and environmental benefits and burdens of increased tourism and development. Complicating these vociferous debates are the concerns of Maconians about the ecological effects of exurban development, including decreased stream water quality and quantity, landslides and other earth movements, summer haze related to ozone, and the clearing of forested hill slopes. These environmental observations and concerns are confirmed by regional ecological studies on the impact of exurbanization on southern Appalachian species, systems, and landscapes (Price and Leigh 2006, Maestas et al. 2001, Canfield and Hawkins 2009, Kirk et al. 2012). Macon County stands as an example *par excellence* of the conflicts waged over Appalachia's biodiversity and environmental amenities, cultural emphasis on private land rights, and urban development pressures.

These degrading environmental conditions contextualize the mixed public responses to exurban development. Exurban growth continues to degrade environmental conditions,

leading to a contradiction of exurban growth. As Sayre (2011) and Robbins et al., (2011) note, this contradiction is characterized by exurbanites attracted to an area because of a particular environmental amenity like a sense of rurality, small town life, and pristine environmental conditions. These very qualities that attract exurbanites are diminished by their increasing presence, thus eroding not only the conditions of exurban growth but also the quality of life of long term residents.

To manage this contradiction, local governments in exurbia adopt urban planning measures, much like the steep slope construction ordinance in Macon County, often reliant on environmental experts like hydrologists and geologists (see also, for instance, the steep slope ordinance in neighboring Jackson County, North Carolina). This offering and solicitation of expertise as a practice of seeing in exurban places matters because planning is often taken for granted in city settings but selectively adopted and highly contested in historically rural areas unaccustomed to the local state functioning in the role of planning and often hostile to the growing role of the state (Walker and Hurley 2011). Efforts to introduce planning have solicited expert opinion on land use regulations, seeking to ground their regulatory impulse in scientifically and expertly vetted research and opinion. Expert intervention into questions of growth and planning, then, represents a broader trend in planning and local regulations to rely on expert legibility of the environment to manage growth, especially in exurbia.

Unlike many historically rural areas in and beyond southern Appalachia, Macon County has drawn the attention of scientific experts for generations. One scientific institution relevant for this research is the North Carolina Geological Survey (NCGS), which provides to the public geological information regarding minerals, gas and oil, landslides, and other related information. Most of the researchers who investigated landslides in the early 2000s live and work in western North Carolina and for several years mapped the landslide hazards of Macon County (see Wooten 2006 a, b, and c for these maps). Another institution is the US Forest Service's Coweeta Hydrologic Lab in southern Macon County, built in the 1930s by the

Civilian Conservation Corps. Their experimental forest and hydrological research data extend back nearly 80 years, providing a long-term view of ecological change in southern Appalachia. Similar to the NCGS, most of the Coweeta Lab scientists live and work in Macon County and have spent the bulk of their careers at the Lab. As public agencies, they are mandated to serve the public interest and also occasionally offer comment on issues of public concern like the Peeks Creek event.

PEEKS CREEK, THE FLOOD

Thomas L. Clingman, who wrote of 'waterspouts' in Macon County in July of 1876, offered early written documentation of landslides in western North Carolina. Clingman described them in an address to The Philosophical Society of Washington in January of 1877 as waterspouts, "as they are popularly called." Clingman (1877) writes:

> In the after noon of this day, June 15th, 1876, during the rain, which had been falling steadily for the greater part of the day, [Horatio Conley, a Maconian] was surprised to see the stream suddenly rise much higher than he had ever seen it at any previous time. …The stream, however, rapidly subsided into its channel, but was still much swollen. …While he and his wife were in the piazza of their house, next to the creek, their attention was arrested by a remarkable appearance up this ravine distance perhaps one hundred and fifty yards from them. They saw a large mass of water and timber, heavy trees floating on the top, which appeared ten or fifteen feet high, moving rapidly towards them, as if it might sweep directly across the Tessantee [River] and overwhelm them.

Clingman speculates as to the intense, column-like rainfall that he imagined to have caused this event, dubbing it a waterspout, after the eponymous tornado-like features over lakes and oceans. In an interesting twist, Clingman's description and initial curiosity were from waterspouts on Fishhawk Mountain, the very same origination point for the Peeks Creek landslide. Similarly intense, heavy rain events with five or more inches falling in 24 hours, the standard North Carolina Geological Survey uses as a landslide trigger threshold for their suite of landslide hazard maps, have happened twenty-one times since 1876 with another several coming very close to the threshold. At least seven, and likely eight, of these

occurrences were remnants of hurricanes or tropical storms (NCGS 2012).

Like the Peeks Creek landslide, consequences of other major storm events in southern Appalachia have been deadly, too. Given its geographic situation, southern Appalachia experiences major precipitation from hurricanes and/or moisture from the Gulf of Mexico. Hurricane Camille, one of the most powerful hurricanes in recorded history made landfall on the Mississippi Gulf Coast with record setting sustained winds over 190 miles per hour. For southern Appalachia, Camille was an unmitigated disaster as it dumped 28 inches of rain in 8 hours across southwestern Virginia (Williams and Guy 1969). Of the 150 people that died in Nelson County, Virginia, during the storm, nearly all of them perished in the 3,793 landslides, not in the concurrent floods. Other named storms, including Agnes (1972), Cindy (2005) and Ernesto (2006), caused hundreds of damaging landslides throughout southern Appalachia. The mountainous increase in elevation, too, makes for increased orographic rainfall, leading to higher amounts of precipitation. These factors combined with unstable soils and steep slopes make southern Appalachia landslide prone.

I asked Dennis about the local history of landslides, whether he or anyone he knew anticipated any landslides resulting from the storms, or whether landslides loomed large in the minds of Maconians. He said the possibility of landslides never crossed his mind and that the Peeks Creek event shocked everyone he knew. Given that landslides after major rainfall are a prominent feature of the southern Appalachian landscape, Dennis' response surprised me. To compare Dennis' response to how other Maconians understood landslide propensities in the days leading up to Peeks Creek, I asked my interviewees about the history of landslides and consulted the local newspapers in Macon County to see if their coverage of the storms prior to Peeks Creek indicated any concern for landslides. I found no specific landslide warning or history in those editions, though some mentioned flooding as a possibility. I also found no suggestion that landslides are consequential to flooding; in other words, that landslides might result from extensive flooding. Furthermore, only one interviewee—a geologist—mentioned

a history of landslides.

Dennis' response, the paucity of newspaper references, and the near absence of interviewee comments regarding historical landslides indicated that landslides had faded from public consciousness at a time when events like Peeks Creek would suggest it might have been vibrantly in the forefront of public memories. For months after Peeks Creek, though, all of the local papers were filled with coverage of the tragic, dramatic event. The apparently minimal level of the public's consciousness of landslides prior to Peeks Creek, even in the face of ripe landslide conditions, was critical because the initial narration of Peeks Creek framed it as a flood, not a landslide. Thus, when forecasters put Macon County square in the predicted path of Ivan's remnants, its potential effects became prevalently addressed in the papers in the language of floods. *The Franklin Press* summarized the county's efforts to prepare for Ivan, noting that record setting rainfall would result in power outages, unnavigable roadways, and, above all, extensive flooding. Stories of flood refugees in the county and warnings of the hazards of floodwater are dominant throughout these pre-Ivan preparations for the storm.

The predominance of 'flood' language continued in the local papers after the event at Peeks Creek. The most prominent references to the Peeks Creek event discussed precipitation, hurricanes, and especially historic floods. This point should not be made too strongly as there are occasional references to 'the landslide' scattered throughout *The Franklin Press*, but the most common language to understand Peeks Creek was that of flooding. For instance, the picture on the front page of *The Franklin Press* (21 September 2004) showed an overhead shot of Peeks Creek's mangled houses with the caption: "Some homes along Peeks Creek were picked up by the flood and moved off their foundations." Additionally, here are the first several paragraphs covering the Peeks Creek event from *The Franklin Press* (Cunningham 2004): "A striking blue sky and crystal clear mountain views have replaced two days of torrential rains and heavy flooding. But it will take more than perfect weather for the county

to recover from the devastating scars left by last week's storm." The *Asheville Citizen-Times* (Ball 2004) also used language of floods: "As emergency workers used cadaver dogs and heavy equipment to search through the mounds of debris swept into a Macon County neighborhood during last week's flooding, there were reports of another body being found." That *The Franklin Press* editions' front-page article mentions mudslides twice, but only insofar as they were a result of flooding. A feature piece in the September 24 edition also addressed the historicity of floods, noting many of the same major precipitation events that the NCGS did in their contextual work for the landslide mapping project. The piece (Stoudemire 2004) reminded Maconians of historic flood events, noting,

> In the early days, floods were referred to as "freshets," the overflow of a stream as a result of heavy rain or a thaw. According to 'Buncombe's Historical Freshets Since 1791 Recalled by Pioneer," in the July 27, 1916 issue of *The Asheville Citizen*, freshets occurred in Western North Carolina in April 1791, May 1841 and June 1876." Reflecting on the damage, a *Press* editorial read: "Residents could hardly believe the quiet stream they had known all their lives had turned into a raging river tearing through the settlement.

Additionally, newspapers framed North Carolina Governor Michael Easley's visit soon after the disaster in the language of floods: talk of flood insurance, flood damage to homes, and flood mapping (Cunningham 2004d). Interestingly, homeowners' insurance policies and FEMA classification parallel this interpretation of the Peeks Creek landslide as a flood event. This is due in part to the fact that no insurance company offered landslide insurance coverage in North Carolina. This means that whatever financial aid comes to these homeowners—if any—was from public sources for flood assistance. One Peeks Creek community member showed me a set of homeowner's insurance claims and FEMA documents from 2004. Under the "Cause of Damages" section, the application lists "Flood, Hail/Rain/Wind Driven Rain" rather than any landslide, debris flow, or other similar language. The State of North Carolina's Application form for State Disaster Assistance also lists "Hail/Rain/Wind/Wind Driven Rain." Similarly, *The Franklin Press* ("Governor Easley tours disaster area," 21 September 2004) notes that "Most home owners did not have flood insurance…For the future,

[Governor] Easley said the state could consider preventative measures to protect flood damage to properties, such as relocating homes farther back from creeks. The state is still in the process of updating flood maps for Western North Carolina."

Within weeks, the flood discourse of Peeks Creek took on political importance in the county. For years, the town of Franklin had been struggling with a floodplain ordinance, what particularly it should address, and even whether it ought to be adopted. Macon County adopted an ordinance in the mid-1990s, but Franklin had yet to follow suit. Ten days after Peeks Creek landslide, *The Franklin Press* investigated the town of Franklin's refusal to adopt a flood plain ordinance in 1978, thereby disqualifying the town and its residents from participating in the US federal government's flood insurance program: "Alderman Jim Williamson, who also worked as past town administrator, says the last time the board of aldermen considered adopting a flood plain ordinance, public outrage ensued. 'There were a whole bunch of people in opposition to it,' Williamson says. 'A whole lot of folks thought we were trying to take their property away from them.' (Lewis 2004a)"

On 19 November, the editorial board of *The Franklin Press* (2004) admonished the town to reconsider the flood plain ordinance. Here, even using the language of 'debris flow,' the authors still manage to frame the event to support a flood plain ordinance. They wrote:

> Perfect safety cannot be guaranteed. For example, the tragedy on Peeks Creek came like a thunderbolt. So far, no human agency can be blamed for the debris flow or avalanche that turned the community into a disaster zone.
>
> However, anyone familiar with simple physics—or plain commonsense—could tell you that water will rise and rivers will spill over when enough rain falls.
>
> Updated flood maps pinpoint the most vulnerable areas. Being forewarned helps residents take protective action before major storms. Up to date maps help county officials determine where construction can safely be permitted. Armed with such information, officials can secure federal grants to move property out of danger areas….
>
> Let's not wait on this. The time to act is now, before the consequences of inaction fade from memory.

Why Peeks Creek could be used compellingly to promote a floodplain ordinance stems from the historic relationship between floods and the economic geographies of Macon

County.. Pre-exurban growth in the region was concentrated along waterways, even dating back to Native American settlements (Gragson and Bolstad 2006). Living high along mountain ridges or at higher elevations was unnecessary and impractical. As one of my interviewees (Interviewee H) with a family history of six generations of Macon County landowners said: "A lot of folks who grew up here [did] rural agrarian farming in the valleys, along the creek in the bottomland and left the ridges [alone]. They also stayed back from the creeks, too." Economic activities and day-to-day livelihoods were often driven by access to water as a source of consumption, irrigation, and power. Indeed, Franklin and other small towns like it across the region relied on rivers for mill power. Floods also can contaminate well water, which is still the dominant source of residential water outside of city limits. Even today, the town of Franklin has virtually no medium or high risk areas for landslides according to the NCGS (NCGS Downslope Hazard Map 2008). Exurban growth, though, has pushed residential living higher on to mountainsides and into areas more prone to landslide activities. Floods would have figured more prominently in the public's consciousness because of housing and work locations. Ultimately, for most of Macon County's history, floods were a more significant threat to life, land, and property than landslides were.

Furthermore, susceptibility to floods was easy for media sources to articulate to the public: they used historic pictures, stories from generational landowners, and local memories to narratively reconstruct these events. For instance, (Stoudemire 2004) offers her own memory of flooding there in a version of her column entitled "History tells us: Rivers will rise":

> I remember the many nights my mom walked the floors while Dad took a flashlight outside to see how high the river was. I remember seeing people taken from their homes in boats. I know all too well the story my folks tell of the flood of 1964. We lost everything we had in that flood.
>
> I remember, at the age of 13, walking out on our front porch and gazing at the lake that covered the entire area up to the porch. "How could a river swell to such massive lengths?" I thought with terror, as we went out the back door to escape.

No expertise was necessary to validate these memories and no scientist needed to offer an authoritative opinion about flooding or to resurrect their happenings. Non-expert, local knowledge was sufficient to remind Maconians of the susceptibility of their valley bottoms to catastrophic flooding events.

PEEKS CREEK, THE LANDSLIDE

Soon after the initial reporting of Peeks Creek event and the simultaneous floodplain ordinance discussion, scientific assessments of Peeks Creek began categorizing the event as a landslide, not a flood. Two main reasons exist for why scientists became involved in the first place. First, as represented in the tone of much of my archival material and interviews, the loss of life and the imperative of protecting life resonated throughout the community. Secondly, scientific experts later became involved in order to ensure that second home construction growth continued. Several years later, this dual logic of life and economy became clear during Governor Easley's comments when the state released a set of NCGS landslide hazard maps: "These maps will show which areas are prone to landslides and that will help developers, county officials, and residents decide where to safely build homes, roads, and other structures." The maps will "enable communities to evaluate and reduce the risks of building homes and other structures in landslide-prone areas of the North Carolina mountains" (Office of the Governor, Press Release, 3 October 2006).

The NCGS, on 16 September, warned the western counties that Hurricane Ivan's rain might oversaturate the ground, leading to landslides. "Given the wet soil conditions we already have in many of these areas, the risk of numerous, fast moving landslides is significant. Residents in landslide prone areas and anyone in mountainous areas should be aware of the warning signs and be prepared to move quickly. Intense rains have triggered landslides in the area before," said Gerry Wieczonek, a USGS landslide specialist, quoted in *The Franklin Press* (Editorial Board 2004b) a month after his warning. A telling example

comes from the 24 September 2004 issue of *The Franklin Press*, (Cunningham and McRae 2004) in which a long-form retelling of the Peeks Creek incident is framed as a scientifically-validated landslide event:

> A state geologist and local hydrologist who inspected the [landslide] site are certain the event was cause by a debris flow, also referred to as a debris avalanche.
>
> Such events can be caused by excess water saturating thin soils on steep slopes, causing everything above bedrock to slip quickly under the weight of gravity. Many follow existing streams.
>
> These events are common in our mountain region, they said.
>
> "It's a natural process—one of the main land-forming processes of the mountains, said Wayne Swank, a hydrologist and retired project leader at the U.S. Forest Service's Coweeta Hydrologic Laboratory in Macon County.
>
> "It has been happening for millennia, but for most of that time there were not people in harm's way," Swank said.

From Wieczonek's quote onward, Peeks Creek slowly emerged as a landslide event largely through scientific expertise, and, as Swank noted, it was made relevant because of the increasing number of people "in harm's way." At the same time, references to Peeks Creek as a flood also dissipated. When scientists' evaluation of Peeks Creek is mentioned in media sources, it only concerns landslides, not floods. The remainder of the fall of 2004, several articles address the science of Peeks Creek, and it is clear that their scientific discourse became an increasingly larger portion of the reflections on the Peeks Creek event. Rather than a 'flood' as was first articulated, terms like "landslide" and "debris avalanche" and "debris flow" become more common in the media, especially when reporting on scientific evaluations (Lewis 2004c). Over time, this discursive shift bled into non-science themed articles, like those around the public cost of debris cleanup (Cunningham 2004g).

The geological definition of a landslide is "a wide variety of processes that result in the downward movement of slope-forming materials including rock, soil, artificial fill, or a combination of these" (USGS Landslide Primer). There are at least nine different major types of landslides: rotational landslides, translational landslides, block slides, rockfalls, topples, debris flows, debris avalanches, earthflows, creeps, and lateral spreads. As the USGS notes,

these all meet the basic definition of 'landslide' but are differentiated by their subsurface movements, geological causes, slope gradients, soil type and structure, and speed (USGS Landslide Primer). Given the western North Carolina's physical geography and geology, landslides in the area are usually rockfalls and debris flows. In 2009, a massive rockfall covered a portion of I-40 in western North Carolina, while the Peeks Creek landslide in 2004 was a debris flow. Debris flows are described as a "slurry" of mud, rocks, water, trees and other materials (USGS Landslide Primer). According to the NCGS, five or more inches of rain in 24 hours is the threshold of precipitation-triggered landslides in Macon County (NCGS Landslide Hazard Maps).

By December 2004, grounded in this scientific approach to landslides, a task force of geologists, climatologists, meteorologists, and state officials issued a report on the causes of Peeks Creek (Cunningham 2004h). That report frames the entire event in the language of landslides, slope failure, and debris flow, all of which work to categorize Peeks Creek in the terms of a landslide rather than a storm event, flood, or even a tornado, as some rumors had claimed.

NCGS scientists also attributed a sense of the area's chronic past and future vulnerability to landslides. In February 2005, the state's effort for mapping these landslide vulnerabilities was building momentum and had broad public support. Addressing the chronic vulnerability to landslides provided the justification for the mapping effort (Cunningham 2005a). These landslides, in the words of the geologists, are "repeat offenders" that have struck in the past and will certainly strike in the future (Cunningham 2005a.) Developing maps of the locations of these past and future offenses, though, was the NCGS's goal.

In the two years after Peeks Creek, the newspaper articles that characterize landslides as endemic to southern Appalachia frequently have some kind of scientific validation. Representatives from the NCGS weighed in: "Things have been going downhill in the mountains for a long time" and "Sometimes, moving a house over 50-feet can make a world

of difference," said Wooten (Cunningham 2005a). So too did representatives from the Coweeta Hydrologic Lab: "It's not a question of if they will occur, but a question of when and where," said Dr. Mark Reidel, a research hydrologist at the Coweeta Lab (Maracle 2005). It was scientific validity, not local memory, which presented the past, present, and future chronic dangers of landslides. In this way, landslides became a sort of "normal accident" of the environment (Perrow 2011), meaning that they could be systematically considered through planning and foresight, though not omitted from the landscape.

Mobilizing and Contesting Geology

I now turn toward the steep slope ordinance conflict of 2010-11 in Macon County to show how Peeks Creek event was understood as a landslide by pro- and anti-ordinance Maconians. In the context of the ordinance conflict, the broadest consequence of the scientific framing of the chronic vulnerability of the landscape to landslides was that pro-planning and anti-planning political groups both understood Peeks Creek as a landslide, when just years earlier similar groups would have understood it as a flood. Up until the beginning of the steep slope ordinance debate in 2010, the work of scientists to frame Peeks Creek and other events in the context of chronic landslide vulnerability received scant negative attention, even from the land rights activists and plenty of positive reviews, especially in the largely pro-planning media.

First, pro-planning Maconians who generally supported the ordinance latched on to the scientific framings of the landslides as chronically dangerous and augmented them with an explicit concern over human life. For much of the debate, this crowd consisted of a pro-planning Maconians, the planning board, and the steep slope subcommittee and was only politically organized by pro-ordinance group MaconSense after the ordinance was tabled. They argued that because scientists claim that landslides like Peeks Creek will happen again, the county should do everything it can to avoid loss of human life. These claims were often made with rigid fervor at public meetings, asking rhetorical questions like "How many lives

will it take before you realize that this regulation is commonsense and is more important than your property rights?" "Preventing another Peeks Creek" also was a common refrain for pro-ordinance Maconians. Said one resident (Planning Board Meeting, 17 June 2010) at a public planning board meeting:

> [I]s it possible that by taking the minimum approach to steep slope regulations that a slope could fail and that there could be a loss of life? If slope failure is possible, and if loss of life is possible, then maybe we could put a number on what this board feels is an acceptable loss rate. One person in 10,000? One person in one million?

These appeals to protecting human life, however, were regularly out-weighed by the presence of vocal land rights activists at public meetings, in newspaper editorials, and in online forums like blogs and other websites. Interestingly, opponents of the ordinance also understood Peeks Creek as a landslide. They framed their arguments in terms of landslides, but disputed their danger. Ordinance opponent Lamar Sprinkle (Macon County Planning Board recording, 17 June 2011), a building contractor and land surveyor on the planning board, regularly claimed at public meetings that Peeks Creek was "a freak event" and that it would likely never happen again. Despite historical evidence to the contrary and the tendency for landslides to happen along the tracks of previous landslides, Sprinkle's argument relied on a sense of unpredictability and infrequency. Some ordinance opponents, however, argued that the paleohistory of the Appalachians meant that no amount of regulation could stop the eventual erosion of the Appalachians. As one (Drummond, 2012) put it:

> The Appalachian Mountains were formed around 420 million years ago. Ever since they have been eroding away. Rains cause soil and rocks to move into the valleys. Landslides of varying sizes have occurred for eons. The Appalachians will continue to erode for the next 420 million years. That means every mountain will eventually succumb to this natural process until it may just be a bump on the landscape.
>
> I'll "predict" that these mountains will continually have landslides. No one can predict when or where a landslide will occur. Every inch of every mountainside is susceptible to landslides.
>
> The Landslide Hazard Maps are pure speculation. They are based on scientific "theories" not to [sic] "scientific methods"...

This argument presents one version of the geology of the western North Carolina mountains, relying on some scientific information to make its argument. What the argument ignores, however, is other scientific geologic knowledge that does not fit this Maconian's anti-ordinance ideology. More interestingly, though, the framing of the region as being chronically landslide prone, much like the geologists argued, shows landslides as "normal accidents," transformed into some kind of inevitability, such that no homeowner, government, or political group could intervene in the area's geologic fate. Thus, the emergence of landslides as regular, unavoidable events shows the double-edged complexity of how environmental objects are contested and ultimately influencing how the county regulates, inhabits, and conceives of its own landscape. Furthermore, for ordinance opponents, Peeks Creek's status as a landslide paradoxically meant that landslides were both rare and unpredictable as well as fundamental and omnipresent in mountain landscapes. Either way, for the ordinance opponents, landslides could be neither controlled nor regulated.

CONCLUSION

This article details how the Peeks Creek event in Macon County became legible first as a flood event, drawing on local memory and historical experience, and second as a landslide, validated by geological science and made relevant because of exurban growth. The epigraph of this article is especially instructive here, as even the geologists who framed the Peeks Creek event as a landslide recognize the literally and metaphorically muddy and ambiguous nature of flood and debris flow events. Given this murky distinction, the debris flow event exceeds human understanding of it, eluding, for instance, the definitive categorization of insurance claims yet resonating strongly with the trauma of local environmental memory. Similarly, though the Peeks Creek event itself did not happen in an exurban-style neighborhood, its dual categorization first as a flood and then as a landslide

permitted its enrollment as a tool of urban planning. The physical form of the event, indeterminate as it was, left room for the things in its path—especially urban development—to lend the event meaning and political purpose.

Landslides became legible as environmental objects in the midst of Macon County's exurban growth trends and increased involvement of experts in assessing historically rural landscapes. In the first months after the event, any scarce mentioning of mudslides or landslides was not referenced with specific historical detail or precedent in the media, despite landslides being a frequent and defining feature of the region's mountainous landscape. Instead, it was a general sense of their imprecise conditions in the mountains. By the time the steep slope ordinance debate reached fever pitch in 2011, though, Peeks Creek was framed entirely in the language of landslides by both pro- and anti- ordinance politicians and citizens. In fact, talk of Peeks Creek as a flood exists only in the historical residue of newspaper articles and other texts. How landslide discourse, rather than flooding, came to narrate the event of Peeks Creek and who initiated that narrative is a story of how expert knowledge claims in southern Appalachia circulated from state-sanctioned scientists into the realm of local politics.

The empirics of the case illustrate two important theoretical claims. The first is that the environmental knowledge of landslides in Macon County is highly related to the co-expansion of urbanization and certain expertise in southern Appalachia, highlighting the importance of expanding UPE's vision beyond its current habit of *methodological cityism* (Angelo and Wachsmuth 2013, Wachsmuth 2012). Before Peeks Creek, if landslides were known and experienced, they did not register highly in the public's awareness of them as measured by my interviewees and archival research in local newspapers leading up to and following the Peeks Creek event. It took local geologic experts, mostly from the NCGS and Coweeta Lab, to initiate the scientific discourse around Peeks Creek, which brought the event into clear objectified focus as a landslide. After it was given expert scientific status as a

landslide, the Peeks Creek event provided policy makers a way to make the landscape legible for an ordinance. This happened mostly by providing landslide hazard maps and a scientific justification for the existence of a steep slope ordinance. Both pro- and anti-ordinance citizens seized on this scientifically verified framing of Peeks Creek, though they crafted entirely different arguments out of its expertise-laden discourse. This matters for understanding exurbia because it reveals the conflicted and changing interpretations of environmental knowledge driven in large part by expertise implicated in exurban metabolism. Increased capital investment brought by non-local residents exposes state and financial arrangements to new vulnerabilities, requiring different approaches to understanding the ramifications of disaster. Landslides that could jeopardize this continued exurban growth, now an essential part of the county, required attention from state legislators and local planners.

The second is for understanding how scientific practices of seeing are related to the conditions and discourse of environmental vulnerabilities of exurban growth. Scientific understanding of Peeks Creek as an example of chronic vulnerability gave landslides in Macon County a history and a future. Without the chronic vulnerability—that is, without the painful past experience coupled with the threats of the future—there would be no political impetus to address disasters. Landslides, then, moved from events without a public sense of their history to events with a history and a future, allowing them to be politically deployed in local policy debates. This was especially true in the steep slope ordinance debate. In other words, vulnerability to any particular hazard event is not simply a natural state—it requires a particular knowledge created and even necessitated by changing urban, socioenvironmental, and political economic conditions.

The political significance of this discursive shift from floods to landslides is an important one for power relations in Macon County. Mostly, the shift changed the entire discursive terrain of environmental politics in Macon County for several years. In the short

term, there was no clear winner or loser as a result of the shift, but rather that it enabled the new participation of some groups, like geological scientists, in local politics. This story does not fit easily into the common set-ups in political ecology that cite coercive state power, abusive capital, or victimized local communities. Instead, state power here seems to work for the good of protecting human life and landscapes, even if it also sees its intervention as a way to promote further capital investment. The conflict also took general anxieties over urbanization and development and put them into scientifically measurable and legally legible terms. Older, well-established conservative land rights activists also were forced to rearticulate their typical arguments in the geological terms of landslides and debris flows. In the long term, however, the participation of experts and the incorporation of scientific vocabulary in county politics is now slowly becoming a matter of course. For urban planning advocates in Macon County, this is likely positive because planning depends on scientific expertise and rationalities. As Macon County continues to urbanize, only future political ecological conflicts over environmental externalities of urbanization will illuminate the degree to which Maconians politically accept scientific legibilities of landslides and other events. These future conflicts will also reveal the influence of expertise and urbanization over social power relations and uneven development.

For his part, Dennis, though having lifelong memories of Macon County, still considers himself part of the trend of exurbanizing Macon County. He supports a steep slope ordinance, hoping against hope that some kind of regulation might prevent people like him from building in landslide prone areas of the county. Dennis also relayed excruciating stories of death and survival in Peeks Creek during our drive and walk up Peeks Creek. The Watts family who died in the Peeks Creek landslide was from south Florida, but had family ties to Macon County and had a small cottage in Peeks Creek. Knowing that Hurricane Ivan was to make landfall near them in Florida, the Watts's took refuge in their Macon County cottage. Fleeing the storm's wrath in one place, the Watts's encountered it again in their haven through

some terrible twist of fate. Dennis said he knew Kattie from his childhood summers in Peeks Creek and mourned her.

Tragic events like Peeks Creek linger in the discourse and practice of the communities they ravage. Ironically, though it is politically expedient to decry the politicization of tragedies like Peeks Creek, tragic events often have political significance long after they are over, especially as they are woven into the communities' environmental discourse. The tragedies themselves take on a particular life of their own as they are remembered, forgotten, resurrected, and reframed. How we come to know nature and how we politically transform this knowledge is often through events characterized by death, destruction, and suffering. The contingencies of death and survival in Peeks Creek mimic the local historical exigencies of political ecological discourse, freighted with heavy emotional, political, expert, and environmental meanings, existing in a macabre mix of vulnerability, nature, and co-option at the exurban frontier.

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