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Forum

The 100th Meridian, Ecological Boundaries, and the Problem of Reification

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Fuzzy and investigative ecological boundaries are reconstituted as absolute and tangible when used to inform natural resource management policies. The process of treating symbolic representations of ecological discontinuities as if they were authentic reflections of reality represents a process of reification and may lead to inappropriate policy provisions with adverse local ecological and social consequences. This essay describes how the United States Department of Agriculture's Conservation Reserve Program takes the 100th meridian—a simplified representation of the ambiguous gradient between the non-arid East from the arid West—and hardens it into a concrete boundary where farmers follow different rules depending on what side of the boundary they reside.

Keywords Conservation Reserve Program, ecological boundaries, natural resource policy, one-hundredth meridian, reification

Driving from east to west through the Great Plains one notices a gradual change in aridity. In Oklahoma, for example, relatively moist forest and woodland environments transition into mixed-grass prairies before giving way to more arid, high-plains, short-grass environments. The 100th meridian has long stood as a geographic place holder for this zone of transition, marking the precise boundary between the non-arid East and arid West. Of course it is unreasonable to think that an unbending line passing through six states could accurately capture the uneven and convoluted shift from wet to dry. After all, the 100th meridian has only ever been a line of approximation, a by-product of society's need to understand the natural world and make "order out of chaos" by categorizing its elements through the construction of ecological classifications and boundaries (Latour 1993).

Yet the Conservation Reserve Program (CRP), which provides a framework for converting productive agricultural areas to temporary restorative land cover, takes

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this abstract boundary and inscribes it through policy provisions as materially authentic. This practice of treating cultural constructs, symbolic representations, and other abstract ideas as if they were reflections of reality represents a process of reification and can have significant material consequences. Depending on what side of the 100th meridian farmers enrolled in the CRP program live, they face different restrictions on how to conduct conservation efforts and manage agricultural resources.

Ecological boundaries are a complicated matter. They define the natural world spatially and yet defy any one, definitive attribute (Cadenasso et al. 2003). They may be long or short, sharp or gradual, thick or thin, and may mark high- or low-contrast transitions. In trying to classify these different boundary types, Strayer et al. (2003) outline a series of characteristics that help differentiate one boundary from another. As part of their study the authors make an important distinction between investigative and tangible boundaries. Investigative boundaries are essentially human constructs, arbitrary or approximated lines drawn on a map that serve a practical function for scientists and government agents attempting to interpret and understand landscapes. Tangible boundaries, on the other hand, are those that can be readily identified by scientists and managers in nature. When used to inform natural resource management policies, however, the distinction between investigative and tangible boundaries is often blurred if not completely erased.

The interplay between investigative and tangible boundaries within the policy arena is examined in an influential 2001 essay by geographer Paul Robbins. In his essay, Robbins investigates satellite images and aerial photographs used in government-led programs to categorize land cover types in Rajasthan, India. According to Robbins, a series of oversimplifications and abstractions during the data collection and interpretation phases led to mapped ecological boundaries that closely followed preconceived government conceptions of the region but were considerably different from the landscapes actually experienced by local residents. Turning predetermined, investigative bureaucratic representations of space into tangible, cartographic truths led to the implementation of management policies that obviated alternative spatialities and failed to serve the best interests of local communities (Pickles 1995; 2001). Robbins's paper and similar examples from North America (e.g., Porter 1995; Keil and Graham 1998; Norheim 2004) offer an important lesson for natural resource managers and policymakers alike: When institutions use investigative and representational ecological boundaries to inform natural resource management policies, they are reconstituted as tangible and authentic. Such measures may lead to provisions with adverse implications for nearby residents. This essay focuses on a particular ecological boundary, the 100th meridian, and describes the troubling way it influences policies and land management practices associated with the U.S. Department of Agriculture (USDA) Conservation Reserve Program.

The 100th meridian, like most other distinctive ecological features, carries immense cultural significance and is an artifact of a long history of ideas about the U.S. West and its climate, environment, and people. During different stages of U.S. history it has represented the separation of old from new, gentle from rugged, civilization from frontier, inhabited from uninhabited, and tamed from lawless, to name a few. In his influential *The Great Plains*, historian Prescott Webb describes the transformative power of the region as pioneers, settlers, businesses, and agencies moved through it.[1] Webb notes how "practically every institution that was carried across [the meridian] was either broken and remade or else greatly altered'' (1931, 8). Equally enduring has been the climatic significance of the boundary that John Wesley Powell famously recorded in his 1879 report to the U.S. Geographical Survey. While the broad and long-standing cultural and ecological significance assigned to the 100th meridian has been well documented, what remains less clear are the implications of the 100th meridian for individuals currently living alongside it.

The Conservation Reserve Program is one of many initiatives established in the 1985 Farm Bill emphasizing land conservation as a means of maintaining long-term agricultural productivity. The CRP gives farmers rental payments and cost-share assistance for safeguarding against the ecologically deleterious effects of intensive agriculture by letting a certain portion of their land lie fallow and regenerate for up to 15 years. The CRP is a voluntarily program that allows producers to convert highly erodible cropland and other sensitive acreage to native grasses, trees, and riparian buffers. Such action establishes wildlife habitat, enhances forest and wetland resources, improves air quality, and reduces sedimentation in streams and lakes. Most importantly for landholders, resource conserving vegetative cover can reduce topsoil loss to erosion. Numerous studies have examined the CRP and, to mixed reviews, its ability to bring about substantive ecological benefits (Dunn et al. 1993; King and Savidge 1995; Delisle and Savidge 1997; Ryan et al. 1998), increases in topsoil retention and quality (Staben et al. 1997; Robles and Burke 1998; Park and Egbert 2005), and positive outcomes for rural economies and individual farmers (Bangsund et al. 2004; Chang et al. 2008).

As CRP conservation periods expire, farmers enter into a breakout phase where they begin preparing the land for the next round of crop planting. The breakout phase typically involves removing restorative ground cover and initiating intensive soil tillage procedures that remove weeds, aerate soils, and break down organic matter in order to prepare productive seed and root beds. CRP rules declare May 1 as the breakout date for landholders west of the 100th meridian, and July 1 for landholders to the east. The earlier breakout date for ''arid'' farmers to the west is designed to help them retain soil moisture and prevent evaporation during the conversion and replanting process. As a result of early breakouts, farmers west of the 100th meridian experience a longer growing season and have the ability to cultivate early-season crop varieties. Both of these conditions provide competitive advantages for western farmers, many of whom can look across their fields at neighboring landholders waiting for up to 2 months to remove their conservation land cover. These implications are by no mean grave, and are unlikely to make or break a farmer's enterprise. Yet to focus on the severity of the consequences is to miss the larger point. What matters most here is that CRP policies are structured around the 100th meridian at all.

In effect then, Conservation Reserve Policies have taken the 100th meridian—a simplified representation of the not-so-simple gradient dividing the non-arid East from the arid West—and hardened it into a concrete and actively managed boundary where farmers follow different rules depending on what side of the boundary they reside. *Under the CRP, the 100th meridian has effectively transitioned from a socially constructed line, to a line actively constructing society.* This is the power, and indeed the problem, of reifiying ecological boundaries through natural resource policy.

As the distinction between arid and non-arid environments is constructed and conveniently ''locked in'' around the 100th meridian it is important to consider that descriptions and classifications of nature often reveal more about the describer than the described (Heidegger 1977). What does the use of the 100th meridian in the Conservation Reserve Program tell us about the USDA? Simply put, use of the 100th meridian has its benefits for government agencies by helping to make this climatic distinction manageable.[2] It is neat, straight, easy to map and simple to govern. Yet despite its advantages, agencies like the USDA must consider the material implications of policies that take fuzzy, representational, and symbolic boundaries and make them absolute, real, and pragmatic. For example, in this case, two farmers separated by only a few hundred yards may find they have different production capabilities and market opportunities because CRP rules preemptively determine one property to be arid and the other non-arid.

In order to account for geographical (and seasonal) variation and to minimize inequitable outcomes for certain farmers under CRP policy provisions, assessment of the region and its residents astride the 100th meridian will require more nuanced climate analysis. While high-resolution maps will be critical for refining precipitation analysis, the CRP may also do well to initiate alternative mapping exercises that involve local stakeholders (e.g., Peluso 1995; Harris and Weiner 1998). Participatory mapping approaches will democratize the CRP and enable enrolled landholders to actively contribute to the policymaking process by recording and sharing localized precipitation levels.

The move toward more fine-grained climatic analysis is already underway within the CRP. Program managers have adjusted their rules to account for greater diversity in rainfall across space by holding early breakout dates only for landholders living in areas west of the meridian receiving less than 25 inches of annual precipitation. This marks an improvement over previously simplistic binary determinations. Yet despite these changes, CRP rules remain stubbornly tied to the 100th meridian. For example, there is no early breakout allowance for areas east of the meridian with less than 25 inches of annual precipitation. Landholders in these areas must wait to convert their fields despite experiencing annual precipitation levels similar to early-breakout producers to the west. Ultimately, breakout allowances that most accurately reflect reality will only be achieved, as Oklahoma Representative Frank Lucas put it, if program managers "scrap the 100th Meridian as a factor in defining what is arid for early break out" (U.S. Congress, 1997) and instead use only localized precipitation levels to gauge aridity.

The Strayer et al. (2003) distinction between investigative and tangible ecological boundaries is extremely useful, yet it fails to capture how natural resource policies utilize, shape, and harden such boundaries. The case of the 100th meridian reminds us that investigative boundaries, intended only to assist the process of understanding ecological discontinuities, can become tangible boundaries through the complex and political process of reification. Reifying abstract or investigative boundaries can lead to provisions with potentially negative social and ecological consequences.

It is therefore important that researchers working in academic, government, and private sectors revisit preexisting ecological boundaries and interrogate their social origins and function within the policy realm. There are numerous examples to draw from. For example, many wilderness-area boundaries are circumscribed by reified ecological delineations. These boundaries, historically constructed out of a values system premised on notions of the untouched and pristine, have frequently failed to recognize prior human habitation and histories of productive labor (Denevan 1992; Cronon 1995; Braun 1997). As a consequence, such designations may warrant reexamination with a more critical eye toward how and where conservation efforts should be prioritized. Another notable case is the Exclusive Economic Zone, which designates a 200-nautical-mile buffer area giving coastal nations governing authority over potentially deleterious fishing, mining, and oil exploration activities. Because the original construction of these boundaries was influenced by approximated continental shelf areas and preexisting coastal security zones, the boundaries do not necessarily correspond with economically productive or ecologically sensitive areas (Churchill and Lowe 1988; Freestone et al. 2006). Numerous other examples exist, including growth management policies based on approximated urban–rural designations, proposed planning efforts constructed around ecoregional delineations (Bailey 1998; 2002), and governance frameworks organized around bioregional distinctions (McGinnis 1998; Duane 1999). Officials working in these policy arenas should carefully review how they may simplify complex ecological boundaries and legitimate them, through policy, as authentic and tangible.

The need for critical ecological boundary assessments will be even greater as new boundaries are created and used in policies as a consequence of emerging social and environmental conditions. For example, global climate change is leading to shifts in the geographic range and distribution of species and ecological communities, which will likely lead to the identification and management of new ecological boundaries (Hughes 2000; McCarty 2001; Walther et al. 2002). Increased urbanization and the industrialization of peripheral areas, especially in the developing world, are prompting land use and land cover changes that generate new landscape interfaces and boundary management opportunities (McDonnell and Pickett, 1990; Folke et al. 1997). These and other social and environmental changes should engender more vigilant oversight of how ecological boundaries are investigated and made tangible in the policy arena. Of course, such oversight will need to be flexible and rely on routine reassessments so as to account for dynamic landscape and global scale environmental changes.

Notes

1. In this case, Prescott Webb refers almost entirely to the 98th meridian, which he and others frequently view as the eastern boundary of the Great Plains. Using this longitude, Webb describes how "the distinguishing climatic characteristic to the Great Plains environment from the 98th meridian to the Pacific Slope is a deficiency in the most essential climatic element—water" (17). That two meridians (98th and 100th) are both used to represent the transition from non-arid to arid only further reinforces its highly subjective nature.
2. Ease of management has always been a priority for CRP managers. This explains why, in certain areas, the breakout line deviates from the 100th meridian to follow highways and other landforms that were used to structure policies such as the Great Plains Conservation Program. The boundary, where it does bend, only does so out of bureaucratic and administrative convenience.

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