

The Treadmill of Destruction: National Sacrifice Areas and Native Americans

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When examining environmental justice and injustice, surprisingly few studies have examined the experiences of Native Americans. In filling this gap, we criticize and build on environmental and political sociology. We make the case and provide evidence that the U.S. military pursues a pattern of environmental "bads" that cannot be reduced to capitalism and that coercive state policies can mold the spatial distribution of people relative to environmental dangers. Our contribution, then, is both theoretical and substantive. First, we recast the environmental sociology literature by specifying the scope conditions under which a "treadmill of production" and a "treadmill of destruction" are applicable. Specifically, we argue that a "treadmill of destruction" is driven by a distinct logic of geopolitics that cannot be reduced to capitalism. Second, we provide empirical evidence of the "treadmill of destruction" by examining the environmental inequality endured by Native Americans at the hands of the U.S. military. We have collected data on a large number of military bases that have been closed but remain dangerous due to unexploded ordnance. We provide evidence that Native American lands tend to be located in the same county as such hazardous sites. In the twentieth century, the United States fought and won two global wars and prevailed in a sustained Cold War. The geopolitical demands of remaining the world's leading military power pushed the United States to produce, test, and deploy weapons of unprecedented toxicity. Native Americans have been left exposed to the dangers of this toxic legacy.

Despite studies indicating that the environmental risks borne by Native Americans are startling, the extant sociological literature on environmental inequality and Native Americans is limited. Grinde and Johansen (1995) characterize current dynamics as the "ecocide of Native America"; Kuletz (2001) refers to state-sanctioned environmental violence as "nuclear colonialism"; Churchill (2002) and LaDuke (1999) describe a "struggle for the land" (see

also Bullard 1994; Gedicks 1993; Small 1994; Sachs 1996; The Akwesasne Task Force on the Environmental Research Advisory Committee 1997; Marshall 1996; Roberts and Toffolon-Weiss 2001). Nevertheless, these compelling case studies of environmental injustice are poorly integrated into the larger environmental justice literature that emphasizes class and race dynamics in urban areas (see Szasz and Meuser

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1997; Mohai and Bryant 1992; Lester, Allen, and Hill 2001; Liu 2001).

Our study helps to fill the gaps in our understanding of the environmental risks facing Native Americans. To do so, we criticize and build on two valuable literatures: environmental sociology and political sociology. The “treadmill of production”—one of the most important concepts to emerge from environmental sociology over the past quarter century (Schnaiberg 1980; Schnaiberg and Gould 1994)—emphasizes the role of capitalism and its inherent tendency to expand. The consequences of this inexorable expansion are the voracious consumption of natural resources and the attendant deposition of toxic waste. When concentrating on environmental inequality and residency (as is our focus), research has examined the degree to which class inequality and racist housing policies force the poor and minorities to live in close proximity to toxic places.

We argue that the “treadmill of production” is not applicable in all instances of environmental inequality. We are *not* suggesting that it is incorrect to examine the role of capitalism and housing markets when studying environmental inequality, rather we identify scope conditions under which these processes are central. Our focus is on the unique experiences of Native Americans, and we develop an explanation that specifies alternative mechanisms through which environmental “bads” and people are distributed. Since Native Americans did not “choose” the location of reservations in the context of markets, and since many of the toxic wastes are generated by the military (not private firms), we assert that the environmental inequality suffered by Native Americans is more precisely the product of a “treadmill of destruction.” Our contribution, then, is both theoretical and substantive. First, we recast the environmental soci-

ology literature by specifying the scope conditions under which a “treadmill of production” and a “treadmill of destruction” are applicable. Second, we provide empirical evidence of the “treadmill of destruction” by examining the environmental inequality endured by Native Americans at the hands of the U.S. military.

TREADMILLS OF PRODUCTION AND DESTRUCTION

Table 1 distinguishes between two major forces that mold residential location: the market and the polity. Likewise, there are two major processes through which environmental “bads” are generated and distributed: capitalism and militarism. The ensuing discussion elaborates each cell in Table 1, beginning with the “treadmill of production” where toxins are generated by private firms in a capitalist economy and where people select residency in the context of a market. In turn, we discuss the cells labeled “military-industrial complex” and “coercive polity,” using the “treadmill of production” as a point of reference. Finally, we identify the specific features of the “treadmill of destruction.”

TREADMILL OF PRODUCTION

The “treadmill of production” frames much of the debate in environmental sociology, including attempts to understand environmental inequality (Schnaiberg 1980; Schnaiberg and Gould 1994). This term is not only rhetorically powerful, but it also captures a fundamental dynamic of capitalism. The treadmill of production identifies an “economic growth coalition” including business, labor, and government. This coalition promotes economic expansion that results in undesirable environmental outcomes: natural resource withdrawals and waste

Table 1. Treadmills of Production and Destruction: The Scope Conditions for Understanding the Distribution of Environmental Inequality

	<i>Production of Environmental “Bads”</i>	
<i>Spatial Distribution of People Relative to Environmental “Bads”</i>	Capitalism/commercial	Militarism/geopolitical
Market (choice as constrained by ability to purchase)	Treadmill of production	Military-industrial complex
Polity (coercion prominent, often on basis of race or ethnicity)	Coercive polity	Treadmill of destruction

additions. Often, the entire community faces exposure to these dangers. Due to institutional racism and class inequality, however, some residents face disproportionate risk; "the most vulnerable groups [are] the poor, unskilled laborers, and the skilled blue-collar" residents (Gould, Schnaiberg, and Weinberg 1996:13). Individual choices, as expressed and constrained in the context of a housing market, result in the uneven distribution of people relative to environmental dangers. There are several sorting mechanisms through which the residential market is thought to operate; mainly it is suggested that race, class, or some combination of the two are the driving forces in residential discrimination (Massey and Denton 1993; Oliver and Shapiro 1995; Conley 1999). Through these processes racial minorities and poor people are more likely to live in proximity to environmental dangers.

The treadmill of production provides valuable insights where environmental hazards are the result of capitalist production and the unequal exposure to these dangers is a function of housing markets. In their research into the Silicon Valley, Szasz and Meuser (1997, 2000) make compelling use of this framework. Similarly, Pellow (2002) makes good use of the treadmill of production framework in an examination of recycling in Chicago: he demonstrates that even the least privileged residents exercise a measure of agency with regard to working and living near dangerous facilities. We call attention to the value of recent research in this tradition to clarify our intent and our contribution. We are not challenging the value of the treadmill of production *per se*; rather we are identifying the scope conditions under which its value is highest.

COERCIVE POLITY

Using the treadmill of production as a point of comparison, the environmental inequality generated by a coercive polity is similar in that capitalism generates environmental hazards but differs in that coercive (and often racist) state policies constrain residential choice. Consider apartheid: the South African state deliberately and systematically "located black communities 'downwind and downstream' of polluting industries and poorly managed waste landfill sites" (Hallowes and Butler 2002:71). Environmental inequality in the United States also displays the

imprint of the nation's racist history. Roberts and Toffolon-Weiss (2001) document the centrality of slavery and segregation in shaping environmental inequality in contemporary Louisiana. Antebellum plantations situated slave quarters adjacent to the plantation. In the twentieth century, sharecropping arrangements enforced by a racist state trapped blacks on these same lands. When Louisiana lured industrial firms to the Mississippi Delta, these firms were attracted to the former plantation lands because it was easier to negotiate with a single landowner. From New Orleans to Baton Rouge—a region known as the "chemical corridor" (Roberts and Toffolon-Weiss 2001:3)—large petrochemical factories dump dangerous chemicals into the air, water, and ground. Most of these factories are located on former plantation lands and are surrounded by traditionally black villages and hamlets. Blacks are now legally "free" to move away, but this freedom is undermined by concentrated poverty that is a direct result of slavery and segregation.

In the debate over persistent residential segregation, Wilson (1978) emphasizes the nation's racist past and not contemporary racism. Sharp inequalities in wealth (especially equity in primary residence) place minorities at a distinct disadvantage in housing markets (Oliver and Shapiro 1995). African Americans with sufficient economic resources are now free to select where they live; yet the observed racial and ethnic segregation is perpetuated by close correspondence between class inequalities and race/ethnicity. Alternatively, Massey and Denton (1993) emphasize the role played by state policies and the state's acceptance of institutionalized racism in the real estate and banking sectors. To the extent that residential choices are primarily a function of class processes, then attendant environmental inequality conforms to the "treadmill of production" processes discussed earlier. Where state-led racism plays the more prominent role, the study of environmental inequality must attend to these racist policies. Although racist policies have figured most prominently in this discussion, it is possible that coercive state policies influence residency on the basis of criteria other than race/ethnicity.

Table 2. Descriptive Statistics and Data Sources

Variable	Unit	Mean	SD	Data Source
Dependent Measures: Count of Formerly Used Defense Sites (FUDS) and their Environmental Danger				
Count of sites with unexploded ordnance rated <i>extremely dangerous</i>	Count	0.13	0.74	USACE ^a
Count of sites considered <i>less dangerous</i>	Count	1.95	7.00	USACE ^a
Independent Measures: Native American Lands and Control Variables				
Acres of Native American land	Acres, natural log	0.99	3.06	USDOI, 1997
Total area, 1940	Acres, natural log	6.49	0.89	USDOC, 1981
Total population, 1940 (natural log)	Natural log	4.59	2.35	USDOC, 1981
Farm population	Percentage of total	0.98	3.05	USDOC, 1981
Founding or Expansion of Military Bases (count)				
Pre-Civil War (1776–1850)	Count	0.05	0.57	USGSA, 1983
Civil War era (1851–1875)	Count	0.03	0.43	USGSA, 1983
Late 19th Century (1876–1900)	Count	0.04	0.49	USGSA, 1983
World War I era (1901–1925)	Count	0.18	1.48	USGSA, 1983
World War II era (1926–1950)	Count	0.89	3.79	USGSA, 1983
Cold War era (1951–1975)	Count	1.36	4.25	USGSA, 1983

SD = standard deviation; USACE = United States Army Corps of Engineers; USDOC = United States Department of Commerce; USDOI = United States Department of the Interior; USGSA = United States General Services Administration.

^a Report was prepared for the authors.

MILITARY-INDUSTRIAL COMPLEX

The environmental inequality generated by the military-industrial complex differs from the treadmill of production with regard to the processes that generate environmental hazards. This distinction is important because geopolitics cannot be reduced to domestic dynamics and structures (Giddens 1985; Hooks and McLauchlan 1992; Mann 1986; Shaw 1988). Firms often profit from war (sometimes scandalously so) and, in some instances, states wage war to protect commercial interests. Nevertheless, as Mann (1988) points out, states—not firms and not classes—declare and wage wars; and states do so to accomplish geopolitical objectives. Tilly (1990) refers to a process of “negotiated accommodation” to capture the give and take between the state and prominent economic institutions and actors. The United States offers a case in which the state secured the resources to pursue geopolitical objectives in exchange for a generous accommodation of prominent firms (Friedberg 1992; Hooks and Luchansky 1996).

The expansionary dynamic of capitalism is the explanatory mechanism at the heart of the treadmill of production; arms races and geopolitical competition among states play a compa-

table role when considering the environmental danger posed by militarism. Coming from very different theoretical backgrounds, E. P. Thompson ([1980] 1982), Martin Shaw (1988), Gabriel Kolko (1994), and Michael Mann (1988) each point to the distinctive spiral of arms races and military mobilizations. From 1800 to 1950, in the United States and other nations, there was an exponential growth in the size of armed forces (expressed in absolute size and as share of total population) and a deliberate inducement of technological innovation designed to enhance the lethality of weapons (Shaw 1988; Van Creveld 1989).

Geopolitics influences the location of U.S. military facilities, but this influence typically stops at the gates of the factory, shipyard, airfield, or military base. That is, national security concerns are rarely extended to displace the functioning of housing markets in the residential areas around defense facilities. Although the dynamics that generate environmental “bads” within the military-industrial complex are distinct, the processes that place some individuals at disproportionate risk are often similar to those created by the treadmill of production.

TREADMILL OF DESTRUCTION

The term "treadmill of destruction" reflects our debt to the treadmill of production for drawing attention to expansionary dynamics that result in the creation and deposition of toxins in the environment. As with the treadmill of production, there exist latent and negative social and environmental consequences. Nevertheless, the treadmills of production and destruction differ in their distinct, underlying logics. For the treadmill of production, economic competition (quest for profitability and market share) explains the acceleration of the human influence on the environment. Arms races and geopolitical competition drive the escalating environmental impact of militarism. Table 1 (shown earlier) makes distinctions based on both the origins of environmental dangers and the processes through which residential location is determined. That is, the treadmill of destruction is distinct not only because environmental dangers are the result of militarism, but also because coercion (rather than choices made in the context of a housing market) determines who resides closest to these dangerous sites. In the United States, the experiences of Native Americans are consistent with the treadmill of destruction in both respects: that is, militarism generated the environmental dangers, and coercion dictated the location of reservations. Political sociology emphasizes the state's geopolitical activities, and can inform the study of environmental justice. Ironically, in an effort to show that militarism is not derivative of capitalism, political sociologists have emphasized positive-sum dynamics and have downplayed the manifest destructiveness of war (see Hooks and Rice forthcoming). Wars continue to be destructive—the wars of the twentieth century have been unprecedented in their ferocity and lethality (Tilly 1990). For this reason, political sociology must examine the destructiveness of war and the unevenness of "sacrifices" for national security.

In the preceding paragraphs, we developed a framework that distinguishes among four types of environmental inequality depending on the processes generating environmental dangers and residential choice. Although the process of the treadmill of destruction is analogous to the treadmill of production in terms of its expansionary tendency, the underlying logic is distinct. Likewise, the location of toxic sites created by the treadmill of destruction, as is the case with

the military-industrial complex, is driven by geopolitical concerns. In contrast to the military-industrial complex, those living in proximity to toxic sites do not choose their place of residence in housing markets.

THE SACRIFICE OF NATIVE AMERICAN LANDS

Some Indian lands have suffered such severe and prolonged environmental degradation that it is beyond current technology to make them safe for human use. Brook (1998) characterizes the military damage to Indian lands as part of an "environmental genocide." Once a locale has been seriously degraded, it often attracts additional pollution (Marshall 1996). Reflecting their permanent degradation and their purported contribution to the collective good, these areas are referred to as "national sacrifice areas" (Kuletz 1998) or "human sacrifice zones" (Bullard 1993). The preceding discussion made conceptual distinctions based on the sources of toxins and the processes through which people come to reside in proximity to them. We assert that because reservations were forced upon Native Americans and because military activities pose the gravest danger to them, the experiences of Native Americans are best understood in terms of the treadmill of destruction. In the ensuing paragraphs we provide justification for this assertion and a historical context for the quantitative analyses that follow. We anticipate finding that the military systematically used and damaged Native American lands. Our research hypothesis is shared by the Department of Defense:

In order to ensure that it meets its national security mission, DoD operates and trains on vast amounts of land, including American Indian and Alaska Native lands. Evidence of DoD's past use of these lands remains: hazardous materials, unexploded ordnance (UXO), abandoned equipment, unsafe buildings, and debris. This contamination degrades the natural environment and threatens tribal economic, social and cultural welfare. (U.S. Department of Defense 2001)

The propinquity of military installations to Indian lands is the result of racism and state-building. That is, over the course of the nineteenth century, through a process that would be referred to as ethnic cleansing in contemporary debates, the United States forced nearly all

Native Americans onto reservations located in western states. In the twentieth century the United States became the world's leading military power. In doing so, it built a vast military complex in the same western states in which Native Americans were concentrated.

NINETEENTH-CENTURY RACISM: INDIAN REMOVAL, INDIAN WARS, AND RESERVATIONS

A pervasive irony of nineteenth-century U.S. history—an irony that was noted and condemned by Alexis de Tocqueville—was that the defense of democracy for those included (white males) came at the expense of those excluded from the polity (Satz 1991:34; see also Markoff 1996:57–59). Native Americans were emphatically excluded. In the early nineteenth century, the federal government and settlers placed mounting pressure on Native Americans residing east of the Mississippi River. With the passage of the Indian Removal Act (1830), these tensions took the form of ethnic cleansing. That is, Native Americans were removed from their indigenous homelands and forced to reside in western territories. The seminal event in this process was breaking an established treaty with the Cherokee Nation (concentrated in Georgia and North Carolina) and forcing this nation to move to Oklahoma (Wilkins 1986). The resulting “Trail of Tears” was calamitous for the Cherokee people; but such calamity was not unique to the Cherokee. As of 1850, Native Americans had effectively been “removed” from all states east of the Mississippi River.

By 1850, the Federal Government “owned” virtually all the land west of the Mississippi River. This ownership was based on the Louisiana Purchase and those terms imposed on Mexico at the end of the Mexican-American War (Coggins and Wilkinson 1981). Effective control over these lands was realized through a series of Indian Wars that forced western tribes onto reservations on lands chosen by the United States. The United States donated and sold off the lands in its possession to promote the settlement and development of the West. In this manner, railroads were awarded vast tracts of land, both as a right of way for the railroad itself and to subsidize the costs of building and maintaining the railroad. The federal government also sold off lands to white settlers, land developers, and mining interests. Despite these

trends, the federal government still owned one-third of all land in the United States in the twentieth century. “Because of the historical pattern of national disposition, the remaining federal lands have relatively less economic potential than the other two-thirds of the United States land area. The public lands tend to be relatively arid and infertile, high in elevation, low in population, and remote from major transportation systems” (Coggins and Wilkinson 1981:1). In effect, the federal government retained possession of the lands that were least desirable to white Americans. Federally owned and Native American lands tended to be in close proximity, and they had a great deal in common: they were concentrated in the states west of the Mississippi, and they tended to be lands that were too dry, remote, or barren to attract the attention of settlers and corporations (Coggins and Wilkinson 1981).

TWENTIETH-CENTURY STATE-BUILDING: THE RISE OF THE PENTAGON

In the twentieth century, military claims on economic and natural resources grew exponentially, as did the lands that were damaged by military activities (Jacob 1992; Shulman 1992). As it fought two global wars, the United States built and maintained a military force of unmatched potency. The expanse of lands controlled by the military grew dramatically, as did the destructiveness of materials stored and deployed on them.

As of 1916, the U.S. army owned approximately 1.5 million acres. Land ownership grew by 33 percent (an additional 0.5 million acres) in the course of the World War I mobilization. As of 1940, the army owned approximately 2 million acres. The scale of the World War II mobilization was unprecedented; the army (including the army air force) acquired 8 million additional acres, thereby quintupling land ownership. Military agencies were given nearly unlimited spending authority to acquire land from private owners and had the option of foreclosing on lands deemed essential to national security. Although the military's spending authority was impressive, it played only a modest role in the World War II land acquisition. “[M]ost of the new acreage cost the army practically nothing. More than 6 million acres, over three-quarters of all the land required, came

from the public domain" (Fine and Remington 1972:175). Securing the transfer of federally owned lands had the advantage of being quick and definitive. Sales (whether forced or negotiated with willing partners) imposed delays under the best of circumstances, and might take a much longer time or even be reversed through litigation.

The federal lands acquired in the course of World War II were in the same western states in which Native American reservations were concentrated. More precisely, the lands remaining in possession of the federal government in 1940 were the more remote, most arid, and least desirable lands from the vantage point of white Americans. The lands set aside for Native Americans shared these traits—and in many cases federal lands and reservations were contiguous. For example, in 1940, President Roosevelt created, with the stroke of his pen, the single largest gunnery range in the world: the 3.5-million-acre Nellis Range (Loomis 1993). After World War II, this bombing range would be absorbed into the nuclear weapons complex concentrated in Nevada, which has been described as the single largest "peacetime militarized zone on earth" (Kuletz 1998:38–39). The impact of these facilities upon Native Americans is not inconsequential because the Western Shoshone and Southern Paiute claim these lands both as a traditional homeland and as religious grounds. In the words of one military officer, the Nevada desert was an ideal choice for a bombing range because the land "really wasn't much good for anything but gunnery practice—you could bomb it into oblivion and never notice the difference" (quoted in Kuletz 2001:251).

It is not simply the case that the military's newly acquired lands were frequently adjacent to reservations, the large expanse of lands and relatively low population densities made it likely that dangerous activities and toxic materials would be concentrated there. In part, this was a function of technological development and arms races. The conventional weapons employed during World War II were far more potent than in earlier wars, and these munitions were produced, tested, and deployed at an unprecedented rate. Moreover, World War II witnessed the maturation of chemical warfare and the birth of nuclear weapons—weapons programs that would leave an enormous and enduring envi-

ronmental scar on the land.¹ As of 1940, the army's Chemical Warfare Service did all of its testing at Edgewood Arsenal (New Jersey) and Aberdeen Proving Ground (Maryland). However, these facilities were "overcrowded, close to thickly populated areas, and too small to permit large-scale assessment of toxic agents" (Brophy, Miles, and Cochrane 1959:38). Consider this account of the origins and use of Dugway Proving Grounds, a facility located in "the desert wasteland of Utah" and adjacent to Indian lands.

Dugway Proving Ground became the major installation for the field-testing, proof firing, and surveillance of chemical agents and munitions under temperate zone conditions. Here researchers carried out airplane spray tests, of unthickened and thickened mustard at various altitudes to develop the technique of air-spraying. . . . Planes dropped incendiaries on facsimile German and Japanese buildings to learn what happened when bombs of certain types struck enemy structures. They also dropped phosgene, cyanogens chloride, and hydrogen cyanide bombs . . . to estimate the quantity of munitions required to lay down a lethal concentration of gas on a given area. (Brophy et al. 1959:39)

The relationship between dangerous military activities and its impacts upon Native American populations that were revealed in the nuclear age, however, have their foundation in earlier collisions between the military and Native Americans. The fate of the Lakota Sioux captures the stark relationship between the ethnic violence of the nineteenth century and the technocratic rise of the Pentagon in the twentieth century. The Massacre at Wounded Knee was the last massacre on the Western frontier. On December 29, 1890, over 300 Native American

¹ Like the Department of Defense, the Department of Energy (DOE) has the dual task of both producing nuclear weapons and maintaining the public safety and the environmental protection against harms that might stem from that production process. Perhaps the most egregious instance of the DoE shirking its duties with regard to environmental regulation occurred at the Hanford Nuclear Site in Washington State. It is estimated that the production and storage of nuclear materials at the site since it opened in 1944 has resulted in exposure levels to those living in the area equivalent to those of the Chernobyl disaster (Geiger and Harrah 1993).

people—most unarmed women and children—were slaughtered by the U.S. military (Brown 1970; DeMallie 1991). Their “offense” was participation in a Ghost Dance ritual—a ritual that held out the hope of an Indian resurgence, a ritual that frightened white settlers and soldiers. Fifty years after this massacre, the Sioux once again confronted the power of the U.S. military: “the U.S. government seized approximately 342,000 acres of the Pine Ridge Reservation in South Dakota for a bombing range to train WWII pilots. The land seizure forced 125 Oglala Sioux families to sell their farms and ranches for three cents an acre” (Featherman-Sam, quoted in Gaddy 1997). This proved to be an exceptionally dangerous bombing range. In fact, after the bombing range was decommissioned, cleanup was long delayed because “the large number of unexploded ordnance there” made these lands too dangerous for cleanup crews to work (Gaddy 1997; see also Bartimus and McCartney 1991; Churchill 2002).²

The history of nineteenth-century racism against Native Americans combined with the twentieth century rise of the Pentagon provides insights into the context of the treadmill of destruction. In the sections to follow we address two separate yet equally important questions raised by the intersection of this historical record. First, is there empirical evidence that Native Americans are systematically more likely to reside near military facilities? We predict that Native Americans are more likely to be located near such facilities, and thus we argue that this is evidence of a treadmill of destruction. Second, the two histories raise significant questions concerning intent: is the location of Native Americans near to military facilities the result of direct racism, as might be associated with the nineteenth-century and early-twentieth-century history, or is this development an indirect consequence of the rise of the Pentagon in the latter half of the twentieth century? To address this question, we examine policies toward Native Americans at the time that military base were expanded.

DATA AND METHODS

Unexploded ordnance is found when land has been used for artillery and bombing ranges and for military exercises using live ammunition. We concentrate on unexploded ordnance because individuals residing near them are likely to find these materials to be dangerous and noxious. In the words of Representative Blumenauer, unexploded ordnance includes the following:

... mines, nerve gases, toxics and explosive shells. It has claimed at least 65 lives, and has maimed and injured many more. Sadly, it continues every day, and if we are not careful, it will continue for another thousand years. ... [Unexploded] ordnances on formerly used defense installations probably contaminates 20 to 25 million acres in the United States, and the number could be as high as 50 million acres. Sadly, no one can give us an accurate appraisal of the problem. What we do know is at the current rate of spending, it will take centuries, maybe even a thousand years or more, to return this land to safe and productive use. Some may be so damaged, we may not attempt to clean it up. (Blumenauer 2001)

Without imposing current environmental concerns on stakeholders acting decades ago, it is reasonable to assume that noise from explosions and the immediate physical danger of live ammunition would make these military installations unattractive, even if nearby residents did not fully anticipate the long-term dangers posed by unexploded ordnance (see also Jacob 1992; Renner 1991; Shulman 1992; Siegel, Cohen, and Goldman 1991).

Quantitative analyses have demonstrated that the poor as well as racial and ethnic minorities experience a disproportionate exposure to toxic materials (for a review of this literature see Szasz and Meuser 1997; Mohai and Bryant 1992). The extant literature tends to focus on urban areas and the minority populations concentrated in them. As a consequence, we were unable to identify any studies of environmental justice providing a comprehensive examination of Native American lands and the danger posed by military installations. Due to national security restrictions, it is difficult to gain full information about military bases that are open and functioning. Full disclosure is required, however, for closed bases that are being returned to civilian use. Beginning in the 1980s and accelerating in the 1990s, the United States had closed hundreds of military bases (these bases are

² Access to information about individual tribes and installations may be found in a database maintained by the Department of Defense (2002a), available online (<https://naets.usace.army.mil/web/tribe/tribe.cfm>).

referred to as Formerly Used Defense Sites, hereafter FUDS). The Army Corps of Engineers, the agency charged with preparing them for civilian use, made available to us comprehensive data on each facility, including the environmental dangers they pose. The Army Corps of Engineers also generated a report on the proximity of Native American lands to each FUDS installation.³

Because many military bases and a large portion of Native American lands are located in rural areas, our unit of analysis must be one that allows investigation of both metropolitan and nonmetropolitan areas. As is the case with many prominent studies of regional processes, this study uses data for the approximately 3100 counties in the contiguous 48 states (Hooks and Bloomquist 1992; Lobao 1990; Lobao, Rulli, and Brown 1999; Tolbert, Lyson, and Irwin 1998). Counties provide comprehensive national coverage, spanning both metropolitan and non-metropolitan populations. They offer advantages for comparative, cross-time analyses, because their boundaries, unlike cities and labor markets, are highly stable. Further, counties are smaller than states, they are less likely to obscure within-area differences and the resulting loss of information.

DEPENDENT MEASURES

Based on reports provided by the Army Corps of Engineers and utilizing the county as the unit of analysis, we develop two dependent measures: (1) the count of sites with unexploded ordnance deemed to be extremely dangerous, and (2) the count of sites thought to pose little or no danger. Because the highly skewed distribution of count data violates the assumptions of ordinary least squares, we employ negative binomial regression (Allison 1999; Long and Freese 2001). To determine the dangerousness of sites with unexploded ordnance, we make use of the *risk assessment code* (RAC)—assigned by Army Corp of Engineer investigators. The RAC score is based on two factors: hazard severity and hazard probability. The “hazard severity” assessment is based on the types and

quantities of materials and the inspector’s assessment of the “worst credible event” that could occur (U.S. Army Corps of Engineers 2000:B-1):

Catastrophic: The worst-case scenario is possible if significant quantities of nuclear, chemical, or biological ordnance are found.

Critical: Small quantities of nuclear, chemical, and biological ordnance or large quantities of high-powered conventional ordnance are likely to yield a hazard severity score in this range.

Marginal: Materials that might yield this assessment include practice grenades and landmines, flares, and other materials that pose an intermediate danger.

Negligible: This rating is given if only less volatile explosives (e.g., small arms ammunition) are found.

None: This rating is assigned only if none of the aforementioned materials are found (U.S. Army Corps of Engineers 2000: Appendix B).

The RAC score also assesses the probability that a hazard will harm people or ecosystems. The hazard probability estimate is sensitive to the proximity of public buildings such as schools and hospitals (U.S. Army Corps of Engineers 2000: Appendix B). These considerations often result in an understatement of the dangers on and near Native American lands: “DoD’s cleanup programs embrace a relative framework . . . and often do not consider tribal-unique factors, such as subsistence consumption, ceremonial use of certain plants and animals, and the low population densities that exist on many reservations. As a consequence, DoD sites on Indian lands often receive low relative-risk scores, which means that cleanup at these sites may be deferred for many years” (U.S. Department of Defense 2001). As such, our data do *not* exaggerate the dangers confronting Native Americans. If anything, these data understate them.

Inspectors combine information on the hazard severity and hazard probability to generate a RAC score (from 1 to 5). This score determines the priority given to environmental containment and restoration. A score of 1 calls on the U.S. Government to “expedite” the intervention to avoid a looming catastrophe. Scores

³ We are grateful to the Army Corps of Engineers, especially to Grady May, for cooperation and assistance that went beyond the letter of the law.

of 2 and 3 maintain a sense of urgency and call upon the U.S. Government to take steps to control and remediate the site. A RAC score of 4 indicates that remediation is required, but the sense of urgency is diminished relative to lower scores; a RAC score of 5 indicates that no further action is needed (U.S. Army Corps of Engineers 2000: B-8).⁴ To create a *count of sites with unexploded ordnance deemed extremely dangerous*, we summed the total number of sites with a RAC score of 3 or less. The Army Corps of Engineers expedites assessments for those sites thought to pose an immediate danger; given limitations of time and staffing, there is often a lengthy delay in completing an assessment at less dangerous sites. On the assumption that those sites for which the RAC assessment remains incomplete are among the least dangerous, we included them when developing a *count of sites thought to be less dangerous* (i.e., we summed the count of sites with a RAC score of 4 or 5 and those sites for which an assessment has been initiated but remains incomplete).

NATIVE AMERICAN LANDS

For each county, we developed a measure of the *acres owned by Native American tribes* (U.S. Department of the Interior 1997). Native Americans control land in 332 counties, ranging from four acres to nearly five million acres. To avoid heteroskedasticity, we employed the natural log of acres owned by Native Americans.

CONTROL VARIABLES

We used several variables to control for other factors that may influence the location of unexploded ordnance: the number of military installations created during several historical periods (pre-Civil War [1776–1850], Civil War era [1851–1875], late-eighteenth century

[1876–1900], World War I era [1901–1925], World War II era [1926–1950], and Cold War era [1951–1975]), as well as *total population in 1940* (natural log), *farm population in 1940* (percentage), and *total area in 1940* (square miles, natural log).

Past research suggests that the factors emphasized by the dominant sociological traditions (social ecology and critical approaches in the Marxist and Weberian tradition) provide only a poor account of the location of military facilities (Hooks 1994b). Instead, military installations have been located according to the strategic and logistic requirements identified by defense planners (Markusen, Hall, Campbell, and Deitrick 1991). As such, we have identified where military facilities were built over the course of U.S. history. We expect to find that the most dangerous unexploded ordnance is found at military installations established during the twentieth century. The ordnance materials of the twentieth century represent both qualitatively more dangerous and quantitatively more prevalent weaponry than in previous eras. In the course of mobilizing for World War I, World War II, and the Cold War, the United States produced vast quantities of highly potent conventional weapons. Moreover, the United States has led the world in the production of esoteric and extraordinarily toxic nuclear, biological, and chemical weapons (i.e., weapons of mass destruction). Specific facilities have been charged with storing and testing this extremely lethal ordnance; it is likely that a portion of this ordnance remained when the base was decommissioned.

We expect to find that total population and total area are positively associated with the presence of unexploded ordnance. In many instances, facilities responsible for the storage and transportation of ordnance were located in urban centers — *total population* allows us to control for this tendency. In some cases, facilities located in urban areas manufactured ordnance and related goods, in other cases these facilities were part of military installations (shipyards and arsenals) that stored ordnance. Because a large quantity of ordnance passed through facilities located in the more populated counties, it is likely that some ordnance materials would remain after these facilities were closed. We anticipate finding that the *total area* in a county is positively associated with the

⁴ Even a site assigned a RAC score indicating little danger (i.e., a score of 5) was not guaranteed to be safe. For instance, when we asked an Army Corps of Engineers contact if he would drive a bulldozer over a site at which unexploded ordnance had been found but it was now thought to pose little danger, his answer was an emphatic no. He went on to relate incidents in which children were killed and maimed when playing on such sites.

presence of unexploded ordnance. In part, large counties have more space and are therefore at greater risk. But it is also the case that larger counties tend to be in western states and often have a low population density—both characteristics of areas that attracted a disproportionate share of military base expansion. We include *farm population* (percentage) to identify counties in which agricultural production is important. Farmers and their elected representatives can mount effective resistance to displacement for military purposes. As noted earlier, rural areas unfit for agriculture are seen to be not “much good for anything but gunnery practice” (quoted in Kuletz 2001:251). Thus, agricultural land reduces the likelihood of a military base (and unexploded ordnance) being located in a county because the U.S. military is less likely to select such an area and because local resistance to such land-use is likely to be higher.

The placement of a military facility in a county is influenced by the larger region in which it is located. We employed the Bureau of Economic Analysis (BEA) economic area to control for this larger context. *BEA economic areas* are clusters of counties: “Each area [encompasses] the place-of-work and place-of-residence of its labor force” (U.S. Department of Commerce 1977:1). That is, based on com-

muting and trade patterns, the Department of Commerce identifies the metropolitan counties and surrounding hinterland of regions. The department has identified 181 economic areas in the 48 contiguous states. The nesting of counties in larger areas creates a data set that is unbalanced due to different numbers of counties within each area (Nielsen and Alderson 1997). This variability in the data introduces potential heterogeneity bias, where unmeasured variables that are county-invariant within a state may bias the effects of covariates of interest. We follow Lobao et al. (1999) in modeling the area-specific intercepts as fixed effects, by inclusion of 180 economic areas (given a total of 181).

RESULTS

Table 3 presents analyses of the association between unexploded ordnance and Native American lands. This table presents models for two dependent measures: the count of extremely dangerous sites and the count of sites deemed less dangerous.

For the most part, control variables played a similar role in both estimations: farm population (negative) and the founding of bases during World War II and the Cold War (positive)

Table 3. Determinants of Count of Sites with Unexploded Ordnance

Independent Measures and Control Variables	Count of Sites with Unexploded Ordnance			
	Extremely Dangerous Sites		Less Dangerous Sites	
	Coefficient	(SD)	Coefficient	(SD)
Acres of Native American land (natural log)	.06**	(.03)	-.00	(.01)
Total area, 1940 (natural log)	.08	(.10)	.33***	(.04)
Total population, 1940 (natural log)	.04	(.08)	.32***	(.04)
Founding of military bases (count)				
Pre-Civil War (1776–1850)	-.04	(.09)	.04	(.03)
Civil War era (1851–1875)	.06	(.08)	.02	(.04)
Late 19th Century (1876–1900)	-.07	(.09)	-.03	(.04)
World War I era (1901–1925)	.04	(.03)	.04	(.02)
World War II era (1926–1950)	.05**	(.02)	.06	(.01)
Post-World War II era (1951–1975)	.04**	(.02)	.04	(.01)
Farm population (percentage of total)	-.03***	(.00)	-.02	(.00)
Pseudo r ²	0.26		.21	

Note: Data show negative binomial regression of 3,130 counties in the contiguous 48 states. To control for the spatial context, dummy variables for 180 of the 181 Bureau of Economic Analysis (BEA) economic areas included in these analyses are also included in this estimation. The Army Corps of Engineers inspected and assigned a rating (see text) to each site at which unexploded ordnance was found. The most dangerous sites are those that are assigned the three highest ratings, indicating that the sites pose an immediate danger.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

played a significant role. Total population and total area achieved statistical significance (positive) in the estimation of the less dangerous sites but not extremely dangerous sites. We did not find a statistically significant relationship between Native American lands and the count of less dangerous sites. However, net of control variables, Native American lands are positively associated with the count of extremely dangerous sites. The more acres owned by Native Americans, the greater the number of sites.

The reader is cautioned that six counties are excluded from Table 3 because the estimation failed to converge when they were included. These six counties differed from the 3,130 included in the analysis in a number of respects, including the number of sites for which the Army Corps of Engineers provides no information. Recall that the Army Corps of Engineers reports on sites for which assessments have been initiated but are not yet completed, and these sites are included in the count of the less dangerous sites (see earlier explanation). Over and above these sites for which the assessment is incomplete, there are a number of sites for which no information is available. The six excluded counties reported an extraordinarily large number of sites with missing assessment data (greater than 8 standard deviations above the mean). These counties are located in two states: California (Imperial, Los Angeles, San Bernardino, and San Diego), and New Mexico (Chaves and Luna). They are (on average) geographically larger, have a larger population, and a smaller portion of their respective populations are farmers. In addition, these six counties are home to both far *more* military installations and are more likely to contain Native American lands (three of the six counties compared to 11 percent of the other 3,130 counties).

Most important, these six counties are also home to a large number of sites with dangerous unexploded ordnance. The average number of dangerous sites for the six excluded counties was 10.5, but the average for the remaining 3,130 counties was 0.12 (i.e., the average for the six excluded counties was over 80 times larger). Given that a high number of dangerous sites and Native American lands are found in these counties, the exclusion of these six counties does not detract from the trends reported in Table 3. On the contrary, even after dropping six

counties in which dangerous sites and Native American lands are found at levels far above the national average, Native Americans experience a disproportionate exposure to the most dangerous unexploded ordnance.⁵

CRUELTY: FEROCIOUS AND CALLOUS

As noted earlier, the quantitative research that we present is not in competition with qualitative studies of environmental justice (Akwesasne Task Force on the Environmental Research Advisory Committee 1997; Churchill 2002; Gedicks 1993; Kuletz 2001; LaDuke 1999; Marshall 1996)—it is part of a continuing dialogue. Our research provides evidence that these case studies of environmental injustice are *not* anomalies; a disproportionate number of the most dangerous military facilities are located near Native American lands. This research also provides insights into the intersection between historical legacies and contemporary processes. The essay on cruelty by Collins (1974) offers a conceptual lens to understand this intersection. With an emphasis on social structural (as opposed to psychological) explanations, Collins contrasts ferocious and callous forms of cruelty. Ferocious violence is common in agrarian societies and is characterized by highly emotional and celebratory assaults on the body; this type of cruelty has declined in importance among industrialized societies (including the nineteenth-century United States). But ferocity does emerge when dominant groups protect boundaries in a stratified society, especially when these social groups are demarcated by

⁵ The fact that Native American lands and dangerous unexploded ordnance are found at very high levels in the six excluded counties allays concern that trends in these counties run counter to those summarized in Table 3. To address concerns over model specification, we transformed the count variables that serve as dependent measures (log and square-root transformation) and performed alternative estimations. These alternative specifications included all counties and generated results that corroborate those presented and discussed in the text. Thus, over several measurement and estimation regimes, we found that the number of sites with extremely dangerous unexploded ordnance is positively and significantly related to Native American lands (results available upon request).

racial and ethnic differences. In the massacres and ethnic cleansing that punctuated nineteenth-century dealings with Native Americans, the dominant group (those of European origin) acted with ferocity “in a vindictive (and secretly terrified) upholding of their power” (Collins 1974: 418), resulting in the expulsion of Native Americans from the eastern United States, a sharp decline in Indian population, and the concentration of Native Americans on reservations in western states (on lands that European Americans found undesirable). Nevertheless, as Table 4 reveals, the ferocious cruelty of the nineteenth century cannot account for the

propinquity of Native American lands and the toxic legacy of military activities.

In industrialized and bureaucratized societies, ferocious assaults on the body decline, but cruelty and violence persists in alternate forms. The distant and calculated cruelty of bombings replace the hands-on slaughter of earlier eras, the distant and impersonal workings of bureaucracy replace the personalized assaults associated with ethnic cleansing. Moreover, these dynamics are at work even as universalism and inclusion are widely embraced. The evidence presented in Table 4 casts doubt on the assertion that toxic military materials were deliberately

Table 4. Sites with Unexploded Ordnance by Trends in Political Climate Confronting Native Americans and by Expansion of Military Bases

Founding and Major Expansion of Military Bases ^a	Regressed on Count of Extremely Dangerous of Sites (Table 3)		Sites with Unexploded Ordnance			
			Extremely dangerous (count and percentage column total) ^b		Less dangerous (count and percentage of column total) ^c	
	Coefficient	(SD)	n	%	n	%
Indian Wars, Forced Removal, and Founding of Reservations (1776–1890)						
Pre-Civil War, 1776–1850 (33 counties)	–0.04	(0.09)	29	4	573	5
Civil War era, 1851–1875 (23 counties)	0.06	(0.08)	15	2	245	2
Late-19th Century, 1876–1900 (37 counties)	–0.07	(0.09)	41	6	887	8
Allotment (Dawes Act) and Sustained Assault on Indian Culture (1890–1934)						
World War I era, 1901–1925 (91 counties)	0.04	(0.03)	69	10	1,339	12
Toleration (Indian Reorganization Act, 1934–1943)						
World War II era, 1926–1950 (368 counties)	0.05**	(0.02)	240	34	3,597	32
Assimilation and Self-Determination (1943–present)						
Cold War era, 1951–1975 (789 counties)	0.04**	(0.02)	310	44	4,453	40

Note: Data shown for 3,130 counties. Assessment of political climate confronting Native Americans based on Wilkinson (1987), see also, Brown (1970); Churchill (2002); Fredericks (1999); LaDuke (1999); U.S. Department of Interior (2003).

^a Counties with base creation or expansion are not mutually exclusive. For example, during the “Civil War era” major military investments were directed toward 23 counties. Of these, 16 counties already contained a military base (i.e., these counties were included among the 33 “Pre-Civil War” counties); while new military bases were created in seven additional counties (see Hooks 1994a).

^b Unexploded ordnance located at 704 sites in 255 counties has been rated *extremely* dangerous by the Army Corps of Engineers.

^c Unexploded ordnance located at 11,094 sites in 1,328 counties has been rated *less* dangerous by the Army Corps of Engineers.

** $p < 0.01$

placed on and near Native American lands. Table 4 demarcates U.S. history by the political climate confronting Native Americans. Several of the variables that we have analyzed—the founding and expansion of military bases and sites with unexploded ordnance—are situated into this periodization. In the nineteenth century, the United States spread from the Atlantic to the Pacific through a series of Indian Wars. Because these wars disenfranchised and decimated the Indian population, they are frequently seen as genocidal in character (see, for example, Churchill 2002). The early twentieth century did not end the systematic assault on Native Americans. The Dawes Act (1887) provided an allotment of land to individual Indian families and declared the remainder of the reservations as “surplus.” Under the Dawes Act, more than half of Indian lands were transferred to whites, undermining the viability of reservations and leaving individual families impoverished. Over this same period, Indian children were forcibly removed from their families and sent to boarding schools. In these schools, children were punished for speaking native languages and practicing Indian culture. Through “the boarding schools, reformers, educators, and federal agents waged cultural, psychological, and intellectual warfare on Native students as part of a concerted effort to turn Indians into ‘Americans’” (Davis 2001).

If the expansion of military bases in the nineteenth and early twentieth centuries was part of a deliberate and systematic assault on Indian peoples, one would expect that the bases established during this period would house dangerous activities and leave a legacy of unexploded ordnance. But this is not the case. As Table 4 reveals, relatively few sites with unexploded ordnance are found in the counties in which military bases were created or expanded prior to 1925 (and Table 3 reveals that the relationship is *not* statistically significant). As part of the New Deal, legislation was passed that emphasized toleration and support for Indian peoples. While these policies have often been scandalously ineffective (see U.S. Commission on Civil Rights 2003), it is difficult to sustain an argument that the treatment of Native Americans has gotten worse since the mid-1930s. Nevertheless, military bases built and expanded during World War II and the Cold War are associated with a large number of sites

containing dangerous unexploded ordnance (see tables 3 and 4).⁶

When the United States expanded its military infrastructure in the 1940s and reinforced this infrastructure during the Cold War, it sought remote lands to house bombing ranges and related noxious activities. By the 1930s, Native Americans had been pushed to the lands that were frequently the least attractive to white Americans and adjacent to vast tracts of federally owned lands. These lands were attractive to military planners under pressure to quintuple military land holdings during World War II. That is, these lands were remote, had a low population density, and could be acquired in a very short period of time because the Federal Government already owned them. This contingent intersection of Indian conquest and the rise of the Pentagon placed Native Americans at great risk of exposure to noxious military activities. To situate these dynamics in Collins’ framework (1974), this outcome was driven by the intersection of (1) the ferocious violence of the eighteenth and nineteenth centuries that resulted in the concentration of Native Americans in western states, and (2) the callous expansion of the Pentagon and its activities in the latter half of the twentieth century.

CONCLUSION

A number of case studies have demonstrated that Native Americans experience environmental inequality (Grinde and Johansen 1995; Bullard 1994; Gedicks 1993; Small 1994; Sachs 1996; The Akwesasne Task Force on the Environmental Research Advisory Committee 1997; Marshall 1996). We have examined the

⁶ With the establishment of the Environmental Protection Agency (EPA) in 1970, the federal government began regulating environmental impacts (see Harper 2004; Schnaiberg and Gould 1994). The military is distinctive because it monitors its own environmental impacts, leading critics to raise serious objections (Geiger and Harrah 1993). The shortcomings notwithstanding, it is certain that environmental oversight is stronger in the twentieth century than in the nineteenth century. Nevertheless, our findings suggest that unexploded ordnance is found in those bases created and expanded during and after World War II—the period in which environmental regulations were strengthened.

degree to which these case studies are exceptions or if Native Americans are systematically exposed to environmental dangers. Our research corroborates the latter conclusion: dangerous military activities have been located in close proximity to Native American lands. In the eighteenth and nineteenth centuries, as the United States expanded across the continent, Native Americans were relocated to reservations—on lands deemed undesirable by European-Americans. In the twentieth century, the United States fought and won two global wars and prevailed in a sustained Cold War. When the United States dramatically expanded its military bases during the twentieth century, bases were built and expanded on and near the lands that had been ceded to Indian nations. Our research suggests that the toxic legacy of this unprecedented military expansion left in its wake a spatial overlap between the lands used for Native American reservations and those lands used for military bases. This treadmill of destruction has systematically placed Native Americans in close proximity to extremely dangerous military sites.

Our empirical results provide direction for future research. First, it is important to bear in mind that our research focuses upon closed military bases only. The gravest environmental dangers are posed by weapons of mass destruction (i.e., chemical, biological, and nuclear arms). Given that the United States currently possesses a disproportionate share of the world's weapons of mass destruction and these weapons are stored at active military bases, a full understanding of the environmental dangers posed by military activities requires a careful examination of the materials and their handling. Unfortunately, due to national security concerns and restrictions, information is incomplete (to gain a sense of the available information—and the limits to this information—see U.S. Department of Defense 2002b). Careful research must be undertaken to identify where the most dangerous materials are currently stored and who might be most affected by toxic releases into the environment. At the same time, the social sciences have devoted little attention to Native American issues and rural inequality more generally. The focus on urban inequality is understandable given the concentration of population in urban centers. Nevertheless, to understand fully the environ-

mental inequality spawned by militarism, it will be necessary to examine the contemporary and historical processes shaping rural areas in general and Native American lands in particular.

Our findings also call attention to the need for theoretical clarification (see also Hooks and Smith forthcoming). Table 1 (see earlier) summarizes processes that produce and distribute environmental “bads” on the one hand and the spatial distribution of residence on the other. To date, the “treadmill of production”—environmental dangers produced and distributed by economic activities with a selection of residence through market processes—has been the dominant focus of environmental inequality research. Our research explores the “treadmill of destruction,” that is, environmental toxins generated by militarism with residency determined by coercion. Even if these are the most common forms of environmental inequality, a clearer understanding of environmental inequality can be gleaned from studies that examine the two other forms of environmental inequality identified in Table 1. In a “coercive polity,” toxins are generated by economic activities, but coercion (often based on institutionalized racism) distorts the choice of residency; the environmental inequality of the “military-industrial complex” is distinct in that militarism (including the manufacture of munitions) generates a toxic legacy, but residential choice is structured by a housing market. Research into these various forms of environmental inequality is not pursued in the spirit of a competition among incompatible theoretical claims. On the contrary, this research should focus on identifying distinctive historical processes and scope conditions, thereby furthering our understanding of the unique dynamics comprising environmental inequality more generally.

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