

# Military pollution and natural purity: seeing nature and knowing contamination in Vieques, Puerto Rico

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**Abstract** Military activities have produced contaminated environments at many sites around the world. This contamination and the associated health risks play a large role in how these places can be redeveloped after military use. In this essay we focus on the island of Vieques, Puerto Rico which was used as a bombing range by the US military for six decades until 2003. We examine the ways different groups of people perceive this formerly militarized landscape and the ways that these perceptions legitimize certain redevelopment options over others. Through participant observation, semi-structured interviews and an analysis of textual materials we found that many local residents view the island as suffering from severe contamination while the large number of visitors, tourism promoters and North Americans now flocking to the post-militarized Vieques view it quite differently. These perceptions of purity and contamination, affected by different knowledges of the island's history, have led to differing valuation of the landscape and contentious economic, political, and cultural battles over an island often labeled

“natural” despite a history of military use and social exclusion.

**Keywords** Militarism · Contamination · US fish and wildlife · Landscape · Risk · Political ecology

## Introduction

Visitors driving into the eastern section of Vieques, Puerto Rico are today greeted by a large brown sign welcoming them to the largest wildlife refuge in the Caribbean. The sign placed by the US Fish and Wildlife Service implores visitors in Spanish and English not to litter, not to camp overnight, and to “please help us protect the plants and animals.” Visitors looking beyond the sign see a landscape of gently rolling Mesquite-covered hills that descend towards the Caribbean Sea. Like many wildlife refuges, there are few outwardly visible signs of past or present human activity. There are no large dwellings, no crowds of people, no houses, and no agricultural activity on either side of the simple dirt road that heads east towards some of the most popular beaches on the island.

The irony is that prior to 2003 this entrance was the site of a tense stand-off between local activists and the US Navy, which was dropping high-explosive bombs on what is now a wildlife refuge. Gone today are the large police and military presence, the barbed-wire fencing and the campaigns of civil disobedience

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that once characterized this site. Gone too are the jets dropping bombs, the helicopters launching missiles, the warships lobbing shells and Marines practicing invasions. What is left now in the landscape of Vieques is a paradoxical mix of bombed-out moon-scape, visually unspoiled land and an unknown amount of mostly unseen contamination from 60 years of military activity.

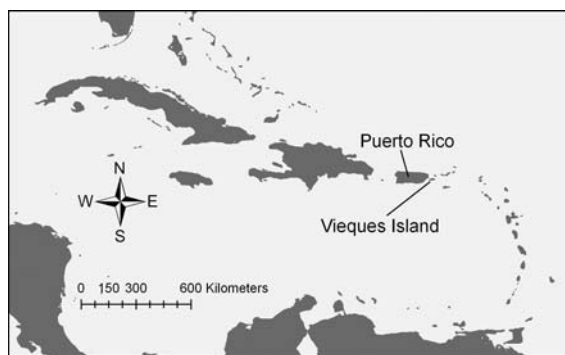
In this paper we examine the ways different groups of people perceive this formerly militarized landscape and the ways that these perceptions legitimize certain redevelopment visions over others. Through participant observation, semi-structured interviews, and an analysis of textual materials we found that while many local residents view the island as suffering from severe contamination, the large number of visitors, tourism promoters and North American homebuyers now flocking to the post-militarized Vieques view it as a preserved natural landscape. These perceptions of contamination and purity have led to differing valuation of the landscape and contentious economic, political, and cultural battles over a landscape often labeled ‘natural’ despite a history of military use and social exclusion.

Landscapes that have hosted military activities are often dangerous, contaminated, and changed in dramatic ways (Woodward 2004). This is particularly true of places where military organizations have engaged in warfare or intense practice activities—places where the machines of war are unleashed to do what they were designed for: to destroy things. Bombing and military maneuvers change a landscape in ways that linger long after the activities have ceased. From battlefields in Serbia and Iraq to nuclear testing sites in the Marshall Islands, Nevada and Kazakhstan, to large operational bases in Guam and the central Indian Ocean, to the numerous recently closed bases across the US there are a large number of spaces profoundly affected by military actions. While Vieques is a somewhat unique place it is important to examine the effects of military uses there because there are similar sites around the world where people must cope with current or recent military activity.

We are interested in the ways in which people consider the issue of contamination in the landscape and the ways in which different actors’ knowledge of the history of a place affect those perceptions. We seek to examine the difference between people *seeing*

nature and *knowing* contamination. To do this we examine the situation on Vieques, Puerto Rico which was used by the US Navy for bombing and military exercises from the 1940s to 2003 (Fig. 1). Our research is based on published accounts about Vieques and semi-structured interviews performed by the authors in Vieques during visits in 2005, 2006 and 2007. The interviews were conducted in Spanish or English, or a mixture of both. Since we promised our respondents that their comments would be kept anonymous we do not identify the individuals by name. Interviews were conducted with a broad array of people in Vieques: federal officials, local government officials, members of local activist organizations, tourists, realtors, prospective home buyers, resort managers, hotel owners, members of a local environmental conservation organization, tourist business operators, health officials, and people managing and working in agricultural projects.

Interviewees were selected through purposive non-random sampling where subjects were chosen based on her/him possessing specific knowledge of the situation on Vieques. We also strove to make sure that we were able to talk to a variety of people experiencing Vieques from different perspectives (tourists, resort workers, long-term residents, officials, activists, etc). Also, snowball, or “chain,” sampling was used when at the end of a meeting someone would recommend other potential interviewees who could contribute to our study (Creswell 1998). Most interviews done with people who worked or resided on Vieques were done by appointment, whereas tourists were interviewed in various locations around the island more opportunistically. In addition to the interviews we also performed a visual



**Fig. 1** Location of Vieques

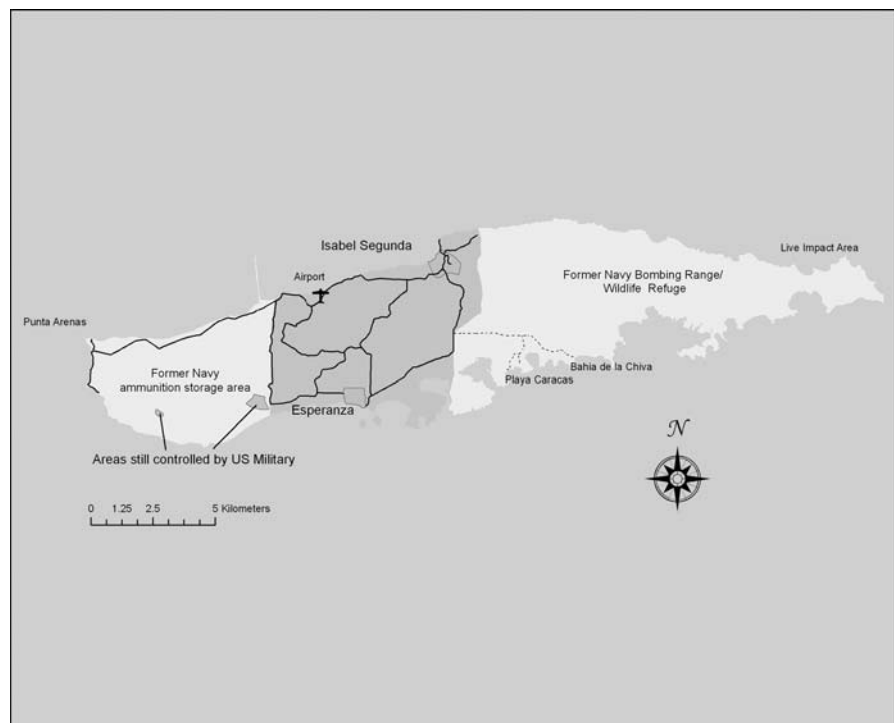
assessment of the island's landscape (both through IKONOS satellite imagery and on-the-ground examination) and we also observed various activities and events on the island such as tourist operations, protests, and meeting of the Restoration Advisory Board ("community participation" meetings related to the clean up of dangerous materials on the island which we discuss in more detail below).

The situation in Vieques is illustrative of the emotional distress, social fracturing and contentious politics that are often seen in communities that have been labeled 'contaminated' (Barnes et al. 2002; Davis 2005a). The added twist to this post-military place is that many people who encounter the landscape on Vieques (particularly visitors and newcomers) view the past activities of the military not as contaminating but as producing an undeveloped and 'natural' landscape by disallowing other uses of the island. While there are studies of the island's environment that show there are high levels of contamination (Berman Santana 2006), we found that what the contamination *means* for the future of the island differs markedly between long-term residents and the dramatically increasing number of tourists and foreigners coming to the island.

## Vieques as bombing range

As authors such as McCaffrey (2002) and Berman Santana (2006) have described in detail, Vieques underwent a tremendous amount of military activity over the last half of the 20th Century. While the history of militarization, contamination and resistance on Vieques is a long and complex story our intention in this section of the paper is to present a brief overview to give the reader a general understanding of the context in which our discussions take place. The beginning of Vieques' experience with the US military began in the 1940s when the US took over almost two-thirds of the island. The eastern half of the island was turned into an area for bombing and military exercises and the western end was used primarily for ammunition storage (Fig. 2). In the process of taking over these large areas, the US forcibly moved the inhabitants of these areas of Vieques into the small central section of the island (McCaffrey 2002). Along with the eviction of the people came the destruction of the sugar industry on the island as well as a disruption of the subsistence agriculture that had been practiced. With the end of the major economic activities on the island and the

**Fig. 2** Vieques island



forceful dispossession of land, the population of Vieques (approximately 10,000 people) sank into an economic depression marked by high unemployment, widespread reliance on welfare programs and a dependence on imported food products.

In 1948, the first large scale war games took place using over 60 ships, 350 planes, and 50,000 troops from all branches of the military (McCaffrey 2006). In Vieques, the Navy rehearsed amphibious landing exercises, parachute drops, and submarine maneuvers. It conducted artillery and small arms firing, naval gunfire support, and missile firings. Bombing the island from air, land, and sea, Vieques became the Navy's "university of the sea," a small island target range situated next to 195,000 miles of ocean and airspace controlled by the military for integrated training scenarios (McCaffrey 2002). Residents started to argue that their lives and health were compromised by the bombs, most of which fell on the Live Impact Area on the eastern end of the island. Due to the direction of the prevailing trade winds the populated area of Vieques lies directly downwind from the area of the bombing and residents expressed concern about the health effects of contaminants from the bombs blowing into the civilian area of the island. Meanwhile, on the nearby island of Culebra, throughout the 1960s and 1970s, intense anti-military activism began, eventually resulting in the Navy leaving occupied lands on the neighbor island. However, this only increased the military practices increased on Vieques. Once the Navy started to severely restrict access to parts of the ocean, the fishermen of Vieques became one of the first groups to actively protest the military's activities.

Despite these early protests the bombardment of the island continued. In the early 1980s, for instance, the island endured an average of 3,400 bombs dropped, 158 days of naval bombardment, 200 days of air-to-ground combat exercises, and 21 days of marines practicing invasions *per year* (Aldrich and Connell 1998). Between 1983 and 1998 the Navy dropped a total of more than 17,700 tons of bombs on Vieques. The impact of dropping bombs on a daily basis was severe-shaking and damaging houses miles from the Live Impact Area as well as depositing contaminants across the island (Grusky 1992). Throughout the 1990s, the Navy continued to drop thousands of pounds of explosive on Vieques. While much of the bombardment on Vieques involved

"conventional" weapons that distributed toxins and heavy metals into the environment, the Navy later admitted they also used weapons such as Napalm, Agent Orange, and depleted uranium on Vieques.<sup>1</sup> While Vieques was used more as a site for target practice than a base for soldiers, it also hosted a number of exercises where military personnel would temporarily stay on Vieques and affect the civilian sector of the island with the usual impacts of a visiting military presence: a mix of spending, drinking, and sexual harassment (Enloe 1990; McCaffrey 2002).

Some citizens formed organizations to fight against this militarization of Vieques. The movements focused both on the exclusion of Viequeses (the term that most Spanish speaking long-term residents use to refer to themselves) from the land and marine resources as well as on the negative health and safety consequences that military activities had on the civilian population sandwiched between the military areas. The protests against the Navy reached a fevered pitch in the late 1990s after the death of David Sanes, a Vieques resident killed by an off-target Navy bomb. In the political and civil disobedience campaign that followed Sanes's death, enough pressure was applied to stop the military use of the island and in 2003 the Navy relinquished control of most of its holdings on Vieques (the Navy still maintains a radar installation on the southwest end of the island and a communications facility on Mt. Pirata, the island's highest point). Many activists around the world saw this as an important victory over the most powerful military on earth by a small, but well organized and active, community on a tiny colonized island.

### After the bombs

During the struggle to remove the Navy from Vieques activists and their allies devised plans for the economic, environmental and social redevelopment of a post-military Vieques (Grupo de Apoyo Técnico y Profesional para el Desarrollo Sustentable de

<sup>1</sup> Vieques is, of course, not the only site where military training and weapons testing has resulted in widespread contamination. There are hundreds of sites across the US and the world which have been affected. The Military Toxics Project is an excellent source of information on the various sites and the specifics of military contamination. <http://www.militarytoxproj.org>

Vieques 2002). However, instead of the lands being returned to the municipality, on May 1, 2003, most of the former military areas were transferred to the US Department of the Interior to become a wildlife refuge. Soon after, in 2005, the Environmental Protection Agency (EPA) listed the Vieques bombing range on the National Priority List of the most hazardous waste sites in the US (a “Superfund” site). Access to much of the eastern end of the island is still limited due to the ongoing removal of unexploded ordnance and munitions debris (NAVFAC 2006). This process has been slow and furthermore has resulted in the release of more contaminants into the air of Vieques, as most of the munitions are removed through “open detonation.”

The landscape that is left after the Navy’s departure is very different from the one it took over in the 1940s. Most of the vestiges of the past agricultural uses of the island are gone. Gone too are most indicators that the east and west ends of the island had been home to generations of Viequenses prior to the 1940s. Instead, what is left is a landscape of forest and scrub vegetation punctuated in the far eastern areas of the island with numerous craters and unexploded bombs with tailfins protruding from the ground.

While it may seem paradoxical that a former bombing range has been turned into a wildlife refuge, it is not uncommon for former military sites to be turned into reserves of some kind (Greenberg 1997; Davis 2005a; Krupar 2007). Since military use has disallowed the building of structures and other obvious signs of human activities the visual landscape is considered by some to be “natural” (Davis 2007). This, along with other “logics of conversion,” has helped to legitimize the US government’s transfer of many Department of Defense and Department of Energy facilities into wildlife refuges or other sites of limited human activity (Havlick 2007). As we will discuss further, one of the major reasons the US government prefers this kind of development of contaminated lands is that it releases them from much of the financial burden of cleaning up the contamination to the level necessary for human use. In the Vieques case, this transfer of the former military lands to Fish and Wildlife was done through an act of congress. This decision has largely been met with consternation by residents, while some small groups in the community see it as beneficial (Baver 2006; Berman Santana 2006). Some activists on the island

reported to us that they believe the transfer of the land to Fish and Wildlife was engineered by some members of the US congress to punish the community on Vieques for successfully stopping the military operations.

The opposition to FWS jurisdiction comes from many angles. First, FWS maintains federal (and many would say *colonial*) control over access to the lands. In most ways access to the eastern lands has actually been diminished since it was under the Navy. People used to be allowed access to large areas of the eastern end whenever exercises were not being conducted. Under FWS, however, all people must leave the refuge by nightfall, certain areas are completely off-limits, and certain gathering activities- such as the gathering of crabs- are more regulated and restricted. Two quotations illustrate local resistance to FWS being in charge of the eastern end of the island. One woman commented, “Fish and Wildlife—we consider it a nickname for DOD. It is the same thing.” Another female resident of Vieques said, “We see them as another oppressive element. They changed uniforms, they are not the Navy, but they are officials nonetheless.”

A second type of criticism of the FWS centers on what is seen as the hypocrisy of turning over the land to an agency in charge of environmental protection when the US government, through the Navy, is seen as the culprit behind the contamination of the island. As we will discuss further below, there is a majority local perception that what is being ‘preserved’ on Vieques by the US federal government is not nature as much as it is the contamination.

Other residents and visitors to Vieques, however, contradict this view. Some see the wildlife refuge, as well as the Navy activities that produced it, as a positive for the island. One North American resident of Vieques is quoted as saying, “The Navy has kept the land pristine... If it weren’t for the Navy, Vieques would be just like St. Thomas” (quoted in McCaffrey 2002, p. 108). The undeveloped look of the landscape, and the designation of most of the island as a wildlife refuge, has lured tourists and new foreign homebuyers down to Vieques in droves. There has been a recent flood of articles in travel sections of US newspapers about Vieques where words like ‘pristine’ and ‘unspoiled’ are plentiful. In representing Vieques as pristine, one tourism manager who we spoke with even went so far as to say,

You have a place that Columbus sailed by in 1493 and documented it. And the majority of it, you can go by, and it pretty much looks the same way... You tell people if you want to see it the way Columbus discovered it, it is here.

How do these two opposing visions of this post-military landscape—pristine and contaminated—interact to guide the redevelopment of Vieques? This question raises a few other important, interrelated questions. First, how does Vieques, a site of decades of bombing, become labeled ‘natural’? Second, how does the spectre and reality of contamination destabilize this allegedly ‘natural’ landscape? Lastly, what groups of people hold different views of the Vieques landscape and how do their perceptions impact the redevelopment of the place? In the remainder of this article we will explore some of the theoretical perspectives on nature and contamination and apply them to the current dichotomous imaginings of Vieques.

### Seeing nature

Vieques, the site of decades of intense bombardment, is now popularly portrayed as a ‘natural’ area. Articles in the travel sections of major US newspapers such as the USA Today, Miami Herald, New York Times and Philadelphia Inquirer have sung the praises of Vieques as an off-the-beaten-path gem of a tourist destination. The title of one article is illustrative of the mood of the writings “Vieques on its own: An homage to the best of the Caribbean’s past, the home of the newly-extinct bombing range is a safe, welcoming, pretty place” (Wooldridge 2003). In another article entitled “Unspoiled? In the Caribbean? Thank the US. Navy for keeping Vieques Island largely off-limits to tourists and developers for 60 years” the island is portrayed as rugged and permanently undeveloped. The writer notes that, “Most of the Navy’s former holdings have been turned over to the US Fish and Wildlife Service, meaning that the majority of the island will remain undeveloped. This translates to thousands of acres of undulating hills where horses roam free and miles of beaches with no buildings of any kind, save for a few small picnic gazebos nestled beneath the palms” (Laughinghouse 2005). Similarly, the New York Times ran an article which stated:

Six decades of military restrictions insulated Vieques from change, including a regional boom in Caribbean commercial development. Bombs have paradoxically preserved much of the island’s natural beauty and delicate tropical ecosystems by preventing the unchecked land speculation and slowing the pace of modernization. As its island neighbors play host to cruise ship passengers and charter-trip vacationers, Vieques is still best known for the natural attractions that inspired the island’s newfound fame—secluded beaches, crystal-clear snorkeling waters and stunning forest vistas. They are open to any traveler willing to work a bit for the experience and adapt to the island’s relaxed pace (Johnson 2005).

How can there be such widely divergent perceptions of Vieques? Much of the answer to this lies in the visual aesthetic qualities of the landscape. As has been shown in studies of other places as disparate as upstate New York, the Pacific, and Africa, the label of ‘nature’ tends to be applied to those places that retain the ‘look’ of nature *as certain people believe it is supposed to appear* (Davis 2005a, Duncan and Duncan 2001, Neumann 2003). There are two main points here to consider. First, there is a long history in western culture about what ‘natural’ tropical islands are ‘supposed’ to look like that influences not only how island places get labeled, but also in how they get altered and reproduced (Davis 2007, Howe 2000). Second, as we emphasized above, while many people are predisposed to label certain tropical landscapes as natural based on a certain look, this look is not universal. As is evident in the case of Vieques, and in the cases cited above, some people actively produce alternative representations of island places that resist this natural label.

How is it, though, that different people are seeing such different places when describing the same island? Certainly part of it is that people are focusing on different parts of the landscape of Vieques when they make use of these labels. Some people are representing the island by focusing on the heavily cratered ‘live impact area’ on the eastern end of the island or the giant ROTHR radar installation the US military is still operating on the west side of Vieques (Fig. 3) while others are focusing on picturesque beaches that are free of obvious damage from



**Fig. 3** Navy ROTHR on Vieques

military activities (Fig. 4). In addition, some people may see the same things and label them quite differently. For instance the mesquite forests and roaming horses on Vieques as described in the aforementioned newspaper article may be perceived by some as natural and beautiful while others see them as evidence of land degradation. Another component of these differential readings of the landscape, and the one we want to focus on in this paper, is the fact that the widespread chemical contamination of the island is largely invisible. It does not mar the ‘look’ of much of the island.

The question then arises as to *why* people chose these particular places on the island, or attributes of these places, to represent the whole of Vieques. We argue that some of these different views of the island



**Fig. 4** Beach on Vieques

arise from the different purposes people have on the island. To some Vieques is a homeland that has been besieged for over 60 years. It is a special place, but a place that also threatens their health and the health of their neighbors and families that live permanently on the island. For tourists and other newcomers to the island, the place means something quite different—a quaint tourist destination. It cannot be overemphasized that there are extreme differences between the life experiences of the Viequeses and the tourists and rising wave of new home buyers from North America. Overall, the tourists and newcomers to Vieques are largely from the Northeast of the US and differ from Viequeses in terms of language, culture, race and level of affluence.

Many of the residents of Vieques we spoke with believe that tourists and newcomers are able to see the island as ‘natural’ only because of a lack of knowledge of the islands history. One long-term resident of the island and her partner had this to say about newcomers’ lack of knowledge about the Navy use of the land and the resulting contamination:

Many people will come here to buy the property, or will come here to vacation. And [they] have no idea at all about what has just gone down, or what is going down. The place as a place doesn’t exist. It is an opportunity. Period. You know? As it was for the Navy. The community did not exist to the Navy. The rights of the community, the health of the community was of no concern. It was an opportunity to make more money, to do testing and do bombing and training.

[partner interjects] Without witnesses.

And we and our history and our bodies didn’t count at all. And unfortunately that is the same thing with the new wave coming in. They don’t want to become part of a community. They don’t give a damn what is going down. They really don’t, you know, except that it is in the Caribbean, it is in the tropics, and it’s the new place.

This view was corroborated in interviews that we undertook with tourists, North Americans in Vieques to buy property, and realtors on the island. Many tourists we spoke with were completely unaware that the US Navy was ever present on the island. Realtors also relayed stories of North Americans buying property in Vieques over the telephone based on

price and representations of the island in newspapers and magazines without even visiting. Most newcomers viewed it quite unproblematically as a beautiful, clean, safe tropical island and an ideal place to buy property as an investment or as a place to retire. One visitor from New Jersey said,

Well, we have been thinking about our retirement and what we are going to do in 20 or 30 years. We have looked at different mutual funds, and it would be nice if we could have somewhere nice to live... I think someplace like this would be an ideal investment. I could see myself retiring someplace like this... I think it's actually a good thing to buy for year round tenants, to cover the cost of the mortgage and then in 20 years, come hang out by the beach.

Not only does the above quote demonstrate the instrumental way in which many newcomers to Vieques view the island as a tropical paradise in which to retire, but it also shows a lack of concern for the effects that the purchase of property has on the less well-off island residents. The gentrification of the island has become a serious problem on Vieques (Berman Santana 2006). Many Viequenses are now priced out of the housing market as average home prices in many areas of the island in 2006 hovered above \$500,000. With the increase in home prices has come the inevitable increase in rent Viequenses end up paying to absentee North American landlords. Furthermore the gentrification process on Vieques is not just a class issue, but has also created dramatic racial, linguistic and cultural change. Not only are the newcomers to Vieques wealthier than most current residents, they are generally Caucasian, North American, and English speaking and they tend to not integrate themselves into the larger Spanish speaking community either culturally or economically.

While problems with land speculation are not wholly determined by the representations of the 'natural' allure of the island it was clear in our meetings with tourists that their decision to visit or buy property was influenced by the representations produced about Vieques in newspaper articles, travel magazines and websites. One tourist commented, "Yeah, well every travel magazine says that [Vieques] is like a diamond in the rough, somewhat, or the last untouched place in the Caribbean." When we further

queried the tourist, asking, "Do you think that is fairly accurate, based on what you have seen?" The tourist replied, "Yeah, definitely, I mean you just drive down Route 201 or 996 and you can tell it's not like Aruba or the Bahamas or anything." Residents of the island also believed the new widely circulated representations of the island have had a large impact on outsider perceptions of the island. One man living on Vieques said,

When the Navy left, the US media made a big deal out of it, and what was their spin on the story?... Now, Vieques has the largest wildlife refuge in the Caribbean... the NY Times article that came out about 2 or 3 months ago was the most outrageous. That says that the bombs actually preserve the land. Ironically, the bombs are what preserved the nature. I mean, talk about lies. And they print this in the travel section of the NY Times.

It is not only the popular press that disseminates representations of the island as a natural landscape that has been helped more than hurt by the naval presence. The US Department of Fish and Wildlife also has their own representation of Vieques on their website which is worth quoting at length:

No matter where you come from, you will definitely leave relaxed and wanting to return again and again to these beautiful refuge areas... What can I do? From mountain biking on the dirt roads to swimming in the turquoise waters, Vieques National Wildlife Refuge offers all types of recreational opportunities. Playa Caracas and Playa la Chiva are an escape from reality. There's no high rise, no hustle or bustle just a quiet destination where you become one with nature. Sometimes you can find a few others. The swimming and snorkeling are fantastic. The waters are crystal clear and the variety of color found in the undersea life is astounding...The dirt roads leading to Laguna Kiani or the surrounding beaches are excellent for biking, jogging or hiking. The lagoon is close to several secluded beaches, such as Punta Arenas (Green Beach). Kayaking is great, especially for glimpses of rare birds and a chance to snorkel, especially to the south. The

view of the main island is fabulous. Take your camera...Playa la Chiva and Punta Arenas all have renovated shelters with picnic tables, trash cans and composting toilets. Remember to keep your beaches clean and beautiful...Vieques National Wildlife Refuge offers more than just swimming, snorkeling, hiking, biking bird watching. It's a place where family and friends can eat "arroz con gandules", play Puerto Rico's national pastime – dominoes or a place to lounge under a palm tree and see no one. Summer is coming! So, make Vieques National Wildlife Refuge your destination. An escape from the everyday life; a place to revive your soul and bond with loved ones! (US Fish and Wildlife Service 2006).

What impacts do these kinds of representations have on Vieques? On one level they serve to erase some aspects of the landscape and the history of Vieques. Not only do the portrayals of the island as a 'natural' place serve to obscure the destructive activities of the Navy, but they also obscure the fact that these 'natural' areas were lived in for centuries before the people were forcibly removed. The appellation of 'nature' (pristine/non-human) serves to de-legitimize the claims of Viequesenses to their once inhabited landscape. The natural landscape, through its labeling, becomes a primordial place that must be protected from the local population rather than a place where they belong (Davis 2007). This discourse of Vieques as a natural place, however, is contested.

### Knowing contamination

Contradicting the widespread discourse of Vieques as a natural paradise is the labeling of Vieques as an abused and contaminated landscape. Contamination is usually seen as being the antithesis of nature rather than its fellow traveler. Mary Douglas's definition of contamination as "dirt" or "matter out of place" is an intriguing starting point for the discussion of contamination on Vieques (1966). Interestingly, the defining of Vieques as natural depends on a believed purity of place. As the tourism manager put it, one can visit Vieques today and "see it the way Columbus discovered it." After all, nature is usually defined as a realm outside social experience and impact (Davis 2007). Contamination on the other hand is profoundly social.

The contamination on Vieques is not only chemical, but cultural. Discursively it operates as a residue of modernity. It serves as evidence that the place has not always been natural. It draws attention to the quite literal (and profoundly physical) social production of the current landscape on Vieques. It throws into doubt the islands status as natural.

Conceptualizing the island as a contaminated and stolen landscape, however, is dependant on *knowing* a history that is not easily seen. That history includes the previous agricultural activity on the island prior to the military's expropriation, and the bombing and chemical contamination from military use. Both of these histories can be known through discussion with residents, texts, and visual images, but are hard to see in the current landscape because the signs of them (in the semiotic sense) are largely invisible. Furthermore 'signs' of the naturalness (fish and wildlife signs, the wilderness look, tourist advertisement portrayals, etc.) counter these histories. Despite this, the view of Vieques as a contaminated landscape is widespread among Viequesenses, many of whom, of course, have intimate knowledge of these histories.

Currently on Vieques there is no consensus about how dangerous the island is due to contamination. There have been some studies done but different groups of people have profound disagreements over their accuracy and over the interpretation of the results. One of more controversial studies was done by the US Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR evaluated the pathways most likely to result in exposure to the residents of Vieques, including drinking groundwater, ingesting or touching soil, eating fish and shellfish, and breathing air. Each of these evaluations was presented in a separate public health assessment. Released in 2003, the Vieques Health Assessments summarized the findings by ATSDR and attempted to educate and advise the residents about their environment and reduce their concerns about contamination. Generally speaking, the ATSDR states that residents of Vieques have not been exposed to harmful levels of chemicals resulting from Navy training activities. According to this report, the contaminant levels that people were exposed to are too low to cause harmful health effects. For that reason, they claim that exposure to environmental contaminants in Vieques are "no apparent public health hazard," (ATSDR 2003).

The results of the ATSDR study, however, have been disputed by other researchers. Dr. John Wargo, Associate Professor in the School of Forestry and Environmental Studies at Yale University released a long list of problems with the ATSDR study (2006). First he faults the ATSDR for not conducting any tests of its own. Instead, the Agency relied on former studies by the Puerto Rican Department of Health, the US EPA, the US Geological Survey, and a consulting firm hired by the Navy. These studies were not peer reviewed, remain unpublished, and are often based upon sampling designs with extremely small sample sizes (1–12 samples). Wargo also states that the results of the water assessments are premature because they did not consider the possible pathway from airborne chemicals collecting in drinking water wells and cisterns (2006). Wargo also argues that the Navy consistently failed to collect data on soil associated with military training and operations. Furthermore, he claims the ATSDR poorly investigated the bioaccumulation of toxins in fish species and how it collects in humans. Finally, Wargo disputes the ATSDR suggestion that the deposition of metals and contamination on Vieques could have been from Saharan dust storms and long distance atmospheric transport of compounds originating thousands of miles from the island rather than the Live Impact Area. While there is a possibility of this occurring, it is difficult to understand why the hypothesis that contaminants have traveled from the Live Impact Area, only 5–9 miles away, is an unrealistic argument while traveling from Africa is not.

Studies done by independent researchers also cast doubt on the findings of the ATSDR study. It has been found that people in Vieques have been exposed to higher levels of mercury than people in more industrialized areas of Puerto Rico and that fish and other sea-life, especially bottom dwelling organisms like crab and conch, were found to have high levels of contamination that can be linked to military activities (Berman Santana 2006). Furthermore, studies also demonstrated that shallow-rooted plants in the civilian area of Vieques had significantly high levels of metals that are present in military munitions (Massol Deyá and Díaz 2003). Also, high levels of toxic metals such as cadmium, arsenic, lead and mercury have been found in hair samples of people living in Vieques as well as

found in dust which had accumulated inside homes (Ortiz-Roque and Lopez-Rivera 2004).

Epidemiological studies also suggest that certain illnesses that can be linked to environmental contaminants are high in Vieques. In 1995, Vieques had the highest mortality rate among Puerto Rico's 78 municipalities (Wilcox 2001). The likelihood that a pregnant woman will give birth to an underweight infant is 65% greater on Vieques than in the rest of Puerto Rico (Wilcox 2001). In 1995, population-based government health data indicated that the risk of dying from cancer was 1.39 times higher on Vieques than on the main island (Wilcox 2001). Researchers have also found that the cancer risk in Vieques has been increasing steadily in statistically significant proportions since the early 1970s (Nazario et al. 2002).

The military, however, disputes the findings that Vieques has been heavily contaminated by their activities. Not only do they point to the ATSDR study, but they have undertaken their own studies that are required as part of the Superfund clean up-studies that many residents regard with suspicion. As an example, recent attempts by subcontractors hired by the Navy to get a background level of metals in the soil on Vieques has been hotly contested and seen by many in the community as rigged to make it appear that contamination caused by military activities gets labeled as 'natural' background. The companies working for the Navy claim they can find sites on Vieques that were not contaminated by the military that can represent background levels, but many in the community dispute this. While members of the community get to comment on the study through a Restoration Advisory Board (RAB), those doing the study have largely ignored the very fundamental and well-researched concerns that local people have about the study's design. What the Navy and their subcontractors do not seem to realize is that by moving forward with a study that many see as deeply flawed, the study results will lack any real legitimacy in the community. In the case of the background study on metal contamination, legitimacy of the results is crucial since it is to be used as a baseline for further studies. If people in the community see it as fundamentally unsound, then the later studies that compare other parts of the island to these 'background' levels will be doubted as well.

These differing perceptions on how to properly measure contamination demonstrates a larger issue when trying to determine whether or not the island is labeled as ‘contaminated’: namely, that the perceptions of contamination and the perceptions of the risks that contamination represents are both socially mediated (Davis 2005b). Real dangers exist from contamination, of course, but the ways in which people come to understand those dangers differ based on their personal histories, culture, politics, and exposure to different types of information (Rosa 2003; Beck 1999; Pidgeon et al. 2003). In other words the perception of risk is socially constructed (Jasanoff 1999). This explains how different groups of people on Vieques view the same island differently, seeing a catastrophically contaminated and abused place at one extreme, and a natural paradise at the other.

Much of this has to do with the knowledge that people had of the military history of the island. Since to a large degree the contamination of the island is invisible (at least over much of the island that people see) it must be *known* in a way that does not rely on a simple visual reading of the landscape. Most of the long-term residents of the island *know* about the contamination by being present during the era of Navy bombing, by experiencing illness, by seeing their friends, family and neighbors experience illness, and by reading the results of scientific reports that confirm contamination. Almost all of the residents of Vieques we spoke with were aware of the findings of the various studies that have been done on Vieques. In contrast, no tourists and newcomers were.

Among the long-term residents, however, people interpreted the results of these studies in different ways and expressed very different attitudes towards how these findings affected their behaviors towards such things as eating particular foods produced on Vieques. Many people said that residents of Vieques are reluctant to eat many of the foods available on and around the island. One woman noted:

We know that the whole island is contaminated, the people and their bodies are contaminated with arsenic and uranium and heavy metals. If people are contaminated then the land also has to be contaminated. People don't eat food that comes from here; the majority of the food that people eat is imported from elsewhere.

Another woman said of the marine life around Vieques:

I think people are more concerned with what's coming from the ocean, but not everything, mostly the bottom feeders, and things that don't move very fast, like the lobster, and the conch. I personally would not eat lobster or conch here, I wouldn't do it. Anything living on the bottom, no. And I have talked to other people who won't eat fish here.

Residents of the island also noted that there were serious barriers to engaging in agriculture because many people on the island (and on the main island of Puerto Rico) believe that foods coming from Vieques are unsafe.

Yet, many respondents explicitly mentioned that not everyone on the island sees it as being so contaminated. They stress that people only see it that way through knowledge of the history and scientific studies. As one female Viequense made clear:

*The people who are aware of what is happening are afraid to eat crab, fish, shellfish, peas, and zucchini, everything that grows on the surface and which has a short growth period. I eat mangos, but I wouldn't eat zucchini because it has a shallow root system, and I don't know if the land from which it was grown is contaminated, I also won't eat shellfish from the island. There are limitations on what we eat. There are people who will eat these things, but they say, "Well I am already contaminated so it doesn't matter if I eat contaminated food." But people who are healthy usually won't eat the vegetables here. Dr. Arturo Massol from the University of Mayaguez did some research about the nutrition and harvests and he told us that a single pigeon pea has enough contamination to harm a baby. Those who participate know what is going on but there are people who don't know the true reality because they don't participate [emphasis added].*

As emphasized in this quote, some people, but not everyone, on the island experiences Vieques as a contaminated place and avoids certain foods as a result of that perception. It is important to note that this connection between contamination and food,

however, is complex. Some residents we interviewed stated that they believed things they ate from the landscape were contaminated but they ate them anyway. As one female Viequense said:

So, what are we going to do, continue buying canned food? That is contaminated also. I will continue eating *MY* fish... I am already contaminated... because I have been living here for so many years. So, I will just continue eating what the land produces.

While there may be differences in the behaviors among people who believe the island to be contaminated, there are even greater differences between these people and the ever increasing group of people who visit and move to the island that do not see the island as contaminated. Many newcomers and visitors to the island are unaware of the military history or present concerns over contamination. This is because of the different background of these people in a geographical and social sense. The more recent representations of the island tend to erase the history of the naval bombardment (or, as we discussed earlier, endeavor to portray that history as environmentally benign or even helpful). This then obscures that image of place from the consciousness of the visitor to Vieques and instead encourages a view of the landscape as a natural paradise. To residents of the island who have a consciousness of the contamination in the landscape, however, the portrayal seems ridiculous.

### **Discussion and conclusion: contamination preserves and preserving contamination**

These two labels of Vieques, contaminated and natural, are produced through necessarily incomplete and biased perceptions of the landscape that are affected by people's knowledge of the island's history. Taken separately they put forward very different visions for the island's future. These two seemingly contradictory geographical imaginings, however, do more than stand in opposition to each other. They also entwine to impact the way different people value the landscape and the way they plan for the future development of the island. We will focus on two ways in which 'nature' and military contamination articulate on Vieques. First, the perceived

contamination of the landscape serves to preserve it from human use and encroachment by making it undesirable and off-limits. Second, the designation of much of the former Navy lands as a wildlife refuge is seen by many on Vieques as a way of preserving the contamination. In other words, people charge that the wildlife refuge designation enables the Navy to get out of cleaning up Vieques to a standard suitable for human habitation.

Contamination preserves the *natural looking* landscape on the two ends of Vieques chiefly through concern over the risks associated with living in the environment and eating food produced on the land and the surrounding sea. As we detailed in the previous section, there is a lot of concern on the part of Viequenses over the safety of the environment on Vieques that makes people weary about using it. The concern over the possible health risks serves as a major barrier to not only living on the former Navy lands but also to developing agriculture on the island. One man who has a farm in the central sector of Vieques claimed, "I started with ornamental plants because these are sold and not eaten... Imagine, if I planted tomatoes, no one would eat them because they come from Vieques." A North American born long-term resident on Vieques elaborated on the difficulties of developing the island:

So there is a haze – there is all this mystery – and it is that kind of stuff that creates even greater anxiety in the community, and makes it more difficult to grab onto an idea and say, lets create this farming project or this fishing project, because there is all of this talk or gossip about, "well no, because it is contaminated we can't eat any of it or grow anything" ...There are some very serious studies that have been done in limited areas in limited amounts that show very troubling things about heavy metals in certain plants, and you know, leaves and seeds and fruit. There are studies that have been done that show high levels of mercury in fish, for instance. It might not be very different from fish that are off the east coast of Boston, or something, but there are other concerns here with fish that people are worried about, although we have no intense amount of studies done about the heavy metals, about the depleted uranium, about the RDX, nitrate/nitrites, and

other stuff, related to bombing over half a century. Crabs, you know, what do they have in them? Are they glowing at night really, or is that just what we all say?

This fear of the landscape causes people to avoid developing it and therefore to preserve it from further human activities. In this way environmental preservation is supported by some in the community as a default use for 'damaged' land.

Counter to this attitude is a more widespread belief in the community that the connection between contamination and wilderness designation works in a different way. Many of the residents of Vieques that we spoke with professed a belief that the transfer of the land to Fish and Wildlife is a way of preserving the contamination. Since the former Navy lands were designated as a Superfund site in 2005 there are certain criteria that the clean-up of Vieques must meet. The thoroughness of the clean-up, however, is dependent on the *designated future use of the site*. If the future use of the site is believed to be residential houses and elementary schools, for example, there are much lower acceptable levels of contaminants that can be in the soil and water than if the designated future use is recreational, a wildlife preserve, or a wilderness area. The fact that the most heavily bombed and contaminated area of the east end of the island (the former Live Impact Area) is not only part of the refuge, but officially designated as a wilderness area with very stringent restrictions on human access is seen by many Viequenses as a cruel irony. One long-time male resident of Vieques and member of the Comité pro Rescate y Desarrollo de Vieques (Committee for the Rescue and Redevelopment of Vieques) made a comment that summarizes well the position of many people we spoke with:

Under the Wilderness Act, you know, that means those are places that have been untouched by human hands... So we really need to keep this place completely pristine by fencing it off. [But] they killed all the pristineness many years ago... Fish and Wildlife did absolutely nothing for decades while the Navy destroyed the fish and wildlife, they completely reneged on their responsibility. Just as the EPA did and other federal and Puerto Rican agencies, and allowed the destruction to the natural environ-

ment, to people's health, etc... It has been the people of Vieques that have defended the environment here and got the Navy to stop bombing, not Fish and Wildlife. So, it is insulting, it is incorrect, it is damaging, and it is part of a Navy plot to not clean up that has Fish and Wildlife here.

Many residents of Vieques view Fish and Wildlife as a 'trash can' agency that has been assigned the role of being a caretaker for the Navy's damaged land. The primary job of the agency is viewed as one of continuing to restrict access. Some in the community even commented that they believed the land was turned over to another federal agency so that the Navy could come back and do more bombardment if they choose. In many ways Fish and Wildlife's regulations are actually more restrictive than the Navy. For instance, Fish and Wildlife requires people to leave the beaches in their area at 6 pm every evening which disallows overnight camping that the Vieques residents used to be able to enjoy between Navy maneuvers. Also, some people have complained about the more stringent regulation on the hunting and collection of certain animals, such as crab and sea snails.

While Fish and Wildlife officials are enthusiastic about their ability to manage such a large wildlife refuge, we were told by one person who worked there that their situation was difficult in that they never asked for Vieques to be under their control. Rather they had it thrust upon them when Congress gave them control of the Navy lands in the law that was passed in 2003 (Spence Act). While FWS officials usually chose to speak about specific areas of Vieques under their control that were excellent areas for wildlife management, they did express dissatisfaction with working in a dangerous environment. One Fish and Wildlife official said:

The idea is that as soon as the Navy [finishes] cleaning, the beaches and the areas...then Fish and Wildlife will allow the people to enter to those areas and enjoy the resources. But we don't enter the areas to do any management, because I am not an expert in contaminants, and I am not an expert in unexploded ammunition. So, I would love to go and manage sea turtles. I would like to go and manage birds and forests

and you know, but I can't. That is not my business right now, because there are very serious contaminants in those areas, and there is only one [group] responsible for that contamination. And that is the agency that produced it [the Navy].

As the above quote demonstrates, even developing the island as a wildlife refuge is made difficult by the lack of a clean-up. It is, however, still seen as by the federal government as cheaper and easier than cleaning up the island to a safe level for human activity. Given the problems with redeveloping the land for human use, some on the island did feel that the best course of action is to leave the majority of the island in the hands of Fish and Wildlife as a preserved landscape. Some see this as a 'win-win' scenario for the environment and the federal government's budget. This is certainly the simplest and least costly option, but is it the most socially just? Many on Vieques answer this with a resounding "no." Continuing to limit human access to the former Navy lands may be good for Fish and Wildlife (and certainly for the liability of the Navy) but it is an option that appeals to very few people on Vieques, even if the refuge could become a magnet for increased tourism and recreational activities. Of the people we interviewed, almost all of the Viequense community opposes the presence of Fish and Wildlife, and only a small number of North American tourism operators and newcomers support it.

The other option for the future of Vieques is that the Navy pays to clean up the contamination they produced and gives the land back to the people of Vieques in a state that is as close as possible to the condition of the land when it was expropriated in the 1940s. Once the island is deemed safe for residents, visitors and wildlife then it could be up to the people of Vieques to decide what mixture of development and preservation they would like to undertake. This is what organizations on Vieques like the Comité pro Rescate y Desarrollo de Vieques uncompromisingly propose. Rather than plan for development with military contamination taken as a given, the far more socially just option is to insist that the military clean the messes that they have made. The decision of many in Vieques to stand firm about the need to clean the island to a standard suitable for human habitation can have global repercussions. The protest movement on Vieques that

forced the US Navy to stop their bombardment has been celebrated and emulated by militarized communities from Okinawa and South Korea to Europe and Ecuador. By rejecting the idea that their island has been made 'natural' by the military, Viequenses can set another important example. Vieques can help to set a precedent for the many places dealing with military toxics by insisting that the current US strategy of avoiding clean-up by changing former military lands to wildlife preserves is not acceptable.

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