

Science, Colonialism and the Case for Environmental Justice in Vieques¹

Jorge L. Colón²

Over the course of six decades, the United States Navy dropped between 150 and 700 million pounds of bombs and ammunition in military practices on the populated island of Vieques, Puerto Rico, an island roughly twice the size of Manhattan (Wargo, 2009). Of the estimated 39 million pounds dropped between 1983 and 1998, 17.7 million pounds were TNT and 88 pounds were depleted uranium (Davis, Hayes-Conroy & Jones, 2007; Sanderson, Fauser, Stauber, Christensen, Løfstrøm, & Becker, 2017; Wargo, 2009). The impacts of the bombing (Figure 1) were significant – flattened mountaintops, cratered lagoons and beaches, toxic levels of contaminants, compromised health of residents, and more (Berman Santana, 2002; Grupo de Apoyo Técnico y Profesional para el Desarrollo Sustentable de Vieques, 2002; Massol-Deyá & Díaz de Osborne, 2013; Díaz, Pérez, Delgado Acevedo & Massol-Deyá, 2018; McCaffrey, 2000; McCaffrey, 2018).



Figure 1. Smoke cloud from U.S. Navy bombing in Vieques.

On April 19 1999, two MK-82 500 pound bombs were mistakenly dropped from a Navy F/A-18C Hornet fighter jet near a clearly marked observation post in the Live-Impact-Area (LIA) of the Navy bombing range in east Vieques, killing the viequense civilian security guard David Sanes Rodríguez. This tragedy sparked a new phase of the protracted struggle, including massive protest and civil disobedience, to end the bombing in Vieques (Cátedra UNESCO de Educación para la Paz, 2000; McCaffrey, 2018). Local viequen-

¹ Based on a plenary lecture with the same title given by the author at the 2017 Conference of Ford Fellows at the National Academy of Sciences, Washington, D.C., on May 4, 2018.

² **Jorge L. Colón.** Professor, Department of Chemistry, Faculty of Natural Sciences, University of Puerto Rico, Río Piedras Campus. jorge.colon10@upr.edu

ses combined with mainland Puerto Ricans, Puerto Ricans from the diaspora, and others around the world forced the Navy to end the bombing in May 1, 2003 (Atilés-Osoria, 2014; McCaffrey, 2018; Zenón, 2018). The Navy transferred the former military camp and target impact area on the east of Vieques to the Department of Interior (DOI) in accordance with Public Law 107-107. The area became a federal national wildlife refuge managed by the DOI U.S. Fish and Wildlife Service.

On February 11, 2005, the U.S. Environmental Protection Agency (EPA) placed the Vieques bombing range and surrounding waters on its Superfund National Priorities List (NPL) under the designation Atlantic Fleet Weapons Training Area (AFWTA)-Vieques (National Priorities List for Uncontrolled Hazardous Waste Sites, 2005). The Superfund program is the common name for the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The NPL is EPA's priority list of sites throughout the United States and its territories with known or potential releases of hazardous substances, pollutants, or contaminants. Under CERCLA the Navy, as the agency responsible for the contamination, funds and conducts all cleanup activities on Vieques, with oversight by the EPA and the Puerto Rico Environmental Quality Board. After more than 16 years since the Navy stopped bombing in Vieques, the cleanup efforts have just consisted in removing bombs and other unexploded ordnance using methods that include open detonation and open burning, which present health risks to residents from the contaminants in the smoke column due to the prevailing trade winds in Vieques. In addition, no soil decontamination has yet occurred, and cleanup activities of underwater areas have not started; the current Navy estimate is that the cleanup activities might be completed by 2032 (almost 30 years after the Navy stopped the bombing). The decades of environmental and health deterioration in Vieques due to the U.S. Navy military practices and the current inappropriate cleanup efforts is a clear example of environmental colonialism (Atilés-Osoria, 2013; Atilés-Osoria, 2014; Ayala, 2003; Concepción, 1998).

The history of environmental colonialism in Vieques is tied to the colonial history of Puerto Rico (Ayala & Bernabe, 2007; Ayala Casás & Bolívar Fresneda, 2011). Puerto Rico, a Caribbean archipelago and colony of Spain for more than 400 years, was ceded, along with Philippines and Guam, to the United States after the Spanish-American War of 1898 by the Treaty of Paris (Immerwahr, 2019). In the now infamous Insular Cases, the U.S. Supreme Court declared that Puerto Rico "is a territory appurtenant and belonging to the United States, but not a part of the United States" (*Downes v Bidwell*, 1901; Rivera, 2007; Torruella, 2013). Puerto Rico is a non-incorporated territory belonging to the United States and subject to Congress's authority under the Territorial Clause of the U.S. Constitution (Article IV, Section 3, Clause 2 of the US Constitution). The colonial status of Puerto Rico did not change when Puerto Ricans were granted U.S. citizenship in 1917 nor upon the establishment of the Commonwealth of Puerto Rico in 1952. A recent court ruling (*Puerto Rico v. Sánchez Valle*, 2016) and a federal law (PROMESA, 2016) have reaffirmed the U.S. colonial control on the island, culminating with the appointment of an unelected seven-member Fiscal Oversight and Management Board that has imposed extreme austerity measures

SCIENCE, COLONIALISM AND THE CASE FOR ENVIRONMENTAL JUSTICE IN VIEQUES and has more power over the island economic decisions than elected Puerto Rican officials (Colón, 2015; Colón 2017).

History of the Navy presence in Vieques

In 1941, U.S. Public Law 247 allowed the expropriation of 78% of the land in Vieques from much of the viequense population in the period between 1941-43 and 1947, to build a Navy base (Cátedra UNESCO de Educación para la Paz, 2003; Grupo de Apoyo Técnico para el Desarrollo Sustentable de Vieques, 2002; Meléndez, 2000). Eighty-nine percent of the civilian population remained on the island in a fifth of the area where they lived in 1940 (Figure 2) (Ayala, 2003). The Navy came to own 26,000 of the 33,000 acres of land in Vieques, with an area on the western end of Vieques for a Naval Ammunition Support Detachment (NASD) used to store munitions, and areas on the eastern end of Vieques for an Eastern Maneuver Area (including Camp García), a Surface Impact Area, and a LIA for military practices. The civilian population of Vieques was kept prisoner in a small central area.

The first large scale war practice took place on Vieques in 1948 with more than 60

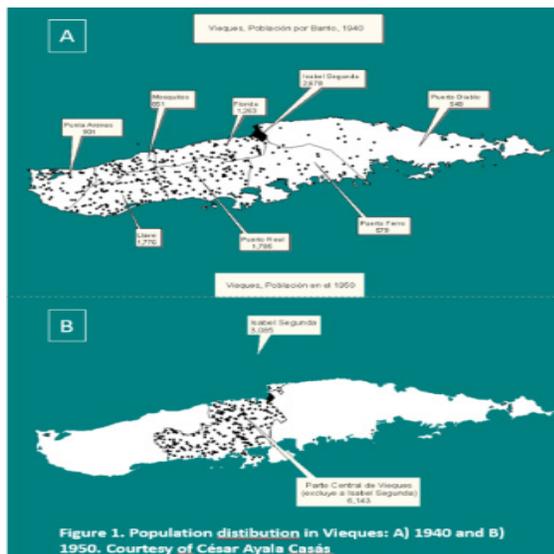


Figure 2. Population distribution in Vieques: A) 1940 and B) 1950. Courtesy of César Ayala Casás.

naval vessels, 350 planes and 50,000 troops. In 1949 the New York Times reported military practices with “more than 100 ships, some 35,000 men and several hundred planes” (The New York Times, 1949) were napalm incendiary bombs were used in Vieques. The large-scale war practices continued from then on (Figure 3). In the early 1980s, on average 3,400 bombs were dropped annually, 158 days of naval bombardment occurred, 200 days of air-to-ground combat exercises were held, and 21 days of amphibious landings took place on the island. Wargo (2009) indicates that the Navy estimated that between 1980 and 2000, on average, 3 million pounds of bombs and ammunition were dropped in Vieques annually and that in 1993 and also in 1994 fourteen million

pounds of ammunition were dispatched by the NASD in western Vieques for use in the maneuvers in east Vieques. During peak training periods, 7,600 bombs were dropped each month, that is, an average of 253 each day (Wargo, 2009), on an island where approximately 10,000 viequenses lived eight miles away, down-wind, from the ranges.

The history of the decades-long struggle of the people of Vieques against the military bombing by the U.S. Navy has already been told on several occasions (Atilés-Osoria, 2014; McCaffrey, 2000, McCaffrey 2018). McCaffrey (2000) indicates that both the Atlantic Fleet of the United States Armed Forces and military forces of the North Atlantic Treaty Organization (NATO) and allied countries of South America and the Caribbean were trained and conducted war games in Vieques. The Navy obtained over \$80 million a year from renting Vieques for training, military maneuvering, and weapons’ testing of its allies. McCaffrey

women and found that as many as 26.7% of those tested had mercury levels that were unsafe for a developing human fetus. This is much higher than the 7% that has been found previously among reproductive-aged women in the continental U.S. and the 6.6% for those tested in the coastal northeast of Puerto Rico. Another study was conducted by the Puerto Rico Department of Health (2006) to detect the presence of arsenic in hair and urine, cadmium in hair and creatinine, nickel in hair and creatinine, mercury, aluminum and lead in blood and uranium in urine. Some of the results were that at least one metal was detected in about 90% of the population in the study and there were fifteen viequenses with toxicity levels.

The Vieques population has been exposed to toxic contaminants by the military practices and bombing of land and sea from 1948 to 2003 and by the BIP, open burning and detonation methods used in the Superfund site cleanup efforts that have impacted the health of the Vieques population (Díaz, Pérez, Delgado-Acevedo & Massol-Deyá, 2018; Mansilla-Rivera, Nazario, Ramírez-Marrero, Crespo & Rodríguez-Sierra, 2014; Nazario, Suárez & Pérez, 1998; Ortiz-Roque & Yadiris, 2004; Porter, Barton & Torres, 2011; Sanderson, Fauser, Stauber, Christensen, Løfstrøm, & Becker, 2017; Wargo, 2009). In 1996, the Graduate School of Public Health of the University of Puerto Rico analyzed cancer data from the Puerto Rico Department of Health up to 1989 and confirmed that: 1) the incidence rate of cancer in Vieques increased since the early 1970s until 1989, 2) the incidence rate followed the pattern of increasing days and intensity of U.S. Navy use of the Vieques Bombing Range, after the Navy closed the Culebra Bombing Range in 1970s and transferred its maneuvers to Vieques, with a lag time of 20 years, 3) in the early 1980s the cancer incidence rate in Vieques surpassed the one in Puerto Rico, and 4) the excess cancer risk for the time period of 1985-89 was 27% ($p < 0.05$) for the population of Vieques compared to Puerto Rico, but the excess was 117% and 257% for viequenses 0-9 years and 10 to 19 years of age, respectively - compared to children of the same ages in Puerto Rico (Nazario, Suárez & Pérez, 1998).

The Agency for Toxic Substances and Disease Registry (ATSDR) was tasked in 1999 to evaluate whether health problems among Vieques residents were associated with exposure to hazardous substances resulting from military training exercises on the island that reached them through exposure pathways such as groundwater and drinking water, soil, fish and shellfish and air. The reports, called Public Health Assessments and published in 2003 (ATSDR 2001, 2003 a, b, c; ATSDR, 2009), did not establish a link between human health and military training. However, upon major criticism of the reports from Puerto Rican scientists and scientists from abroad for lacking scientific rigor, these reports were withdrawn by ATSDR in 2009, citing sample design inadequacy and sample size insufficiency (Navarro, 2009). A second ATSDR report (2013) reached similar conclusions as the first, but was strongly disputed on scientific grounds (Pierluisi, 2012). Vieques residents have been denouncing the Navy and its contractors for not providing the information needed to access the cleanup process and not considering alternatives suggested by their environmental consultants. The Navy pretends to “clean up” Vieques to the lowest standard possible (a

“low” cleanup/remediation level that would classify the ranges as “limited public access” to use them for wildlife preservation, but not for human habitation), as it has done in many of its former contaminated practice ranges (Government Accountability Office, 2001).

The U.S. Navy continues to use open burning/open detonation in the cleanup activities of thousands of remaining bombs in the former LIA, a Superfund site. In 2013, 7,000 Vieques residents filed a petition to the Inter-American Commission on Human Rights (IACHR) against the U.S. Navy, alleging violations of their human rights and environmental justice (Epting, 2015). This petition was supported by the Natural Resources Defense Council (NRDC) who submitted an *amicus curiae* brief in 2017. On April 3 2019, U.S. Ambassador Carlos Trujillo sent a letter to the IACHR with the U.S. response and, as expected, argued that the petition is inadmissible and must be dismissed. The response letter includes the following information about the Navy cleanup efforts: “During this effort, over 7.7 million items of Material Potentially Presenting an Explosive Hazard (MPPEH) have been safely recovered and processed. To date, the Navy has removed approximately 102,000 munitions items, including 39,000 projectiles, 32,000 bombs, 4,300 mortars, 1,300 rockets, 16,000 submunitions, and 9,400 grenades, flares, pyrotechnics, and other munitions. The remaining 7.6M items were scrap metal or other material documented as safe. Approximately 57,000 munitions items have been destroyed in controlled detonations, and 45,000 munitions items have been processed by other means.” (Trujillo, 2019, p.11). Since “controlled detonations” is the BIP, open burning/open detonation method, the U.S. government is admitting that thousands of bombs and other ordnance have been detonated in open air exposing the Vieques residents to the environmental and health consequences of such actions.

In January 2019 a report by the National Academies of Science, Engineering and Medicine indicated that there are alternative means of demilitarizing conventional bombs and munitions, including using closed detonation chambers (National Academies of Sciences, Engineering, and Medicine, 2018), as has been suggested for many years by community environmental consultants and the Vieques population. However, the Navy continues to oppose their use in Vieques. Swift land and underwater cleanup and decontamination from the unexploded ordnance left behind by the US military is necessary. Full disclosure by the Navy of all bombing activities has not occurred and it is urgently needed to provide a full assessment of contamination levels and future decontamination efforts.

Vieques community-based organizations such as *Vidas Viequenses Valen* (Figure 4), *La Colmena Cimarrona*, and *Vieques en Rescate*, among others, are actively leading the way in denouncing the Navy clean up efforts and providing health, farming and nutrition services to the population (McCaffrey, 2018; Medina, Pellegrini & Mogro-Wilson, 2014). The daily situation of the viequenses, particularly the ones in need of medical help, and the tourism industry, which provides jobs and injects money into the small island economy, is dire since the ferry service to the island operated by the Puerto Rico government is in such bad shape that recently the Governor had to call in the National Guard for help with transportation. In addition, medical facilities are urgently needed in Vieques. Unfortunately,

SCIENCE, COLONIALISM AND THE CASE FOR ENVIRONMENTAL JUSTICE IN VIEQUES

Vieques is definitely a colony within a colony. The same solidarity demonstrated by so many people worldwide that helped stop the bombing in Vieques is required again to pressure the U.S. Navy to conduct a responsible and comprehensive cleanup of Vieques, and the Puerto Rican and U.S. government to provide funds for ferry and health services to the Vieques population. The Cease Fire Campaign (cswab.org) has included Vieques in its campaign to stop open burning and open detonation of military munitions.

The environmental injustice in Vieques cannot continue. Peace for Vieques will not be accomplished if health and environmental justice does not reach all of its citizens.



Figure 4. Protest of *Vidas Viequenses Valen* against the U.S. Navy.

References

- Atilés-Osoria, J. M. (2013). Colonialismo ambiental, criminalización y resistencias: Las movilizaciones puertorriqueñas por la justicia ambiental en el siglo XXI. *Revista Crítica de Ciencias Sociales*, 100, 131-152.
- Atilés-Orsoria, J. M. (2014). Environmental colonialism, criminalization and resistance: Puerto Rican mobilizations for environmental justice in the 21st century. *RCCS Annual Review*, 6(6), 3-21. URL : <http://rccsar.revues.org/524>; DOI : 10.4000/rccsar.524.
- ATSDR (2001). Focused public health assessment: drinking water supplies and groundwater pathway evaluation, Isla de Vieques Bombing Range, Vieques, P.R. Appendix F. https://www.atsdr.cdc.gov/HAC/PHA/reports/isladevieques_10162001pr/index.html. Accessed October 6, 2019.
- ATSDR (2003a). Public health assessment: soil pathway evaluation, Isla de Vieques Bombing Range, Vieques, Puerto Rico. February 7. Springfield, VA: National Technical Information Service. https://www.atsdr.cdc.gov/HAC/PHA/reports/isladevieques_02072003pr/expopath.html. Accessed October 6, 2019.

DESCOLONIZAR LA PAZ

- ATSDR (2003b). Public health assessment: fish and shellfish evaluation, Isla de Vieques Bombing Range, Vieques, Puerto Rico, National Technical Information Service, Springfield June 27 2003. https://www.atsdr.cdc.gov/HAC/PHA/reports/isladevieques_06272003pr/appendices2.html. Accessed October 6, 2019.
- ATSDR (2003c). Public health assessment: air pathway evaluation, Isla de Vieques Bombing Range, Vieques, Puerto Rico. National Technical Information Service, Springfield, Aug 26 2003. https://www.atsdr.cdc.gov/HAC/pha/reports/isladevieques_08262003pr/index.html. Accessed October 6, 2019.
- ATSDR (2009). Vieques scientific consultation November 5–6. Books I and II. Agency for Toxic Substances and Disease Registry, Atlanta, GA.
- ATSDR (2013). An evaluation of environmental, biological, and health data from the Island of Vieques. U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR), Division of Community Health Investigations, Atlanta, Georgia 30333. https://www.atsdr.cdc.gov/sites/vieques/2013_report.html. Accessed October 6, 2019.
- Ayala, C. (2003). Recent works on Vieques, colonialism, and fishermen. *Centro Journal*, XV(1), 212-225.
- Ayala, C., & Bernabe, R. (2007). *Puerto Rico in the American century: A history since 1898*. Chapel Hill: The University of North Carolina Press.
- Ayala Casás, C., & Bolívar Fresneda, J. (2011). *Battleship Vieques: Puerto Rico from World War II to the Korean War*. Princeton: Markus Wiener Publishers.
- Baldwin, H. W. (1949, March 2). Island Bombarded in Navy War Game. *The New York Times*, p. 11. <https://www.nytimes.com/1949/03/02/archives/island-bombarded-in-navy-war-game-live-shells-bombs-and-rockets.html> (accessed on October 8, 2019).
- Berman Santana, D. (2002). Resisting toxic militarism: Vieques versus the U.S. Navy. *Social Justice*, 29(1/2), 37-47.
- Cátedra UNESCO de Educación para la Paz (2000). *De Vieques a la Universidad: Lecciones y necesidades del pueblo de Vieques en lucha por la paz y el desarrollo*. Tercera Lección Magistral de la Cátedra UNESCO de Educación para la Paz de la Universidad de Puerto Rico. Río Piedras: Universidad de Puerto Rico.
- Colón, J. L. (2015). Puerto Rico's future at stake. *Science*, 349(6253), 1145. DOI: 10.1126/science.aad3620.
- Colón, J. L. (2018). Renewable energy for Puerto Rico. *Science*, 362(6410), 7. DOI: 10.1126/science.aav5576.
- Concepción, C. M. (1998). Justicia Ambiental, luchas comunitarias y política pública. *Revista de Administración Pública*, 31-32, 89-113.
- Davis, J. S., Hayes-Conroy, J.S., & Jones, V.M. (2007). Military pollution and natural purity: Seeing nature and knowing contamination in Vieques, Puerto Rico. *Geo Journal*, 69(3), 165-179.
- Díaz, E., Pérez, D, Delgado-Acevedo, J., & Massol-Deyá, A. (2018) Longitudinal survey of lead, cadmium, and copper in seagrass *Syringodium filiforme* from a former bombing range (Vieques, Puerto Rico). *Toxicology Reports* 5, 6–11.
- Downes v. Bidwell*, 182 U.S. 244 (1901) p. 287.

SCIENCE, COLONIALISM AND THE CASE FOR ENVIRONMENTAL JUSTICE IN VIEQUES

- Epting, S. (2015). The limits of the environmental remediation protocols for environmental justice cases: lessons from Vieques, Puerto Rico. *Contemporary Justice Review*, 18(3), 352-365.
- Government Accountability Office (2001). Environmental Liabilities: DOD Training Range Cleanup Cost Estimates are Likely Understated. GAO-01-479, <https://www.gao.gov/new.items/d01479.pdf>. Accessed October 8, 2019.
- Government Accountability Office (2004). Report to the Senate and House Committees on Armed Force, Chemical and Biological Defense, DOD Needs to Continue to Collect and Provide Information on Tests and Potentially Exposed Personnel (May 2004) ("In the 1962-74 time period, the Department of Defense (DOD) conducted a classified chemical and biological warfare test program—Project 112—that might have exposed service members and civilian personnel to chemical or biological agents."). <https://www.gao.gov/new.items/d04410.pdf>. Accessed April 22, 2019.
- Grupo de Apoyo Técnico y Profesional para el Desarrollo Sustentable de Vieques (2002). *Guías para el Desarrollo Sustentable de Vieques*. San Juan: Publicaciones Gaviota.
- Immerwahr, D. (2019). *How to hide an empire: A history of the greater United States*. New York: Farrar, Straus and Giroux.
- Mansilla-Rivera, I., Nazario, C. M., Ramírez-Marrero, F., Crespo, C. J., Rodríguez-Sierra, C. J. (2014). Assessing arsenic exposure from consumption of seafood from Vieques-Puerto Rico: A pilot biomonitoring study using different biomarkers. *Archives of Environmental Contamination and Toxicology*, 66(2), 162-175.
- Massol-Deyá, A., & Díaz de Osborne, E. (2013) *Ciencia y Ecología: Vieques en crisis ambiental*. Adjuntas, Puerto Rico: Publicaciones Casa Pueblo.
- Medina, C. K., Pellegrini, L. C., & Mogro-Wilson, C. (2014). Political power and health inequalities in Vieques, Puerto Rico, *Social Work in Public Health*, 29(5), 401-416. doi:10.1080/19371918.2013.853017. Accessed October 8, 2019.
- Meléndez López, A. (2000) *La batalla de Vieques*. Río Piedras, Puerto Rico: Editorial Edil.
- McCaffrey, K. T. (2002). *Military power and popular protest: The U.S. Navy in Vieques, Puerto Rico*. New Brunswick: Rutgers University Press.
- McCaffrey, K. T. (2018). Environmental remediation and its discontents: the contested cleanup of Vieques, Puerto Rico. *Journal of Political Ecology*, 25(1), 80-103.
- National Academies of Sciences, Engineering, and Medicine (2018). Alternatives for the Demilitarization of Conventional Munitions. Washington, DC: The National Academies Press. doi: <https://doi.org/10.17226/25140> . Accessed February 10, 2019.
- National Priorities List for Uncontrolled Hazardous Waste Sites; Environmental Protection Agency, 70 Fed. Reg. 7182 (January 11, 2005).
- NAVFAC ATLANTIC Public Affairs Office. 2018. Vieques Environmental Restoration Fact Sheet. Depleted Uranium in the Live Impact Area of Vieques. Vieques Environmental Restoration Fact Sheet. Depleted Uranium in the Live Impact Area of Vieques. https://www.navfac.navy.mil/content/dam/navfac/Environmental/PDFs/env_restoration/vieques/Depleted_Uranium_FS_English.pdf. Accessed April 22, 2019.
- Nazario, C. M., Suárez, E., & Pérez, E. (1998). Critical analysis of the Puerto Rico Department of Health's Report *Cancer Incidence in Vieques*, March 10, 1998. Department of Biostatistics and Epidemiology, Graduate School of Public Health, University of Puerto Rico.

DESCOLONIZAR LA PAZ

- Ortiz-Roque, C., & Yadiris, L. R. (2004). Mercury contamination in reproductive age women in a Caribbean island: Vieques. *Journal of Epidemiology and Community Health*, 58(9), 756–757.
- Pierluisi, P. R. (2012). Comment on “An evaluation of environmental, biological, and health data from the Island of Vieques.” Committee on Ethics, U.S. House of Representatives; Washington, DC. March 6, 2012.
- Porter, J. W., Barton, J. V., Torres, C. (2011). Ecological, radiological, and toxicological effects of Naval bombardment on the coral reefs of Isla de Vieques, Puerto Rico. In G. Machlis, T. Hanson, Z. Spiric, & J. E. McKendry (eds.) *Warfare Ecology: A New Synthesis for Peace and Security*. (pp 65-122). NATO Science for Peace and Security Series – C: Environmental Security. Dordrecht: Springer.
- Puerto Rico Department of Health (2006, noviembre). Estudio de prevalencia de metales pesados en Vieques, Puerto Rico.
- Puerto Rico v. Sánchez Valle* (2016), 136 S. Ct. 1863.
- Puerto Rico Oversight, Management, and Economic Stability Act (PROMESA). 2016. Public Law 114-187, 130 Stat. 549 (codified at 48 U.S.C. § 2101 (2016)).
- Rivera, E. R. (2007). *American colonialism in Puerto Rico: The judicial and social legacy*. Princeton: Markus Wiener Publishers.
- Sanderson, H., Fauser, P., Stauber, R. S., Christensen, J., Løfstrøm, P., & Becker, T. (2017). Civilian exposure to munitions-specific carcinogens and resulting cancer risks for civilians on the Puerto Rican island of Vieques following military exercises from 1947 to 1998. *Global Security: Health, Science and Policy*, 2(1), 39-60.
- Torruella, J. R. (1988). *The Supreme Court and Puerto Rico: The doctrine of separate and unequal*. San Juan, Puerto Rico: Editorial de la Universidad de Puerto Rico.
- Torruella, J. R. (2013). Ruling America’s colonies: The Insular Cases. *Yale Law & Policy Review*, 32, 57-95.
- Trujillo, C. (2019, April 3). Letter to Dr. Paulo Abrão, Executive Secretary, Inter-American Commission on Human Rights.
- Vieques to Protest Explosions, Contamination by US Navy (July 31, 2017). Retrieved October 17, 2019, from <https://www.telesurenglish.net/news/Vieques-to-Protest-Explosions-Contamination-by-US-Navy-20170731-0011.html> .
- Wargo, J. (2009). *Green intelligence*: New Haven: Yale University Press.
- Yelin, J. C., & Miller, D. S. (2009). A brief history of environmental inequity and military colonialism on the isle of Vieques, Puerto Rico. *Environmental Justice*, 2(3), 153-159.
- Zenón, C. (2018). *Memorias de un pueblo en lucha: Manual de lucha para los jóvenes que quieren transformar a Puerto Rico*. San Juan: Editorial El Antillano.

Colón, J. (2020). Science, colonialism, and the case for environmental justice in Vieques. En Yudkin Suliveres, A. & Pascual Morán, A. (Eds.). *Descolonizar la paz: Entramado de saberes, resistencias y posibilidades*. Antología conmemorativa del 25 aniversario de la Cátedra UNESCO de Educación para la Paz. Cátedra UNESCO de Educación para la Paz, Universidad de Puerto Rico. ISBN 978-0-578-23166-2. <http://unescopaz.uprrp.edu/antologia25.html>