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Beautiful Ruin: Creating Healthfields

Laurel Berman

Abstract

Multiple programs promote redevelopment of land reuse sites, which are environmentally impacted or potentially contaminated sites. Historically, such programs have focused primarily on economic development. However, public health is an important consideration to address not only sustainable redevelopment but also health inequity and disparities. The Agency for Toxic Substances and Disease Registry's (ATSDR) Land Reuse Health Program is a special program to promote broad public health improvements through safe land reuse and redevelopment. Land reuse sites are virtually in every community in the U.S. and are a global problem. Brownfields are the greatest number of land reuse sites. With estimates of over 450,000 land reuse sites across the U.S., most communities suffer the burden of blight and contamination associated with these sites. ATSDR promotes and practices **Healthfields Redevelopment**: The safe reuse of environmentally distressed land to reduce exposures to contaminants and to improve overall health in the community. In this chapter, I highlight Navajo Nation Healthfields activities using ATSDR's **5-step Land Reuse Strategy to Safely Reuse Land and Improve Health (5-step Land Reuse Model)** and describe some of ATSDR's Healthfields projects and related tools and resources for communities to create their own Healthfields practice.

Keywords: Brownfields, land reuse, community revitalization, Healthfields, redevelopment, health outcomes, ATSDR

1. Introduction

Land reuse is the redevelopment of environmentally impacted sites. While there are many types of land reuse sites, brownfields—potentially contaminated, underused, or vacant properties—are the most numerous of these sites. Brownfields may have less serious contamination than other types of land reuse sites, such as Superfund sites, which are hazardous waste sites that are on the National Priorities List for remediation [1, 2]. Land reuse sites like brownfields exist all over the country and include old gas stations, abandoned manufacturing and commercial/industrial facilities, residential buildings, and incompatibly located or under-utilized sites [3].

Contaminated sites are routinely reused and redeveloped in the U.S. and throughout the world. In the U.S., multiple programs are in place to promote redevelopment. Two well-known programs are the U.S. Environmental Protection Agency's (EPA's) Brownfields Program [4] and Superfund Program [5]. Many

federal and state programs promote economic development aspects of land reuse and redevelopment. However, land reuse and redevelopment is also an opportunity to reduce health inequity and disparities by redesigning communities to improve overall health.

The Agency for Toxic Substances and Disease Registry (ATSDR) in Atlanta, Georgia, is a federal public health agency of the **U.S. Department of Health and Human Services**. ATSDR protects communities from harmful health effects related to exposure to natural and man-made hazardous substances. We respond to environmental health emergencies; investigate emerging environmental health threats; conduct research on the health impacts of hazardous waste sites; and build the capabilities of and provide actionable guidance to state and local health partners. Our Land Reuse Health Program is a special program to promote broad public health improvements through safe land reuse and redevelopment. This includes economic development, as it is integrally tied to other health improvements, such as the ability to afford healthful food, participate in recreation, and clean up distressed environments.

Since the mid-1990s, ATSDR's Land Reuse Health Program has built skills and knowledge of communities and state, local, tribal, and territorial partners to integrate a public health focus in land reuse and redevelopment.

Some land reuse sites can pose significant harm to the health of people and ecosystems. People who live near or access land reuse sites often experience disproportionate exposure to environmental pollution, which can result in poor health outcomes, including higher rates of chronic disease; toxic exposures such as from mercury or lead based paint that result in adverse health effects; and cancer [6–8]. Children and other vulnerable populations, such as the elderly or pregnant women, may suffer even greater levels of adverse health impacts from exposure to environmental pollution. In their analysis of environmental threats to child health, Wigle, Arbuckle, and Walker, et al. [9] highlighted common environmental contaminants that included lead, methylmercury, polychlorinated biphenyls (PCBs), dioxin, polycyclic aromatic hydrocarbons (PAHs), pesticides, environmental tobacco smoke, air toxins (e.g. particulate matter and ozone), and many other contaminants that can harm children. Many of these contaminants and factors are commonly associated with land reuse sites and can be very toxic.

To illustrate typical contaminants of concern associated with land reuse sites such as brownfields, ATSDR's Land Reuse Team summarized EPA's Cleanups in My Community (CIMC) data from 2013 to 2017 [10]. We generated a list of U.S. entities that received EPA brownfields assessment or cleanup funding. We selected the measure of cities and counties in states that received the most funding as a proxy measure for states with the highest numbers of brownfields. In all there were 11 states with the highest number of brownfields. We selected 10 of the 11 states that also currently have ATSDR cooperative agreement funding to conduct public health assessments. In a subsequent analysis, we compared the 2013–2017 brownfields listings to brownfields on which public health assessments had been completed. As shown in **Figure 1**, we reviewed the “Top 10” states for suspected or confirmed contaminants of concern at brownfields. The majority of sites listed in the CIMC data base were undergoing site assessments. Very few were undergoing cleanup. The primary contaminants, from most to least common, ranged from metals (other metals and lead), volatile organic compounds (VOCs), petroleum, PAHs, asbestos, arsenic, chromium, cadmium, mercury, “other” [contaminants], semi-volatile organic compounds (SVOCs), selenium, copper, PCBs, nickel, iron, and pesticides. These contaminants can be highly toxic and can cause neurological effects (e.g. lead, mercury, and pesticides) or cancer (e.g. VOCs and chromium), among other adverse health effects.

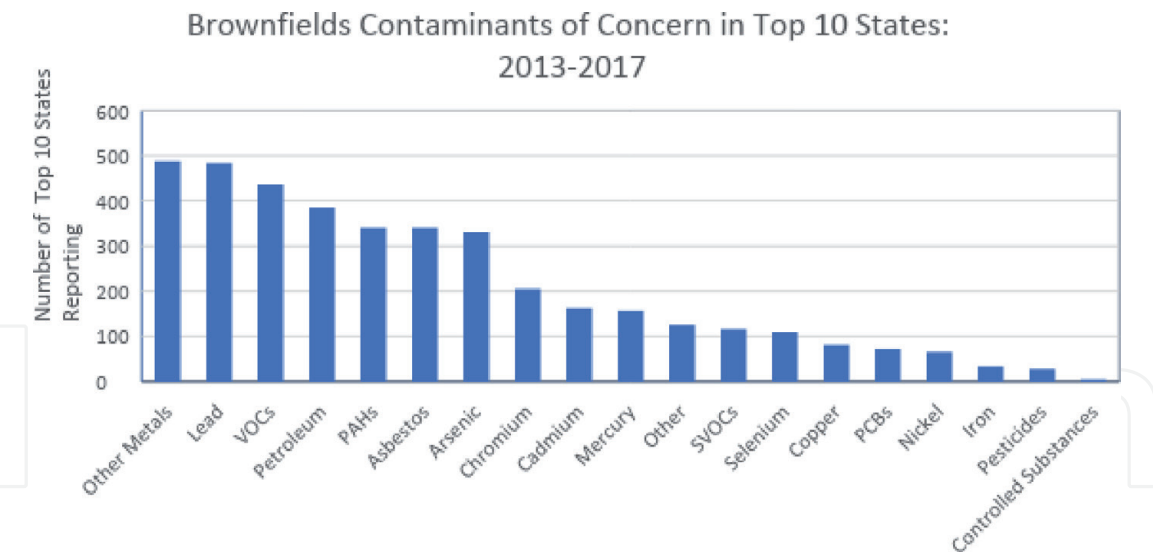


Figure 1. Brownfields contaminants in “top 10” states that received the Most brownfields funding and are in cooperative agreements with ATSDR. Source: Berman, L. Agency for Toxic Substances and Disease Registry. Brownfields contaminants in “top 10” states that received the Most brownfields funding and are in cooperative agreements with ATSDR. Atlanta: Agency for Toxic Substances and Disease Registry; 2020.

2. The extent of the land reuse problem

Apart from potentially harmful chemical exposures, the blighted nature of land reuse sites alone can drag down communities. While blighted properties that are residential may have contamination issues, such as lead based paint or asbestos, at the same time they can be nuisances that attract youth, squatters, and vandals. According to the U.S. Government Accountability Office (2011), vacant and unattended residential properties can attract crime, cause blight, and pose a threat to public safety. The number of vacant residential properties increased 51 percent (%) from 2000 to 2010, from nearly 7 million to 10 million [11]. In their report, *Urban Blight and Public Health: Addressing the Impact of Substandard Housing, Abandoned Buildings, and Vacant Lots* (2017), de Leon and Shilling summarize literature that quantifies the impact of blight on health. They emphasize that exposure to substandard housing disproportionately impacts people of color and people of lower income, particularly in urban areas. In addition, neighborhoods with persistent blight can attract crime and vermin. The impacts on residents include mental distress; higher rates of chronic illness and sexually transmitted diseases; stunted brain and physical development in children; and limited opportunities for exercise [12].

Land reuse is no small problem. Land reuse sites are virtually in every community in the U.S. and are a problem worldwide. Brownfields are a majority component of land reuse sites. As mentioned above, there are estimates of 450,000 brownfields sites across the United States. In the map below, the gray circles represent over 22,000 brownfields sites that have been entered in the EPA’s Assessment, Cleanup and Redevelopment Exchange System (ACRES) database by federal EPA Brownfields grantees. The sites designated by colored circles are communities with brownfields sites where ATSDR has implemented a community health project, provided technical assistance, performed a health assessment, launched a special initiative (e.g. a residential soil sampling event known as “SoilSHOP”), or provided other services to address concerns about contamination.

The map shown in **Figure 2** illustrates that land reuse sites such as brownfields exist everywhere throughout the U.S., particularly in the “rust belt” and former

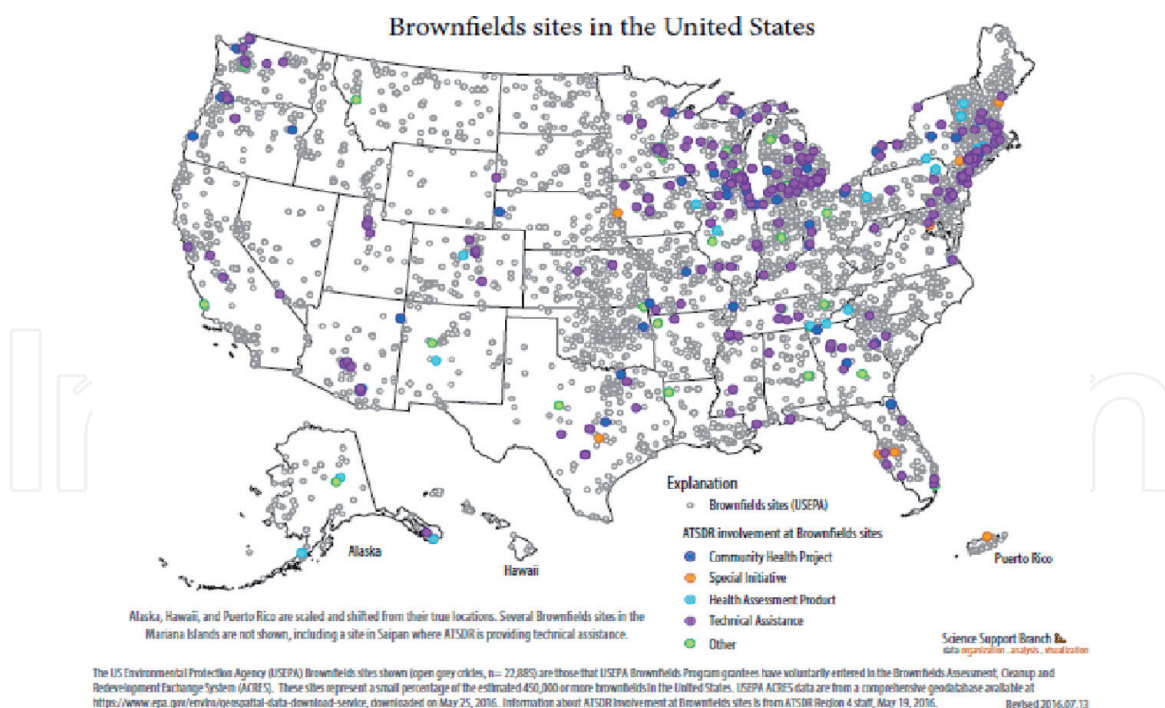


Figure 2. ATSDR involvement at brownfields sites in the United States. Source: Science support branch. Agency for Toxic Substances and Disease Registry. Brownfields sites in the United States. Atlanta: Agency for Toxic Substances and Disease Registry; 2016.

industrial areas in the Eastern United States¹. However, the sites represented in this map are only the known sites, meaning they are only a fraction of the total number of sites. The world of land reuse sites may continuously expand as more sites are created through bankruptcies, foreclosures, or abandonment. The 51% increase in vacant residential properties is one factor that can increase land reuse sites. Other factors include sites that were contaminated in the past and may be discovered during land expansion and development projects or when people become sick, smell odors, or suspect previous contamination.

The map in **Figure 2** shows that there are known land reuse/brownfields sites in Navajo Nation (Northern Arizona and New Mexico). Over 156,000 Navajo live within Navajo Nation, and over 33,000 live on the borders of or outside the Nation (e.g., Flagstaff, Holbrook, and Winslow) [13]. Over 50% of the population is below age 29. Navajo is rural and has low population density. The median household income for the Navajo Nation is \$27,389, which is approximately half that of the State of Arizona (\$51,310) overall. One-third (32%) of all households on the Navajo Nation have incomes of less than \$15,000 when compared to the State of Arizona (17%) [14]. Many Navajo live without electricity (32% of the population), plumbing (31% of the population), water services (38% of the population), natural gas (86% of the population), and telephone services (60% of the population) [15].

The Division of Health and the Navajo Epidemiology Center (2013) report that Navajo people are burdened with many health issues such as alcoholism, diabetes, and cancer. They believe that from an epidemiologic perspective, many of these health issues may be related to socio-economic status and social behavior (see Ref. [13]).

Except for former uranium mining sites and associated health issues of exposure to uranium, it is not known whether health issues in Navajo Nation are related to the presence of land reuse sites. However, Navajo Nation, known for the Painted Desert, Canyon de Chelly, Monument Valley, and many other places of cultural

¹ ATSDR Region 4 staff provided the location data for ATSDR brownfields activities shown on the map.



Figure 3.
 Images of a petroleum spill remediation site in Chinle AZ (left) and the former Navajo Forest products industries site in Red Lake NM. Source: Berman, L. Agency for Toxic Substances and Disease Registry. Brownfields images in Navajo nation. Atlanta: Agency for Toxic Substances and Disease Registry; 2017.

significance and beauty, is littered with land reuse sites and contamination. In Chinle, vacant former fast food restaurants, two sites with active petroleum spills, and other vacant land reuse sites are present. In a conversation with Navajo planner T. Begay (June 6, 2016) during a field visit to a petroleum spill site, he stated that one petroleum plume is currently being remediated and one petroleum plume may have migrated under a multi-unit apartment building, which can impact residents who live there. In Red Lake, the former Navajo Forest Products Industries (NFPI) site sits vacant, with waste left in place until 2019 (right photo of **Figure 3**, below). The site is reported to be over 100 acres [16]. The woodchip fill from the site has caught on fire more than once and when it does, it smolders for days, potentially exposing nearby residents and children at a nearby Head Start and a charter middle school to particulates (i.e., smoke) that may be toxic (interviews with US EPA representative (October 2016) and Navajo Nation EPA representative (June 2019)). The images below highlight two land reuse sites in Chinle and Red Lake (**Figure 3**).

2.1 Healthfields redevelopment

ATSDR conducts public health assessments to determine whether exposure to hazardous substances associated with a hazardous waste site (i.e. a contaminated site) may be harmful. Of over 2700 public health assessments completed by ATSDR as of 2017, 274 were specifically on brownfields, and 42% of the time these assessments indicated a public health hazard. This emphasizes how important community health can be as a driver for redevelopment plans that reduce health inequity and disparities often associated with distressed environments.

ATSDR calls health-focused redevelopment “**Healthfields**” **Redevelopment**: The safe reuse of environmentally distressed land to reduce exposures to contaminants and to improve overall health in the community. Healthfields are integral to a Culture of Health. The Culture of Health Leaders (CoHL) is a program developed by the Robert Wood Johnson Foundation (RWJF) that supports and trains leaders working to improve health inequity and disparities in communities across the United States.

3. Methods used: the 5-step land reuse model to promote Healthfields

To address health risks and exposures related to land reuse sites, ATSDR integrates a public health model in land reuse and redevelopment, the **5-step Land Reuse Strategy to Safely Reuse Land and Improve Health (5-step Land Reuse Model)**. The steps of this model, shown in **Figure 4**, are steps to achieve

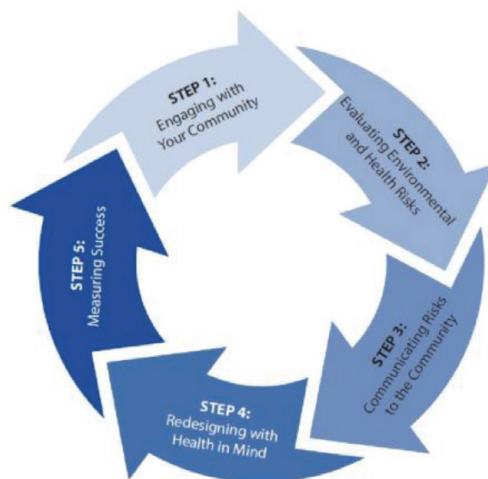


Figure 4.

ATSDR 5-step land reuse model. Source: Agency for Toxic Substances and Disease Registry. ATSDR 5-step land reuse model [image on internet]. Atlanta: Agency for Toxic Substances and Disease Registry; 2019–0904. Available from: https://www.atsdr.cdc.gov/sites/brownfields/land_reuse_toolkits.html#.

Healthfields and highlight activities that community revitalization partners can take to ensure that community health outcomes are at the forefront of redevelopment planning. ATSDR’s goal is to promote Healthfields as a national effort effected at the local level.

In 2016, RWJF launched the first cohort in their CoHL Program. Forty individuals were selected to participate in this three-year program grounded in equity, diversity, and inclusion. ATSDR was able to leverage RWJF funding into ATSDR’s 5-step Land Reuse Model Healthfields initiatives across the country, primarily through Community Partnerships projects and Land Reuse Toolkit Pilots, described below. Ultimately, ATSDR was able to focus intensively on Healthfields as a redevelopment option in our largest Community Partnership: Navajo Nation.

3.1 The 5-step land reuse model steps

Communities interested in renewing and reusing land reuse sites can follow the 5-step Land Reuse Model steps shown in **Figure 4** [17]. These steps can be followed sequentially or individually. For example, if a community is already engaged and contamination has been assessed, the Development Community may opt to start with Step 4 to redesign with health in mind.

Step 1: Engage the Development Community.

The Development Community includes stakeholders with an interest in redevelopment, including residents, nonprofits, officials, planners, environmental or health professionals, developers, and any others with an interest in health-focused community revitalization.

Step 2: Evaluate Environment and Health Issues.

Evaluating environment and health issues at the beginning of the project can help ensure a safer project and a plan to protect and improve public health.

Step 3: Communicate Risks or Health Issues to the Development Community.

Describing risks of contaminants or hazards associated with land reuse sites can help community members learn more about how revitalization projects can address health and environmental issues.

Step 4: Redesign the Community with Health in Mind.

It is important to ask questions to build a healthier community (i.e., what are the benefits?). Redevelopment can be planned to promote healthier places to live and work for the long term, helping to ensure a sustainable, community-driven plan.

Step 5: Measure Success: Environment and Health Change.

Select metrics that correspond to health factors that affect the community, such as assessing the number of sites that are slated for redevelopment, counting the number of grocery stores, or mapping sites with known contamination that are close to residential properties. Tracking these indicators can measure changes in environment and health over the course of redevelopment.

A strong Development Community can work together to assess, clean, and re-envision land reuse sites. Through the diverse partnerships and collaborations that Development Communities offer, public health and planning can lead the effort to reshape America, recycling and improving land and serving as a resource for creating Healthfields.

3.2 Community partnerships

To promote Healthfields, a team of volunteer, multi-sector community engagement and redevelopment experts, the Brownfields & Opportunity Working Network (BROWN), provided free consultative assistance to land reuse communities through ATSDR's Community Partnerships pilot projects. BROWN includes federal, state, and local environmental, housing, development, and health agency representatives; private sector planners and consultants; academics with expertise in community-based research; filmmakers who document land reuse sites and community conditions; and several others who are proponents of Healthfields.

During the 2014–2016 pilot period, BROWN collaboratively provided assistance to seven Community Partnerships in the U.S. and one partnership in Romania. The U.S. partnerships included Healthfields projects in Whitewright, Texas; K.I. Sawyer, Michigan (formerly K.I. Sawyer Air Force Base); Jacksonville, Florida; Howardville, Missouri; Baker City, Oregon; the Arizona Healthfields Initiative focused on creating Healthfields throughout the state; and the Navajo Nation (primarily Chinle and Red Lake). In each Community Partnership, BROWN provided consultative assistance that essentially reflected Steps 1 through 5 of the 5-step Land Reuse Model. We are beginning to quantify outcomes that measure changes in overall community health resulting from these projects. ATSDR is currently highlighting our initial pilot projects and BROWN resources as models for rapid assistance to new partnership communities. ATSDR welcomed two new Community Partnerships in 2018 (Atlanta GA and Andrews University in Berrien County MI). The Navajo Nation Community Partnership is the partnership of focus in this chapter, and it is the partnership that is geographically the largest.

3.3 Land reuse and redevelopment (Healthfields) toolkits

In 2017, ATSDR's Land Reuse Team created the Land Reuse and Redevelopment Toolkits (Land Reuse Toolkits/Healthfields Toolkits). The Land Reuse Toolkits provide guidance to communities to implement the 5 steps of the 5-step Land Reuse Model to create Healthfields. The Toolkits are synchronized and serve as a resource for the typical roles represented in a Development Community: the **Community Champion, Community Planner, Developer, Environmental or Health Professional**, and the **Municipal Agency (Figure 5)**. The Land Reuse Toolkits are available at: ([available at: https://www.atsdr.cdc.gov/sites/brownfields/land_reuse_toolkits.html](https://www.atsdr.cdc.gov/sites/brownfields/land_reuse_toolkits.html)).

In early 2018, ATSDR leveraged RWJF CoHL funding to provide in-person technical assistance to seven Land Reuse Toolkit Pilots. One of the pilots was an expansion of the Navajo Nation Community Partnership. Each pilot focused on at least one step of the 5-step Land Reuse Model. The Navajo Nation Land Reuse

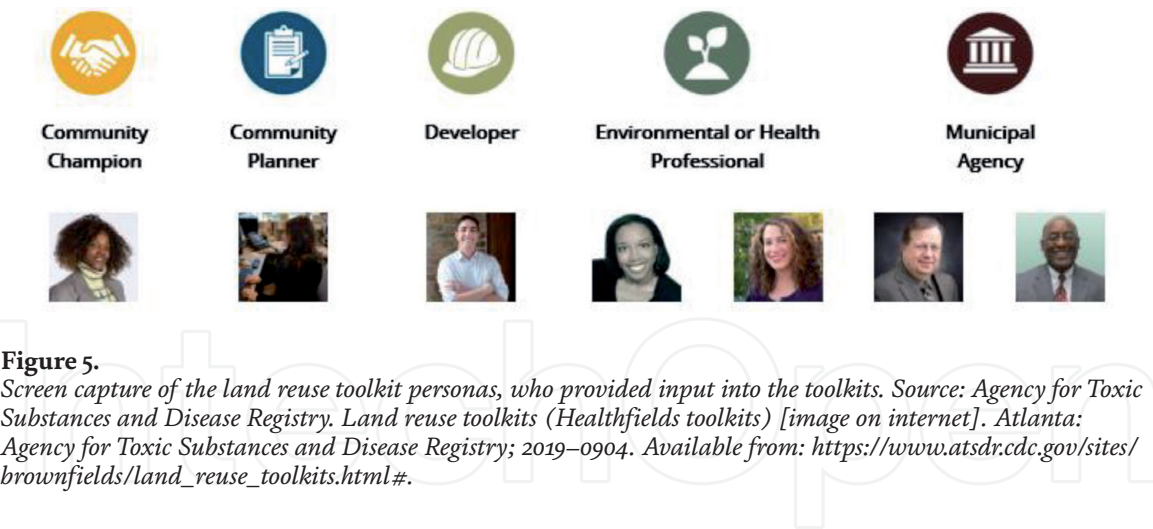


Figure 5. Screen capture of the land reuse toolkit personas, who provided input into the toolkits. Source: Agency for Toxic Substances and Disease Registry. Land reuse toolkits (Healthfields toolkits) [image on internet]. Atlanta: Agency for Toxic Substances and Disease Registry; 2019–0904. Available from: https://www.atsdr.cdc.gov/sites/brownfields/land_reuse_toolkits.html#.

Toolkit Pilot initially focused on community engagement (step 1) and redesigning the community with health in mind (step 4). Navajo Nation completed intensive community engagement and visioning sessions, as well as a full rendering and plan for a vendor crafts village, and ultimately obtained funding to move towards the development phase of this project. During the summer of 2019, the Navajo Nation Land Reuse Toolkit Pilot began to implement the evaluation of environmental and health risks (step 2) by completing a Phase 1 Environmental Site Assessment at a site in Chinle and conducting stakeholder meetings about the former Navajo Forest Products Industries Site in Red Lake.

3.4 A culture of Healthfields in Navajo nation

Navajo Nation is vast. It extends over 27,000 square miles, through Arizona, Utah, and New Mexico (**Figure 6**). Navajo Nation is comprised of five governing Agencies (Tuba City, Chinle, Shiprock, Fort Defiance, and Crownpoint/Eastern) that are subdivided into 110 Chapters [18].

ATSDR leveraged RWJF CoHL funding into expanding the Navajo Nation Community Partnership into a strategic initiative focused primarily in Chinle, Red Lake, and Tsalie (Diné College) Chapters. The strategic initiative focuses on finding resources to clean up and redevelop properties in Chinle and Red Lake; and to provide a curriculum in Healthfields for Diné (Navajo) College students and for tribal environmental professionals in general.

Navajo Nation stakeholders include Navajo Department of Tourism, individual Chapters and Chapter members, Navajo natural resources and environmental agencies, National Park Service (NPS), BROWN members, and many others. We formed the Healthfields Redevelopment Coalition (HRC) as a sustainable entity to apply for redevelopment funding and to address community environmental health concerns. Key members include a planning contractor, an environmental consultant who is also a Culture of Health colleague, Navajo Department of Tourism, Navajo Nation EPA, Diné College, and Chinle and Red Lake Chapters.

The HRC is focusing on numerous sites throughout Navajo Nation. Currently, the HRC is advancing a Healthfields project on a vacant parcel of land in Chinle slated to be a vendor crafts village. Years of outreach and visioning have culminated in a plan for “Vendor Village” that will feature Navajo arts, culture, and a community recreation and cultural history amenity. To supplement the visioning process, we facilitated the use of ATSDR’s Brownfields/Land Reuse Action Model (Action Model) (see: <https://www.atsdr.cdc.gov/sites/brownfields/model.html>) to ensure that multiple stakeholders had equal opportunities to contribute to a health-focused redevelopment plan. During the Action Model process, stakeholders created metrics



Figure 6.
Map of Navajo nation (Navajo nation tourism department, n.d.). Source: Navajo nation tourism department. Map of Navajo nation [image on internet]. Window rock, AZ: Navajo nation tourism department; 2019–0904. Available from: <https://www.discovernavajo.com/hard-map.pdf>.

to measure environment and health change over the course of redevelopment. In addition, the Land Reuse Team trained Chinle, Navajo, and other Chapter representatives on the ATSDR Land Reuse Site Tool, a tool that enables rapid inventorying of land reuse sites, site contamination, and environmental and health risks associated with land reuse sites.

To focus on advancing Healthfields, as well as education about Healthfields, ATSDR partnered with Diné College faculty who run a special Summer Institute for science, technology, engineering, and math students; the HRC; a Summer Institute mentor; and other partners to provide a Healthfields curriculum. HRC members and the Diné College Summer Institute mentor highlighted field activities for two Summer Institute students. ATSDR also created an EHLR Classroom Training Certificate course to ensure that environmental professionals have opportunities to engage in Healthfields practice.

4. Outcomes/results

The RWJF Culture of Health funding enhanced technical assistance through a \$60,000 allocation to the Centers for Disease Control and Prevention (CDC) through the CDC Gift Foundation and a \$35,000 separate allocation to Navajo partners for Healthfields-related projects. The RWJF funding supported ATSDR Land Reuse Team travel and technical assistance to several communities within Navajo Nation and in other projects focused on Healthfields. The RWJF funding also supported ATSDR’s development of educational materials and resources, attendance at conferences and trainings, general strategic planning around Healthfields, and

activities related to editing and production of the BROWN co-authored book, *Land Reuse and Redevelopment: Creating Healthy Communities*, which ATSDR intends to publish in 2020.

4.1 A culture of Healthfields in Navajo nation

The Navajo Community Partnership is incorporating history, education, and redevelopment success to drive small wins and long-term changes. The HRC will build on successful projects, incorporate culture, maximize positive health outcomes, and increase capacity to obtain resources.

Specific activities in the Navajo Nation Healthfields project included the development of community-driven indicators in Chinle to measure changes in environment and health over the course of redevelopment; funding for Healthfields projects; and environmental health (Healthfields) education (**Figure 7**).

Navajo Nation was one of 40 different communities across the U.S. that contributed to the development of a robust data set of public health indicators associated with land reuse and redevelopment. These were derived using the ATSDR Action Model (available at: <https://www.atsdr.cdc.gov/sites/brownfields/model.html>). Among the many Navajo indicators, those specifically related to Healthfields are provided in **Table 1**.

The Navajo Nation Healthfields project covers many different Chapters and community areas. By collaborating with another CoH leader, ATSDR cumulatively leveraged at least \$105,000 in RWJF funds into Navajo Nation Healthfields projects. In addition, a lead HRC member was awarded over \$400,000 in federal funding to finalize the Vendor Village plan (see **Figure 8**). Using CoH funding, in June 2019 a CoH colleague who is also an HRC member, performed the Phase 1 Environmental Site Assessment for the proposed Vendor Village site. Two Diné College Summer Institute students, HRC members, and the Chinle Chapter president observed and participated in the assessment. The site assessment saved the Chinle Chapter \$5,000. After assessing two parcels, the HRC determined that the larger of the two parcels had few environmental issues of concern, and the smaller parcel had two older housing structures (pre-1970 or even earlier) and a small exterior burn pit that require further assessment to rule out the presence of asbestos containing material or lead based paint, which are routine findings of site assessments of properties with similar older structures.



Figure 7. Planning and visioning session in Navajo nation. Source: Berman, L. Agency for Toxic Substances and Disease Registry. Planning and visioning session in Navajo nation. Atlanta: Agency for Toxic Substances and Disease Registry; 2017.

Public health theme	Indicator
Environment/Land Reuse Agriculture and Land Reuse	Improved land management system Improved water efficiency/conservation Recognition of land uses by agencies Farming returns to residents
Community Development Watershed Health Interpretation/education of visitors Create a Navajo Narrative	Reduced 900 acres of tamarisk (an invasive species) Improved signage Cultural and other exhibits Community input training for guides Additional research and publications about Navajo culture and Healthfields Navajo language to be included in interpretative signs and exhibits
Business/ Economy Vending/Tours Home-based Business No fees to enter Canyon de Chelly	Establishing Vendor Village Less reported conflicts over use of area Actual (amount of) sales for vendors Decrease in illegal businesses More cooperation

Table 1.
Excerpt of Navajo nation action model indicators for the Chinle Vendor Village project.



Figure 8.
Rendering of Vendor Village in Chinle, AZ. Source: Antero group. Economic development plan – Navajo nation. [image on internet]. Chicago: Antero group; 2019–0904. Available from: <https://www.anterogroup.com/project/navajo-nation-economic-development/>.

Through the partnership of Diné College in the HRC, two Diné students learned about and participated in the Phase 1 Environmental Site Assessment in Chinle and observed land reuse sites in Chinle, Red Lake, and Holbrook (see **Figures 9 and 10**). In July 2019, RWJF funds sponsored the two Diné students travel and expenses to extend their learning in Chicago for one week. They met federal partners and local experts engaged in land revitalization, environmental justice, public health, and development. I also immersed the students, along with four additional participants, in the pilot test of the EHLR Certificate Classroom Training course.

To promote Healthfields broadly, along with Land Reuse and HRC team members, ATSDR Land Reuse team members taught the EHLR Classroom



Figure 9.
Diné college students participating in a phase 1 environmental site assessment. Source: Lloyd DeGrane. Diné college students participating in a phase 1 environmental site assessment. Chicago: Lloyd DeGrane; 2019–0624.



Figure 10.
Diné college students observing brownfields in Holbrook, AZ. Source: Lloyd DeGrane. Diné college students observing brownfields in Holbrook, AZ. Chicago: Lloyd DeGrane; 2019–0624.

Training Certificate course during the Institute for Tribal Environmental Professionals (ITEP) Tribal Environmental Lands Forum in August 2019. A total of 20 tribal environmental professionals participated in the course and successfully passed their course module tests. One of the environmental professionals serves Diné College, and we hope to jointly provide the training to Diné students in coming years. ATSDR will also host the EHLR Classroom Training Certificate as a free training on our land reuse website. Ultimately, the EHLR Classroom Training Certificate will remain available to future Diné College students, ITEP, tribal environmental professionals, and all environmental and planning professionals long into the future.

5. Discussion

Ultimately, Healthfields redevelopment in Navajo Nation can serve as a model for other regions of the country. ATSDR maintains the Healthfields tools and resources, such as the Action Model and Land Reuse Toolkits on our website, under “Healthfields Tools and Resources” at <https://www.atsdr.cdc.gov/sites/brownfields/index.html>. The real people engaged in Healthfields redevelopment who are the backbone of each Land Reuse Toolkit—community champions and planners, developers, environmental and health professionals, and municipal agencies—are change leaders who are models for others. Success stories about how pilot communities are using the toolkits to engage their communities, communicate risk, create Healthfields community designs, and many other purposes, can pave the way for Healthfields projects nationally.

To promote Healthfields, ATSDR and partners create manuscripts and commentaries about Healthfields and related resources. From 2018 to 2019, the *Journal of Environmental Health* featured a 3-part Healthfields series that focused on the development of the 5-step Land Reuse Model as a national resource; the capacity of local health departments to engage in health-focused land reuse and redevelopment; and community-driven public health indicators associated with land reuse and redevelopment. In addition, 49 BROWN members and their colleagues voluntarily created the book, *Land Reuse and Redevelopment: Creating Healthy Communities* that is slated to be published by ATSDR in 2020.

One exciting development in elevating Healthfields nationally has been connecting with other Culture of Health leaders. For example, a 2018 roundtable discussion during a RWJF CoHL convening blossomed into a new Healthfields project in Berrien County, Michigan. Key partners are faculty from Andrews University in Berrien Springs, Michigan. Andrews University is deeply committed to improving community health through education. Faculty partners are pursuing funding to become a Center for Excellence in Environmental Health. They have become one of ATSDR’s newest Community Partnerships. Through this partnership, we are preparing our first publications that highlights the multi-media (land, air, and water) environmental landscape in Berrien County. In addition, Andrews University Environmental Health faculty intend to integrate the EHLR Certificate as a curriculum option for public health students.

The 5-step Land Reuse Model was formalized in the Land Reuse Toolkits and it is now the basis of the EHLR Certificate. The Certificate is geared to graduate students in public health, planning, and environmental science; environmental professionals; and planners. To ensure the training resources and Certificate are widely available, ATSDR will host the EHLR course materials indefinitely within our website at www.atsdr.cdc.gov/sites/brownfields. Soon, the EHLR Certificate will enable us to train thousands of environmental professionals, planners, and students, broadly promoting Healthfields.

As we gain traction promoting and featuring Healthfields projects, ATSDR can reflect on how much we accomplished with a small amount of funding. We hope that the successes, resources, and tools highlighted in this chapter will provide a roadmap and model for communities to implement in their own revitalization projects, helping to create sustainable health-focused land reuse programs across the country.

6. Leader learning

For leaders struggling with the problem of land reuse sites, blight, concerns about harmful contaminants and the associated health disparities and inequity in

your communities, the 5-step Land Reuse Model approach to creating Healthfields can be adapted to your needs. The 5-step Land Reuse Model is fluid and does not always have to start with Step 1, Engaging with Your Community. However, unless your communities are already engaged and organized, I cannot emphasize enough how important meaningful community engagement (step 1) is to this process. It is like learning to crawl before you can walk. It takes practice, and it is a slow process. As leaders, you may make mistakes. It happens, you are human. Embracing your mistakes as opportunities to learn, and sharing this with your communities, helps with trust-building and is part of the process of community engagement.

It can take months to years to fully form an inclusive and engaged Development Community. As a leader, it is important to support your community's vision of what their end goal is in community revitalization. Keeping the vision in mind while building the coalition of the Development Community can ensure that everyone has a place at the table, everyone feels heard, and everyone is an expert. Once communities are fully engaged and collaborating, they are ready to take action to achieve equitable and just Healthfields revitalization.

7. Toolkits

If you live in or work with communities burdened by blight and land reuse sites, there are many resources available to walk you through the Healthfields process. These include:

ATSDR Land Reuse Toolkits (Healthfields Toolkits): https://www.atsdr.cdc.gov/sites/brownfields/land_reuse_toolkits.html#.

ATSDR Action Model: <https://www.atsdr.cdc.gov/sites/brownfields/model.html>

ATSDR Brownfields/Land Reuse Site Tool: https://www.atsdr.cdc.gov/sites/brownfields/site_inventory.html

ATSDR's Environmental Health and Land Reuse Classroom Training Certificate will be available within our website, along with a future online EHLR Certificate that we are developing with the National Environmental Health Association. Please check here to search for the Certificate: <https://www.atsdr.cdc.gov/sites/brownfields/>.

Additional resources, including a variety of federal agencies, tools, and information are provided on ATSDR's website: <https://www.atsdr.cdc.gov/sites/brownfields/resources.html>.

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