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## Next Generation Learners to Leaders: Intro to Environmental Justice

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### Introduction

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Today, students are aware of the global threats to the environment – but their physical contact, their intimacy with nature is fading. A kid today can likely tell you about the Amazon rain forest – but not the last time he or she explored the woods in solitude or lay in a field listening to the wind and watching the clouds move.<sup>1</sup> When this disconnect happens, it can become hard for them to value the natural world. The long-term effects are that young people lose the ability to focus on sustainability and do not care about the quality of the environment and how this impacts humans. The focus of this unit is for students to gain awareness of the increasing divide between them and the natural world, understand the concept of green spaces, exploring environmental issues of air and water pollution, and identify environmental justice and its movement.

### School Demographics

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I teach at a magnet school in Tulsa, Oklahoma. We celebrate diversity, value our multilingual learners, and pride ourselves with Culturally Responsive Teaching. We house the only secondary dual language program in the Tulsa Public Schools district, allowing elementary dual language students a place to continue receiving instruction in both Spanish and English language arts, as well as instruction in full Spanish in one or more content areas. At Will Rogers Middle School, our current student body is 69.9% Hispanic, 13.7% Caucasian, 5.6% Multi-Race, 5.5% African American, 5.1% American Indian, and .1% Asian with 96.4% of our population on free and reduced lunch. I teach four sections of English Language Development (ELD). My classes reflect this diversity, except for the Caucasian and African American students. I have students with ranging abilities, so it is important that I differentiate and scaffold my instruction, as well as build in some flexibility for those students who need it. This unit will be written for 6<sup>th</sup> grade ELD students, however excerpts of the unit topics articles, podcast, and videos will be beneficial for our middle school study skills classes which includes Caucasian, Native Americans, Asian, and African American students. This class is required for all middle school students. It is a high school preparation course with relevant cultural teachings, such as, Black History Month, Latin American Month, Earth Day Celebrations, etc. therefore the addition of my curriculum unit sprinkled throughout the year will bring a new depth of information to our middle school students.

## Content Objectives/Background

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### **Definition of Environmental Justice.**

What is environmental justice (EJ)? Bullard defines this as the principle that “all people and communities are entitled to equal protection of environmental and public health laws and regulations.”<sup>2</sup> Two claims of the environmental justice movement (EJM) are the assertions that hazardous facilities are concentrated in minority and low-income communities in the United States and that these communities are exposed to inordinate amounts of environmental hazards.<sup>3</sup>

### **Engaging in Nature.**

The unit opens with students recalling experiences in nature followed by making connections to how those experiences shaped their relationship with nature. For some in my students’ generation, nature is more abstract than reality. Increasingly nature is something to watch, to consume, to wear, to ignore.<sup>4</sup> The students will focus on the concept of Nature Deficit Disorder, a term coined by Richard Louv a journalist and author. He helped launch an international movement to connect children, families, and communities to nature. The concept of Nature Deficit Disorder is not a medical diagnosis but a detachment from nature. Physicians, educators, parents, and caregivers recognize its profound impact on children. Children have shifted away from outdoor activities and moved indoors, losing the ability to see themselves as part of nature. This presents a problem because how the young respond to nature, how they raise their own children, will shape the configurations and conditions of our cities, homes, and daily lives,<sup>5</sup> for example, urbanization without nature, shifting to a culture of fear and anxiety, and cultural devaluing of nature.<sup>6</sup> Reducing the deficit – healing the broken bond between our young and nature is in our self-interest because the health of the earth is at stake.<sup>7</sup> The concept of Nature Deficit Disorder caught on and serves as a rallying cry for an international movement of cross-sector leaders including educators, activists, practitioners and parents working to make sure that children have equitable access to nature. These leaders base their work on a growing body of evidence that highlights nature’s critical role in children’s healthy development — and the belief that all children deserve to benefit from regular time spent playing and learning outdoors.<sup>8</sup> The effect of Nature Deficit Disorder is that Richard Louv called for a New Nature Movement, one that recognized the interconnection of all life on earth, including plants, humans, and other animals. From this call to action, the Children & Nature Network was born. These leaders base their work on a growing body of evidence that highlights nature’s critical role in children’s healthy development — and the belief that all children deserve to benefit from regular time spent playing and learning outdoors. Their vision is a world in which children have access to the benefits of nature everywhere they live, learn, and play and their mission is to increase equitable access to nature so that children—and the natural world—can thrive. They are working to advance Nature Everywhere in 100 communities by 2025. They define communities geographically – cities, towns, regions – and as trusted national and global partners focused on the health and well-being of children. Participating communities are selected through an open application process.<sup>9</sup>

The students will learn the term green spaces. These are accessible spaces in a natural setting with grass, trees, any flora, or fauna that could be as small as a local park or as large as a national forest, including community gardens and protected conservation areas. They serve the purpose of giving people access to nature nearby home, work, or school. The benefits of these open areas with vegetation are enhanced health, improved wellbeing, a connection with the landscape, just to name a few.<sup>10</sup> In the journal article, Promoting

Environmental Justice Through Urban Green Space Access: A Synopsis. It gives information on several studies and the positive and negative human health aspects of green spaces or lack thereof. The following is a list of human health aspects from the article:

- Innate need to be in contact with biodiversity for psychological well-being and personal fulfillment
- Urban green space users have greater longevity
- Urban green space users had better self-reported health
- Urban park users reported better general perceived health, more physical activity and relaxation
- views restore attention fatigue; and quicken recovery of attention-demanding cognitive performances
- views provide relaxation, increased positive self-reported emotions, and recovery from stress
- Children with attention deficit disorder who are active in green spaces show reduced symptoms
- Green views increase the effectiveness of people in facing major crises, and lessen aggression by reducing mental fatigue
- People visit favorite places, often natural settings, for regulation of self-experience and feelings
- Natural features and open spaces in a residential area enhance sense of community
- Observed that the majority of trees in a city's planting program were placed on owner occupied properties
- A population that was exposed to the "greenest" environment experienced lower health disparities related to income
- Street trees were related to a lower prevalence of childhood asthma
- Greenness is inversely related to the z-scores for youth body mass index (BMI)
- Reported variation in the distribution of public green spaces; low income areas were negatively associated with the quality of green space
- There is a lower proportion of tree cover on public rights-of-way in areas with a high amount of African Americans, renters, and low income residents
- Green space within a defined distance was associated with all cause and cardiovascular mortality
- Natural environment may influence pregnancy outcomes<sup>11</sup>

There are injustices when discussing green spaces that students should be aware of. These spaces are not historically equitable in who has access to them. Unequal access to urban green spaces is generally not considered in traditional environmental justice research. However, recent conceptualizations have expanded to issues such as equitable access to urban parks and other natural resources. Such access is important because open spaces are associated with economic, psychological, and cultural benefits. Fair access to natural resources and balanced land use practices are examples of ecological issues embedded in environmental justice. Social privilege has enabled many middle-class communities to enjoy a greater distribution of environmental amenities such as public parks.<sup>12</sup> The Children & Nature Network acknowledges that longstanding systems of injustice have impacted the design and distribution of green spaces and call for new policies informed by people who have been impacted by racism and systems of inequity. They are committed to strengthening efforts to advance equity in access to nature.<sup>13</sup>

Richard Louv calls for a New Nature Movement, one that recognized the interconnection of all life on earth, including plants, humans, and other animals. From this call to action, the Children & Nature Network was born.<sup>14</sup> These leaders base their work on a growing body of evidence that highlights nature's critical role in children's healthy development — and the belief that all children deserve to benefit from regular time spent playing and learning outdoors. Their vision is a world in which children have access to the benefits of nature everywhere they live, learn, and

play and their mission is to increase equitable access to nature so that children—and the natural world—can thrive. They are working to advance Nature Everywhere in 100 communities by 2025.<sup>15</sup> They define communities geographically – cities, towns, regions – and as trusted national and global partners focused on the health and well-being of children. Participating communities are selected through an open application process.<sup>16</sup>

The Outdoors for All Act (H.R. 1065 & S. 448) will create and improve state & locally owned parks & outdoor recreation areas, especially in nature-deprived communities. People from all over the country currently face barriers like lacking usable facilities or accessible pathways. Everyone deserves to access the benefits that green spaces and parks provide, like cleaner air and opportunities to run and play.

If passed, this legislation will protect and formally guarantee the continuation of a federal program (the Outdoor Recreation Legacy Partnership) that builds and maintains parks and green spaces. Specifically, this program especially helps urban communities that historically have been denied access to nature. In the United States, 100 million people, including 28 million children, do not live within walking distance of a quality public park.<sup>17</sup>

### **Case Study: The Land Application of Sewage Sludge.**

As a case study, we will consider air pollution from the industry of wastewater management producing sewage sludge that in turn becomes aerosolized during regulated disposal practices. To start, sewage sludge, (also referred to as biosolids), is the byproduct of municipal wastewater treatment plants. Wastewater treatment plants serve an important function by processing and separating the waste in city sewer lines into liquids and semi-solids, then disposing of them. The semi-solid byproduct, sewage sludge is disposed in various ways including, but not limited to incineration, landfilling, or the most popular disposal method is land application where it is disposed on agricultural farmland as fertilizer. So, what seems so bad? Almost sounds like an effort to recycle or reuse waste, right? It will be up to students to decide. Sewage sludge is waste that enters a city's sewer lines, including industrial waste, toxic chemicals, medical waste, cleaning solvents, human sewage, disease-causing pathogens and more. When farmers spread these contaminants onto their fields, aerosols are produced that can be inhaled deep into human lung tissue. In toxicology studies, sewage sludge caused harm to human lung cells.<sup>18</sup> Whose lungs are breathing in sludge? Mostly neighbors to farms in rural parts of the U.S. In addition to humans, our wildlife is exposed to sewage sludge. Through deer lung tissue analysis, Figure 1 demonstrates that wildlife and nearby residents are exposed to chemicals in sewage sludge.

<sup>19</sup>Figure 1 source : [www.Mission503.org](http://www.Mission503.org)

# The strongest relationship of biosolids to animal tissue is the lung

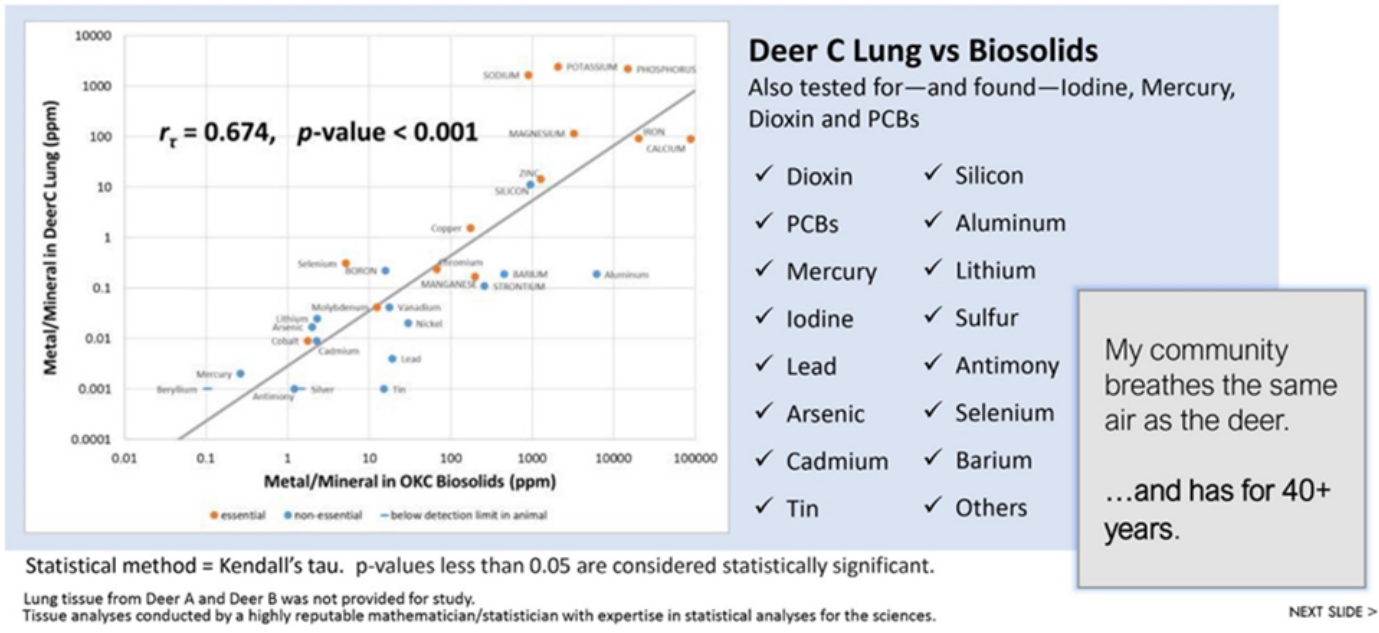
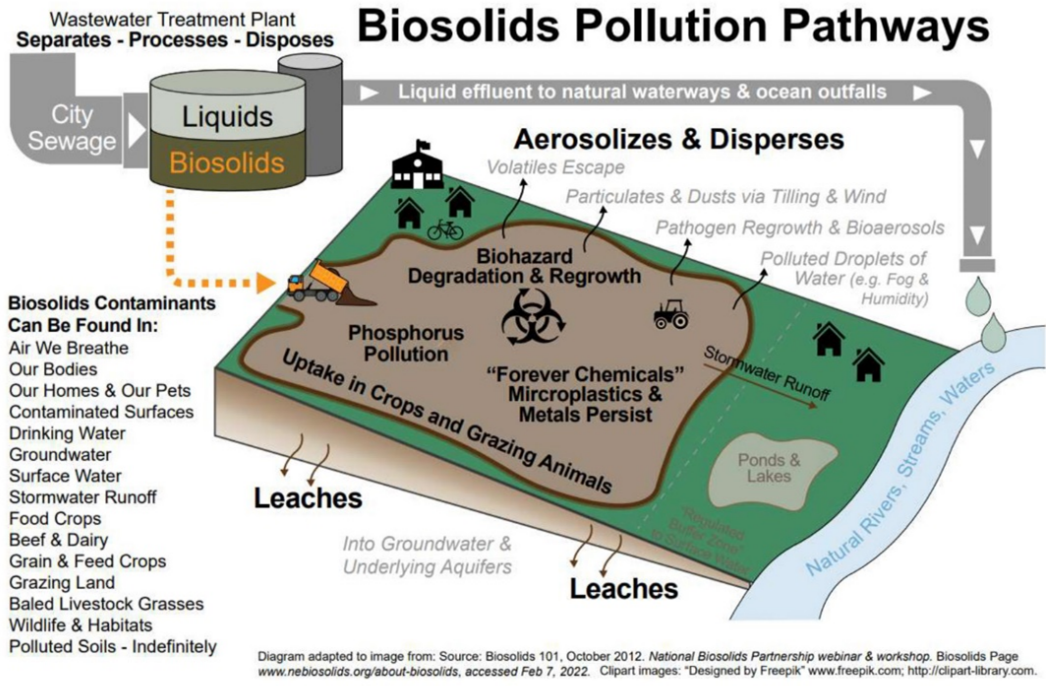


Figure 1. Relationship of biosolids to animal lung tissue

According to the article, Sludge Victims: Voices from the Field, residents who live by sewage sludge land application sites complain of many adverse health effects including sinusitis, bacterial infections, staph infection, eyes, nose, throat and lung infections and irritations such as burning sensations or tearing of the eyes, bloody noses, lung congestion, uncontrollable constant coughing, thick yellow mucus, irregular breathing, gasping for air, pneumonia, bronchitis, pleurisy, asthma, colds, flu, headaches, fever, nausea, dry heaves, gastrointestinal distress, cramps, severe diarrhea, rotavirus, skin rashes, lesions, blisters, boils, fatigue, undiagnosed infections, lupus, cardiomyopathy, cancer, and death.<sup>20</sup> The following visual (Figure 2) illustrates human exposure pathways to sewage sludge.

<sup>21</sup>Figure 2 source : [www.Mission503.org](http://www.Mission503.org)



This diagram illustrates the process.

Land-applying biosolids provides multiple pathways for exposure to harmful pollutants via air, wind, soils, dusts, groundwater, food supply, contaminated surfaces & more.

How do we know?

Figure 2. Exposure pathways to land-applied sewage sludge

In addition to air pollution, land-applied sewage sludge can contaminate well water. Then there are additional effects including swarms of flies and the odor. Some victims liken it to the scent of a dead body.

This is injustice because of the lack of fairness to the innocent victims, animals, and the environment. In 2018 the Environmental Protection Agency (EPA) Office of Inspector General released a report that states, "its controls over the land application of sewage sludge (biosolids) were incomplete or had weaknesses and may not fully protect human health and the environment."<sup>22</sup> The report concludes with, "Although the EPA could obtain additional data to complete biosolids risk assessments, it is not required to do so. Without such data, the agency cannot determine whether biosolids pollutants with incomplete risk assessments are safe. The EPA's website, public documents and biosolids labels do not explain the full spectrum of pollutants in biosolids and the uncertainty regarding their safety. Consequently, the biosolids program is at risk of not achieving its goal to protect public health and the environment."<sup>23</sup>

So, this is where I ask the students, why is this something we should care about? Why does it matter to us and our community? The short answer is that Oklahoma is currently an active user of land-applied sewage sludge with disposal sites across our state. The students had previously studied the Climate and Justice Screening Tool determining that most of Oklahoma is considered disadvantaged with many low-income communities. Are Oklahoma farmers accepting the free delivery of sewage sludge for fertilizer without consideration of the environmental repercussions? It may seem that way, but today's federal regulations and state statutes do not disclose to our farmers the harmful pollutants that are in sewage sludge, nor the environmental repercussions. When you overlap the data from CEJST over the map in Figure 3, the residents ranged from 60% to 90% poverty where there are high concentrations of sewage sludge sites near Tulsa. Without legislation banning sewage sludge application, the best way to make a difference is to turn to grassroots organizations. One such organization is based in Oklahoma City, Mission503. A mom on a mission, Paula

Yockel pursued facts to understand her family’s illnesses that occurred during and after land application of biosolids next to her home. The harm to her family inspired her research. The findings of her research inspired her mission. Each discovery in her primary research appeared to counter to the claims of the federal 503 Rule—40 CFR Part 503—which regulates the use and disposal of sewage sludge. After more than six years of testing and research, some of her top learnings were these:

1. It wasn’t just her family being harmed, and not just communities in Oklahoma
2. The federal 503 rule is misleading our Nation and our farmers
3. City and State authorities are blindly trusting an insufficient and unprotective rule
4. Industry has a vital job and are doing what the law prescribes
5. The cards are stacked against innocent victims and against change, but change must happen<sup>24</sup>

Mission503 aims to end all land disposal of sewage sludge and lead the Nation to responsible and safe sewage disposal solutions.<sup>25</sup>

[26] Figure 3 source : [www.Mission503.org](http://www.Mission503.org)

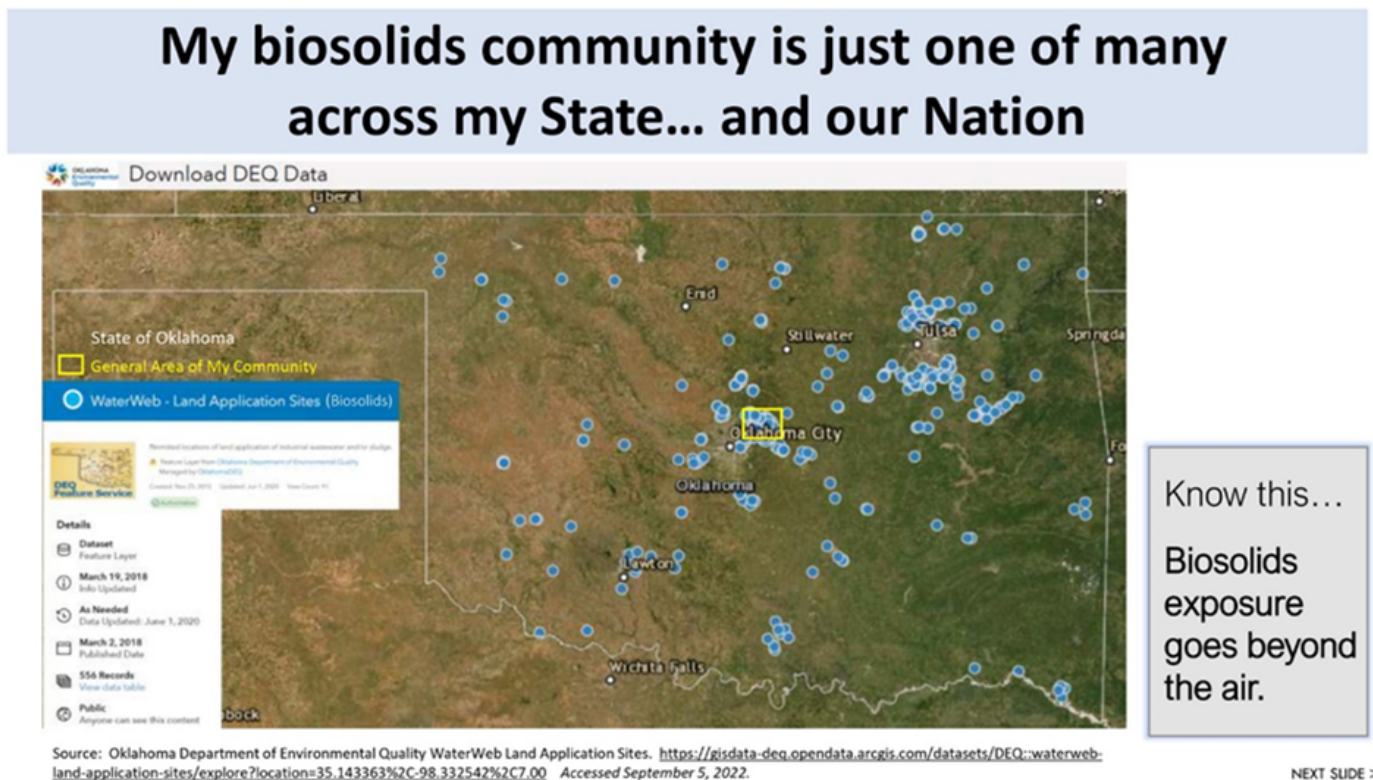


Figure 3. Biosolids sites in Oklahoma

At [www.Mission503.org](http://www.Mission503.org), a brief historical background to the 503 Rule says this: “Municipal sewage has been discarded on soils and in natural waters since modern municipal sewer systems were built. When ocean-dumping of sewage was banned in 1988, federal agencies were tasked with crafting guidelines to regulate, yet still promote, the existing practice of land-disposing sewage. The result? The U.S. Code of Federal Regulations—40 CFR Part 503—the “503 Rule”.<sup>27</sup>

As students explore [EPA.gov](http://EPA.gov) for more information on sewage sludge disposal and the 503 Rule, you will find

information such as this:

- The Part 503 rule established pollutant limits and operational standards to control disease-causing organisms and to reduce the attraction of vectors (disease-carrying organisms, such as rodents and insects) to biosolids. Additionally, the Part 503 rule determined general requirements and management practices, recordkeeping, and reporting, as well as frequency of monitoring.<sup>28</sup>
- Existing requirements and guidance help ensure that biosolids are processed, handled, and land-applied in a manner that minimizes potential risk to human health. Biosolids are divided into “Class A” and “Class B” designations based on treatment methods. The different classes have specified treatment requirements for pollutants, pathogens, and attraction reduction for vector (disease-carrying organisms, such as rodents and insects), as well as general requirements and management practices. 40 CFR Part 503 treatment processes for Class A biosolids claim to eliminate pathogens, including viruses. Generally, pathogens may exist when requirements are met under 40 CFR Part 503 for Class B biosolids, which is why EPA’s site restrictions that allow time for pathogen degradation should be followed for harvesting crops and turf, for grazing of animals, and public contact. Requirements for meeting Class A and Class B biosolids are determined by the federal regulation 40 CFR Part 503. Individual states may have more stringent requirements and additional criteria. Additionally, most states require permits to apply biosolids and a site evaluation might need to be conducted. Biosolids annual reports are collected from the 41 states where EPA implements the Biosolids Program. There are currently nine states (Arizona, Idaho, Michigan, Ohio, Oklahoma, South Dakota, Texas, Utah, and Wisconsin) which are authorized through the National Pollutant Discharge Elimination System (NPDES) Program to be the permitting authority for biosolids. NPDES Program to be the permitting authority for biosolids. Components of the NPDES program include the biosolids program, state NPDES permits, regulation of federal facilities, the pretreatment program, and the general permits program.<sup>29</sup>
- Additionally, it should be noted that there are proponents of the 503 Rule which view land application of biosolids as a beneficial way to recycle organic matter, saying biosolids have successfully been used to improve physical, chemical, and biological properties of soils and to restore degraded ecosystems. However, biosolids may contain heavy metals, organic chemicals and pathogens that may be detrimental to human health and the environment.<sup>30</sup>

40 CFR Part 503 has been amended several times since the regulation was finalized in 1993.<sup>31</sup> The EPA has been resistant to more strictly regulating land application of sewage sludge since the promulgation of the 503 Rule in the early 90’s.

Despite having a federal rule that allows for the disposal of our Nation’s sewage sludge onto our Nation’s soils, one Oklahoma mom, Paula Yockel, the founder of Mission503, believes her testing and research indicate the 503 Rule is harming life and polluting life-sustaining resources, such as air, water, and food supply. So, should the 503 Rule end? Some advocates think so. And to do so, grassroots organizations like Mission503 are advocating for change, not only in Oklahoma, but across the United States because “it will take all of us—uniting on common ground and solid facts—to change a federal rule.”<sup>32</sup>

### **DDT water contamination in Alabama**

This next case is much more intentional with significant repercussions for the environment. According to the book, *Toxic Communities: Environmental Racism, Industrial Pollution, and Residential Mobility Residents*, the author Dorceta Taylor delivers the story of a small predominantly Black rural settlement of Triana, Alabama.



Taylor starts with the residents discovering that they were poisoned with dichlorodiphenyltrichloroethane (DDT) in 1978. They wondered how race and poverty were related to their exposure. Beginning in 1974, DDT – an insecticide widely used to spray crops and kill mosquitoes – was manufactured in the Calabama Chemical Company facility later to be sold and operated under the title Olin. The plant was located six miles from Triana operating on land leased from the U.S. Army at the Redstone Arsenal Complex. When it was in business it operated seven days a week producing between one to two million pounds of DDT monthly. Wastewater contaminated with DDT was released into brick-lined trenches alongside the factory. The trenches transported the effluents from the Olin factory to an acid-neutralization pit and a series of drainage ditches emptied into a stream – the Huntsville Springs Branch. The two most contaminated streams were the Huntsville Springs Branch and Indian Creek. Both tributaries empty into the Tennessee River at Triana. The lives of Triana residents were inextricably linked to what went on in the DDT-manufacturing facility. Contaminated wastewater from the factory traveled less than a mile before emptying into the Huntsville Spring Branch. Triana residents fished for and consumed contaminated fish from Indian creek; they also used the creek and the Tennessee River for their drinking water supply until 1967. DDT is a chemical that poses danger to human health.<sup>33</sup> It is associated with increased risk of pancreatic and breast cancer, non-Hodgkin’s lymphoma, hypertension, impaired neural functions, liver disease, reduced psychomotor function, obesity, elevated cholesterol, and reduced fecundity and other reproductive problems.<sup>34</sup>

Though Olin representatives testified in court that the company believed it operated a “closed plant” that is, a facility that did not allow its product (DDT) or byproducts to escape into the environment, the plant released DDT almost continuously during its operation. Records show that even before Olin acquired the plant, DDT was escaping into local tributaries. In 1948, Calabama’s manager, Benton Wilcoxin (who continued to manage the plant after Olin bought it), discovered that DDT was absorbing to sediment in the waste-water trenches. In 1952, the U.S. Army, concerned about chemical leakage from the plant, set maximum levels of 10 parts per million (ppm) DDT for the effluents. The Army also established a zero permissible level of DDT for the Huntsville Spring Branch. Nonetheless, three years later, Olin engineers found DDT in the waste-water trenches. DDT was again found in samples analyzed from the trenches in 1957 and 1961. While events unfolded at Olin, evidence was mounting that DDT was harmful to humans and the environment. By the mid-1950’s, researchers and DDT manufactures were aware that the chemical was very toxic. As early as 1959, the U.S. Fish and Wildlife Service reported that there was a 97% drop in the number of double-crested cormorants at the Wheeler national Wildlife Refuge (parts of which about the Redstone Arsenal). Rachel Carson’s book, *Silent Spring*, also provided strong evidence that DDT was harmful to wildlife and humans. During the 1960’s, the Army increased the testing of nearby creeks as public awareness of the dangers of DDT grew. After the buildup of DDT was observed at the confluence of the Olin drainage ditch and the Huntsville Spring Branch in 1963, the Public Health Service was asked to conduct a study. The Public Health Service found toxic levels of DDT in the Huntsville Spring Branch and that the fish in the creek were dying from exposure to the chemical. The study also found traces of DDT at a dam more than 100 miles downstream of the Olin plant. Toxicity data in the Public Health Service report indicates that fish exposed to 25% concentration of Olin’s effluents died within an hour of exposure. The study expressed concern for the health of fish and wildlife and for people consuming them. However, it was several more years before local residents who were

subsistence anglers and who consumed large quantities of fish from the creeks around the Olin plant were tested and warned about DDT contamination. In 1964, the Tennessee Valley Authority (TVA-which has jurisdiction over the Tennessee River watershed) also conducted a study of the Huntsville Springs Branch and found that it was polluted with DDT. Nonetheless, the Olin plant continued to pollute the waterways with DDT throughout the 1960's. In 1965, Olin began running its effluents through a settling tank to filter out contaminants and reduce water pollution. The tank filled up quickly, collecting more than 12,000 pounds of DDT-tainted materials in a four-month period. Court documents also show that Olin executives were notified that DDT was being released by the plant. A 1967 conference concerning pollution at the Redstone Arsenal concluded that pollution in the Huntsville Spring Branch was dangerous to aquatic life. Finally in August 1969, the Army began procedures to close the facility on the grounds that Olin had violated its lease by releasing DDT into local streams, when a new filtering system failed to stem the flow of DDT from the plant, the Huntsville factory closed on June 30, 1970. A 1972 Army study found extensive water pollution in the area around the defunct Olin plant. Fish in area streams also had high levels of DDT in their systems. Based on the results of the tests, the Environmental Protection Agency (EPA) ordered the Army to clean up the facility.<sup>35</sup>

In 1978, the EPA ordered the Army to develop a remediation plan for the Huntsville Spring Branch. The Army argued that it was not responsible for cleanup because the Wheeler Wildlife Refuge is just outside the Redstone Arsenal boundary. The centers for Disease Control (CDC) analyzed samples of fish caught in Indian Creek in 1979 and found they had an average of 226 milligrams per kilogram (mg/kg) of DDT residues.<sup>36</sup>

The lack of concern for residents shown by wildlife managers, some government agencies, the Army, Calabama Chemical Company, and Olin did not escape notice of Triana's residents. Though evidence of DDT contamination was identified as early as 1948 and research indicating that the chemical might be harmful to humans began surfacing in the 1950's, Black community members who lived close to the Olin plant and drank contaminated water and ate large quantities of toxic fish were not tested or alerted to the problem till three decades after the problem was first identified.<sup>37</sup>

Evidence to wildlife is well known. So how is it toxic or harmful to humans? The first round of testing of residents began in December 1978. The CDC collected blood samples from 12 residents. Analysis showed that one of the test subjects had DDT and DDE (dichlorodiphenyldichloroethylene) levels that were twice as high as any level previously recorded in medical literature. The CDC conducted a more extensive study in 1979 in which 518 people were tested; 86.9% of the study participants were Black. Participants ranged from a few weeks to 90 years old. Adults had resided in Triana for an average of 24.9 years. There were several ways in which Triana residents were exposed to DDT. Routes of exposure included consumption of locally caught fish, imbibing water from local creeks, spraying off nearby cotton fields, and working in the pesticide-manufacturing facility. However, the primary source of exposure was fishing consumption.<sup>38</sup>

The study found that the average DDT level in the study population was 159.4 nanograms of DDT per milliliter of blood (ng/ml). However, six participants had between 1,000 and 2,820.5 ng/ml of DDT in their systems. A third sample had DDT levels that were greater than 500 ng/ml, and 28% had levels of DDT and it's derivatives in their blood that were ten times the U.S. average. At the

time of the study, the U.S. average for DDT levels in people 12-74 years was 15 ng/ml. The study found that DDT levels were higher in Black residents than in Whites residents and higher in males than in females. The study also found that age was the strongest predictor of DDT levels - the oldest respondents had the highest levels of DDT.<sup>39</sup>

DDT was developed as the first of the modern synthetic insecticides in the 1940s. It was initially used with great effect to combat malaria, typhus, and the other insect-borne human diseases among both military and civilian populations. It also was effective for insect control in crop and livestock production, institutions, homes, and gardens. DDT's quick success as a pesticide and broad use in the United States and other countries led to the development of resistance by many insect pest species. The U.S. Department of Agriculture, the federal agency with responsibility for regulating pesticides before the formation of the U.S. Environmental Protection Agency in 1970, began regulatory actions in the late 1950s and 1960s to prohibit many of DDT's uses because of mounting evidence of the pesticide's declining benefits and environmental and toxicological effects. The publication in 1962 of Rachel Carson's *Silent Spring* stimulated widespread public concern over the dangers of improper pesticide use and the need for better pesticide controls.<sup>40</sup>

In 1972, EPA issued a cancellation order for DDT based on its adverse environmental effects, such as those to wildlife, as well as its potential human health risks. Since then, studies have continued, and a relationship between DDT exposure and reproductive effects in humans is suspected, based on studies in animals. In addition, some animals exposed to DDT in studies developed liver tumors. As a result, today, DDT is classified as a probable human carcinogen by U.S. and international authorities.<sup>41</sup>

DDT is:

- known to be very persistent in the environment,
- will accumulate in fatty tissues, and
- can travel long distances in the upper atmosphere.<sup>42</sup>

After the use of DDT was discontinued in the United States, its concentration in the environment and animals has decreased, but because of its persistence, residues of concern from historical use remain. Since 1996, EPA has been participating in international negotiations to control the use of DDT and other persistent organic pollutants used around the world. Under the auspices of the United Nations Environment Program, countries joined together and negotiated a treaty to enact global bans or restrictions on persistent organic pollutants (POPs), a group that includes DDT. This treaty is known as the Stockholm Convention on POPs. The Convention includes a limited exemption for the use of DDT to control mosquitoes that transmit the microbe that causes malaria - a disease that still kills millions of people worldwide.<sup>43</sup>

In September 2006, the World Health Organization (WHO) declared its support for the indoor use of DDT in African countries where malaria remains a major health problem, citing that benefits of the pesticide outweigh the health and environmental risks. The WHO position is consistent with the Stockholm Convention on POPs, which bans DDT for all uses except for malaria control.<sup>44</sup>

DDT is one of 12 pesticides recommended by the WHO for indoor residual spray programs. It is up to

individual countries to decide whether to use DDT. EPA works with other agencies and countries to advise them on how DDT programs are developed and monitored, with the goal that DDT be used only within the context of programs referred to as Integrated Vector Management. IVM is a decision-making process for use of resources to yield the best possible results in vector control, and that it be kept out of agricultural sectors.<sup>45</sup> DDT has saved the lives of many (millions) of people.

Now students should have all the information to ponder DDT.

### **Landmark environmental justice case - Cancer Alley.**

Academic interest in environmental justice stems from charges that environmental burdens such as landfills, toxic-emitting facilities, and other environmental hazards are disproportionately located near socially disadvantaged groups.<sup>46</sup>

Cancer Alley is an 85-mile-long area along an industrial stretch of the Mississippi River known for its abundance of petroleum plants and, as the name implies, cancer cases.<sup>47</sup> The area has 45,000 residents and lies in Southeastern Louisiana, between New Orleans and Baton Rouge. <sup>48</sup> Compared to the rest of the state, Cancer Alley has a higher percentage of Black and poor, residents.<sup>49</sup> It is significant in amplifying awareness of environmental hazards in minority communities. As a landmark case it helped to establish the master frame for many of the EJ claims that arose in relation to minorities and exposure to hazards.

A 1987 the Washington Post published an article focusing on a community of St. Gabriel, Louisiana, called Jacobs Drive-a Street in the hamlet, because there were 15 cancer victims living in a two-block stretch. Half a mile away there were seven cancer victims living in one block. The meandering stretch of the Mississippi River from Baton Rouge to New Orleans used to be known as “petrochemicals corridor” but since reports of the numerous cancer cases occurring in the small rural communities on both sides of the river surfaced, the entire area has become known as Cancer Alley. There are about 135 petrochemical plants in Cancer Alley. The most recent cancer data show that Louisiana has the second-highest male cancer rate in the country.<sup>50</sup>

Eco Watch, a long-time leader in environmental newspaper reported that In November 2021, after a week-long environmental justice trip to Mississippi, Texas and Louisiana, U.S. EPA Administrator Michael Regan announced that the EPA will address residents’ complaints about contaminated drinking water, chemical plants placed close to residences and a school and toxic air. Regan said the EPA will invest \$600,000 in air pollution monitoring equipment for use in “Cancer Alley,” an area of industrial plants and refineries in Louisiana and increase enforcement of federal rules for air and water quality in communities that are disproportionately affected by pollution, especially communities of color. It was quoted in The New York Times that he stated, “Seeing the situation for myself, talking directly to community members, it is startling where we get to this point — the point where children miss school days because the water isn’t safe”. He said the environmental conditions he had seen were “unacceptable in the United States of America.”<sup>51</sup>

Furthermore, Eco Watch announced that President Biden was quoted in The New York Times, declaring that at least 40 percent of federal climate and clean energy programs would benefit poor communities and made a point of instructing agencies to consider environmental justice in their decision making. The New York Times article went on to say according to an EPA press

release in the spring of 2023, a new team focused on pollution accountability will begin providing environmental monitoring and environmental enforcement in the South, more specifically Mississippi, Louisiana, and Texas.<sup>52</sup> The Pollution Accountability Team will provide “boots-on-the-ground” inspectors and airplane monitoring of facilities, as well as ground-based pollution monitoring vehicles. Follow-up investigations on emissions detections will be conducted by EPA inspectors at specific sites. More unannounced inspections will also be conducted, as Regan expressed that not enough had been performed by the Trump administration. The article in The New York Times gave voice to an 81-year-old lifelong resident of St. John Parish, Louisiana, who is the leader of the Concerned Citizens of St. John, Robert Taylor. He stated, “We had been so downtrodden and beaten down by our efforts to try to protect ourselves, and we were being attacked by those who were supposed to protect us,”. Founder and director of Houston nonprofit advocacy group Coalition of Community Organizations, Reverend James Caldwell, said that Regan coming to their communities to see firsthand the extreme environmental concerns citizens had been discussing for years was a significant first step. Eco Watch also published that Regan was also quoted in The Washington Post discussing the same topic, he clearly expressed, “When I was in Louisiana, nearly everyone I spoke with had a family member or neighbor who’s been impacted by a serious illness. We’re talking about generations of people living just a stone’s throw away from industrial facilities who may be sickened by the air that they breathe”.<sup>53</sup> In the end, the world needs justice and equality. It may be a slow process and most discouraging at times but as empathetic humans, we must carry on in our work to spread awareness and advocate for change.<sup>54</sup>

As we can infer, grassroots organizations and public awareness are factors that change the environment’s climate and create a way for environmental justice to take place. This unit was written to provide students with awareness of environmental justice issues past and present, to learn about activist, to conduct research of how to get involved in grassroots organizations, and most importantly to make the world a just and equitable place for all.

## Teaching Strategies

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### **Activate Background through Demonstrations and Experiences**

Activating background knowledge allows culturally and linguistically diverse students to connect prior learning with a new concept. Educators benefit from gaining a deeper understanding of the difference between activating knowledge and building background to create meaningful language and content learning opportunities.

### **Assess Language and Learning using Quick Checks**

Quick checks allow multilingual learners to demonstrate gains in language and content learning in an informal way. They also provide educators with an opportunity to adjust their instructional practice. Build upon your existing knowledge of classroom-based assessment to gain a clearer understanding of how to use quick checks effectively.

## Assess Language and Learning using Varied Assessments

Multilingual learners benefit from varied assessments that allow them to show what they know without unnecessary language barriers. Providing multimodal options to demonstrate mastery in the classroom allows for authentic and equitable assessment of both content and language. Gain a better understanding of how using varied assessments can inform your instruction.

## Teaching Activities

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Students will question why is this something they should care about and why does it matter to them or their community? Students will understand the importance by examining case studies, laws, and environmental justice organizations, leaders, and activists. Asking themselves what do I need to know to help me better understand environmental problems that minority or low-income communities face so that I can create a compelling solution? Ultimately based on what the students have learned they will investigate what specific actions need to be taken to have influence. The outcome is for students to play a part in making the world better through environmental justice by researching aspects of this unit and contributing as an environmental justice influencer striving to educate all who will listen.

My entire unit is more of a comprehensive yearlong project. The project end date is on Earth Day. Our success criteria for the entire project are based off an Environmental Zine that will be published unique to each classes' research and a series of podcasts in which the students will be presenting their topics in a panel discussion. The first three sections will be taught in the three weeks between Thanksgiving Break and Christmas, culminating as their semester final. For their final, the students will send me a video to tell me what they feel like contributing as their written final, an article on a topic for the class Zine. We will pick back up in February as the students begin Access Testing. I will be in and out of the classroom, thus the students will be assigned to create a PowerPoint presentation on their topic that will be available to all the study skills classes in the school to use for the month of April for environmental awareness month and we will be passing out or class zines.

I teach in a WIDA state, meaning that my students are tested and graded in four domains: reading, writing, speaking, and listening. The name WIDA originally stood for the three states on the grant proposal: Wisconsin, Delaware, and Arkansas. Today, the name WIDA has come to represent the entire WIDA Community of states, territories, federal agencies, and international schools. Funded by the grant, WIDA developed the 2004 WIDA English Language Proficiency Standards, which served as the basis for the ACCESS for English Language Learners test of English Language Proficiency that we use today. My goal is to teach academic vocabulary and help further English Language Proficiency. This unit will work towards English Proficiency for Multilingual Learners using academic vocabulary to answer the Guiding Question: How can we ensure that everyone has access to a healthy environment to live, learn, and work in? It consists of three main sections in the fall semester.

Section One will start with a self-reflection assignment, what is your relationship to nature? Followed by a questionnaire about environmental literacy for each class. We will create class graphs to accurately show the quantifiable data of each class's background knowledge to see where we need to focus. Then a lesson on what is Environmental Justice. This section ends with the focus question...Why is this something I should care

about? Why does this matter to me or my community?

This is where I will introduce them to the Climate and Justice Screening Tool (CEJST). The students will look at the percentages of green spaces in their neighborhoods and make comparisons within our Tulsa community and other cities throughout the United States. The Climate and Justice Screening Tool was created by the Biden/Harris administration. CEJST is a geospatial mapping tool that identifies areas across the nation where communities are faced with significant burdens. These burdens are organized into eight categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Each burden is ranked using percentile thresholds or yes/no indicators and based on this methodology, communities are considered disadvantaged: if they are in census tracts that meet the thresholds for at least one of the tool's categories of burden, or if they are on land within the boundaries of Federally Recognized Tribes. To respect Tribal sovereignty and self-government and to fulfill Federal trust and treaty responsibilities to Tribal Nations, land within the boundaries of Federally Recognized Tribes is designated as disadvantaged on the map. This decision was made after meaningful and robust consultation with Tribal Nations. This is consistent with CEQ's Action Plan for Consultation and Coordination with Tribal Nations, President Biden's Memorandum on Tribal Consultation and Strengthening Nation-to-Nation Consultation, and Executive Order 13175 on Consultation and Coordination with Indian Tribal Governments. Tulsa and most of Oklahoma are considered disadvantaged with many low-income communities.

Section Two will start with the case studies from the African American community taken from Toxic Communities by Dorceta Taylor. In this section we will conduct research using a variety of note catchers to learn about laws, organizations, and activists. Ending with the focus question...What do I need to know to help me (or us) better understand so that I (or we) can create a compelling solution?

Section Three Action. This section is based on what the students learned or want to further their research. We will be discussing what specific actions can they (or we) take to make a difference. Students will create tweets to bring awareness to social media. This is also the conclusion of the first semester so this is when students will send me video proposals of their final written articles. They will conclude with the completed research article ready for print in the class zine.

Second Semester students will create PowerPoint presentations, participate in the panel pod cast, and promote Earth Day by passing out the Zines. To wrap up the experience, students will again make videos explaining what they learned from this experience over the course of the year pared with a writing assignment about their experience of the environmental justice curriculum.

A classroom library will consist of resources for the students. The following list are the books I compiled for the classroom library: How to Connect with Nature by Tristan Gooley, Environmental Literacy from A-Z by Steven Dashefsky, Engage, Connect, Protect by Angelou Ezeilo, As Long as the Grass Grows: The Indigenous Fight for Environmental Justice, from colonization to Standing Rock by Dina Gilio Whitker, Toxic Communities by Dorceta Taylor, Youth to Power by Jamie Margolin, Climate Change from the Streets by Michael Mendez, One Earth by Anuradha Rao Engage, Connect, Protect by Angelou Ezeilo, and a copies of the article "Environmental Justice" by Paul Mohai, David Pellow, and J. Timmons Roberts.

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