

Seeds are host to plant embryos, much like the womb, and every plant, including our food plants begin with a seed.

Seed Basics:

There are 3 types of seeds:

1. Heirloom Seeds or Open-Pollinated Seeds are sometimes known as “true to type” seeds. They come from plants that are naturally pollinated. They will grow into plants from which you can harvest the seeds and grow an identical plant again and again. Most heirlooms have been around a long time – centuries or more.
2. Hybrid Seeds are created by humans by crossing two varieties of the same plant (species). If you harvest the seeds from these plants for next year, there is no guarantee that you will get a plant that looks the same as its parent.
3. Genetically Modified Seeds are created by selecting traits that are expressed in genetic materials from not just other varieties of plants, but even other species (like fish) and inserting them into the genetic makeup of the new plant seed. This is an excellent short (7-minute) [video](#) explaining the process of genetic modification. Stick with the video to see the scientific explanation. It is quite an amazing scientific feat.

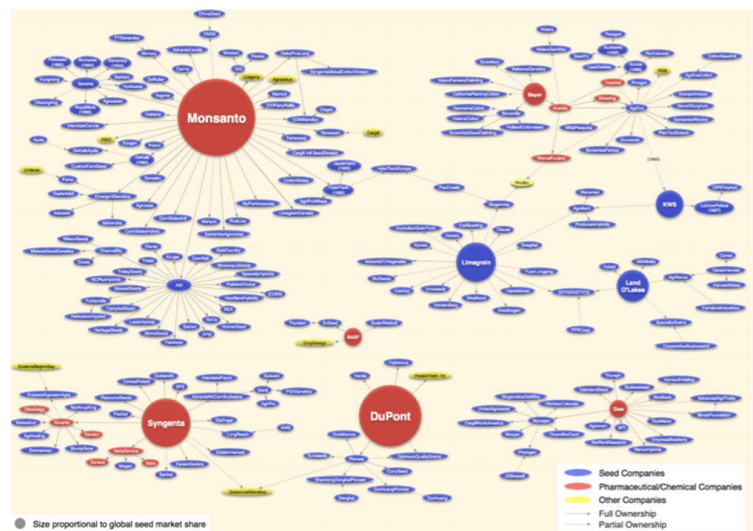
Another thing you may see on a seed packet is the USDA Certified Organic symbol. Those seeds come from plants that were grown without the use of chemical pesticides or synthetic fertilizers and on soil that does not contain sewage sludge.

One of the things that GMO seeds have been designed to do is resist chemical pesticides. The most commonly sold resistant seeds are designed to resist glyphosate, an herbicide (kills plants) which is sold commercially as Round-up. These seeds are called Round-up Ready and the plants they produce will not be harmed by Round-up applications, but all the other plants that are sprayed in the area will die. There have been multiple negative changes that have occurred because of genetic modification:

- GMO seeds are patented and therefore protected as “intellectual property” causing a whole cascade of legal problems for farmers around the world.
- GMO seeds now dominate several critical crops, including corn and soy.
- GMO seeds are produced by large, multinational corporations versus the local and small-scale seed exchanges that dominated the agricultural landscape up to the mid-20th century.

Over 10,000 years ago, humans started to grow and raise their food. A key element to growing food has always been to save the seeds from current harvests to plant for the following year's crops. Historically there was huge diversity in food crops. Seed exchanges were a common occurrence in agricultural communities, often located in the public libraries. Seed libraries were created to promote community gardening and local food systems. Recently corporations have been lobbying for laws and regulations to render seed exchanges illegal and they have been successful in some cases.

Today, large multinational pharmaceutical/chemical companies dominate the seed industry. Another way of saying this is that these same companies command global food access. Below is a graphic that depicts the global sale (and control) of seeds by corporation and even at the writing of this chapter mergers are being discussed that would create an even smaller number of larger and incredibly influential agricultural corporations (Maisashvili, 2016). It should be noted that these same companies produce both seeds and pesticides, thus cornering the market on large-scale agricultural in-puts.



Achieving food / seed sovereignty will require the securing of rights to breed and exchange open-pollinated seeds. Seed sovereignty can be defined as the right “to breed and exchange diverse open-sourced seeds.” This is seen as critical to a healthy food system, one that supports agricultural biodiversity and food security.

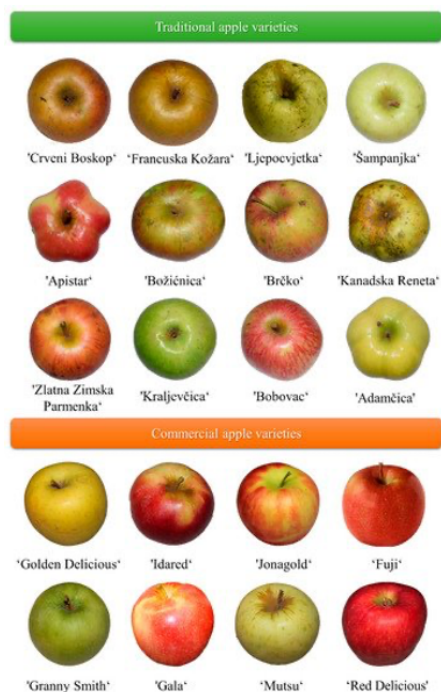
MONOCULTURE FARMING

Currently, large scale food production requires very specific and consistent size, shape, smell, and shelf-life of plant food products in order to package and sell them

either directly to consumers or to food processing corporations. Because of this emphasis on uniformity, we have also lost much in diversity. For example, there are 7,500 varieties of apples in the world, 2,500 of which can be found in the US, but less than 90 varieties are grown commercially in the US. Yet when you go to any given grocery store you are likely to have only a handful of selections. (In the early 19th century, there was an estimated 14,000 apple varieties in North America.) Over time, this has seriously diminished seed diversity.

One reason that seed and plant diversity is important in food production is that if a monoculture crop succumbs to a fungus or bacteria or insect, the whole crop is at risk. Having variety can mean that some crops will be resistant to the threat and thus help to maintain availability of that produce. Having variety also allows us to breed more desirable features in future plants, such as disease resistance.

Another important reason for seed/plant diversity is nutritional content. In their study of the polyphenols (chemicals associated with disease prevention for a wide range of chronic diseases, including cardiovascular diseases and cancer) found in apple skins, Loncaric et al (2020) observed that traditional apple skins had statistically higher levels of polyphenols compared to current commercial apples. The traditional apples (Illustrated below) were recommended as healthier options.



Apple varieties used in the Loncaric study. Found here: <https://www.mdpi.com/2304-8158/9/1/80/htm>

The manner in which we are farming the majority of vegetables is one crop at a time and on a grand scale. There are several elements that go along with large scale production:

1. Annual tilling of the soil, which releases soil into the air, releases carbon into the air (contributing to greenhouse gases), and destroys the soil's natural ecosystem
2. Repeatedly planting annual vegetable crops in the same soil depleting the soil of its minerals and nitrogen such that farmers then have to artificially add these things back using synthetic chemicals to make up for the loss.
3. Reliance on synthetic, often toxic, pesticides that include insecticides, herbicides, and fungicides. (More on agricultural pesticides later in this chapter, as well as under [Pesticides](#) in the Hazards A-Z section of the ANHE website.)

POLLINATORS

The third in the trifecta of plant essentials is pollinators. According to the National Park Service, "A pollinator is anything that helps carry pollen from the male part of the flower (stamen) to the female part of the same or another flower (stigma). The movement of pollen must occur for the plant to become fertilized and produce fruits, seeds, and young plants. Some plants are self-pollinating, while others may be fertilized by pollen carried by wind or water. Still, other flowers are pollinated by insects and animals - such as bees, wasps, moths, butterflies, birds, flies and small mammals, including bats" (NPS, 2018). Pollinators are responsible for more than 1,200 crops in the US and more than different 180,000 plants. Together, these plants protect soil from erosion, provide oxygen, support wildlife, and, of course, provide food.

The world's food crops are being threatened because the world of pollinators is being significantly diminished. There are a number of reasons for this crisis, the profligate use of agricultural, lawn, and indoor pesticides (many of which are designed to kill insects); the loss of supportive habitat; mites and viruses and other pathogenic organisms; and our changing climate. In 2018, the Monarch butterflies, those iconic orange, black and white beauties, were reportedly down by 84% in North America. This may foresee the end of Monarch migrations.

Honey bees contribute over \$20 billion value to food production in the US (ABF, 2020) and they enable the production of 90 critical food crops; without them we would not have these crops (WHOPS, 2014). Commercial

beekeepers transport bee boxes from farm to farm appropriately timing their presence with the plants blossoming seasons.



Bee box placement for pollination of almond orchard (USDA ARS) Found here: <https://tellus.ars.usda.gov/stories/articles/bolstering-bees-in-a-changing-climate/>

Losses experienced in managed honey bee colonies are nearly 40% annually, jeopardizing the solvency of the US beekeeping industry. Causes of colony losses include nutritional stress from lack of pollen and nectar sources, parasitic Varroa mites and the viruses they transmit, and pesticide exposure (including neonicotinoids, which are specifically known to harm bees) (Cox-Foster, retrieved 7/1/20). For wild honey bees and other pollinators, loss of habitat is a serious contributor to their decline. There are also evidence that electric and magnetic frequencies, cell towers, and radio frequencies can compromise bee colony health (Kumar, 2018).

The use of the word crisis when talking about things that significantly threaten our food supply is not hyperbole. The crisis of pollinator decline was raised to high relief and addressed by President Obama when he created the Federal Strategy to Promote the Health of Honey Bees and Other Pollinators. This serious call to action demanded a response by several cabinet level agencies, including the Department of National Security. After all, if pollinator decline persisted, food security is at stake in the US, as well as globally. Elements of the Strategy included new research, public education, public/private partnerships to develop and protect habitat, and land use policies for transportation and energy programs. The programs that were initiated are still underway.

Climate change is also a significant contributor to pollinator decline. Changing weather patterns mean changing plant patterns, causing nutritional stress. Shifts in temperature, droughts, and flooding further destroy pollinator habitat.

PESTICIDES IN AGRICULTURE

Just as many modern industries rely on toxic chemical inputs, so do many of our farms. While pesticides are often successful at combatting their targeted agricultural pests, they are just as often creating human and ecological health risks (Donley, 2019).

The word pesticide is an umbrella term for a category of chemicals that are formulated, produced and applied to harm a biological system. Pesticides are often further categorized by function, for instance, herbicides kill plants, insecticides kill or harm insects, fungicides kill fungus, and so on.

In the US, over a billion pounds of pesticides are used annually and worldwide the number is over 5 billion (Marquez, 2018). Pesticides generally are made up of both an “active ingredient”, the chemical specifically formulated to harm an organism and the “inert or other ingredients” which are the chemicals that help to deliver the active ingredient or increase its efficacy. Information regarding these “other” compounds is considered proprietary business information and is most often not publicly available. Many active ingredients in pesticides are petrochemically-derived.



In some instances, pesticides will kill something outright, like the herbicide glyphosate (known widely as Roundup) that kills plants. In other instances, pesticides prevent reproduction, like oral flea medication that is used to control dog and cat fleas. And in other situations, the pesticides harm the neurological system of an insect or rodent. What must be understood is that many of the pesticides that are used in agriculture come with potential human health risks to those who work in the fields, to those who live in agricultural communities, and to those

that eat the food products on which the pesticide residues remain.

Pesticides banned in the EU account for more than a quarter of all agricultural pesticide still used in the US, accounting for 322 million pounds a year (Donley, 2019). In the US, pesticides are regulated federally under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Under FIFRA, a pesticide is defined as “any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest or intended for use as a plant regulator, defoliant, desiccant, or any nitrogen stabilizer.” All pesticides must be registered with the Environmental Protection Agency (EPA). (Even the antimicrobial soap that you may have in your bathroom or purse contains a pesticide that must be registered with the US Environmental Protection Agency because the antimicrobial ingredient was formulated to kill microbes.) Here you can find the official EPA [summary of FIFRA](#).

Of the 12 chemicals that were originally targeted for prohibition or elimination by the international treaty, the Stockholm Convention on Persistent Organic Pollutants, 10 of them were pesticides (UNEP, 2001). (An additional 10 chemicals have been added to the list.)

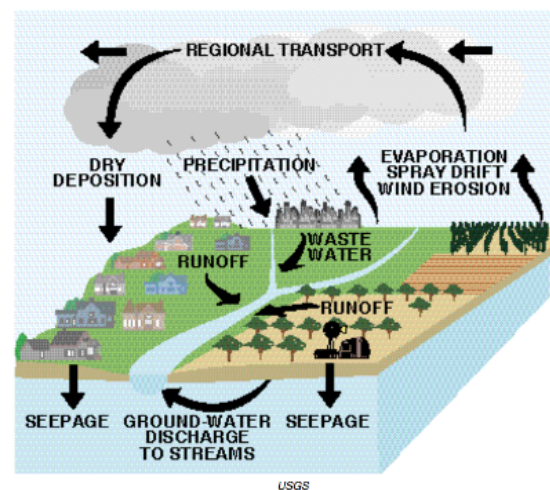


Collectively pesticides have the potential to cause a very long list of health risks including cancer, birth defects and other birth outcomes, reproductive health risks, neurological problems, and many more. Nevertheless, it is important for nurses to be specific when talking about pesticides and health risks because all pesticides do not

cause all of the health risks. To be evidence-based, nurses must evaluate the specific evidence for specific pesticides. When asking patients about potential pesticide exposures it is important to get as specific information as possible. The evidence in the literature is substantial and easily accessible.

The US Geological Survey (USGS) monitors ground and surface water for 76 pesticides and seven pesticide breakdown products. A survey found that 90% of streams and 50% of wells tested were positive for at least one pesticide (USGS, n.d.). Contaminated water has one of the greatest impacts on ecological health, creating risks to aquatic life and then by extension to the entire food chain within the natural world.

PESTICIDES IN THE ATMOSPHERE AND WATER



USGS: ca.water.usgs.gov/pnsp/atmos/atmos_1.html

One of the most important laws affecting pesticides and food is the 1994 Food Quality Protection Act (FQPA). The major elements of FQPA are as follows (EPA, n.d.):

- Set “tolerances” (amount of pesticide residues allowed on produce) to achieve “a reasonable certainty of no harm”
- Reassess, over a 10-year period, all pesticide tolerances that were in place when the FQPA was signed, in 1996
- Consider the special susceptibility of children to pesticides by using an additional tenfold (10X) safety factor when setting and reassessing tolerances unless adequate data are available to support a different factor;
- Consider aggregate risk from exposure to a pesticide from multiple sources (food, water, residential and other non-occupational sources) when assessing tolerances
- Consider cumulative exposure to pesticides that have common mechanisms of toxicity

While all of the basic elements are important the last two elements represent the first time that the EPA was required to look at multiple and cumulative exposures, a very important environmental health concept. Despite the codification of pesticide safety, the US has not yet achieved the goal of keeping everyone safe from pesticide-related health risks.

The EPA's Office of Pesticides provides a wide range of information and on their [website](#) information can also be found in Spanish and materials for children to learn about pesticides.

USDA CERTIFIED ORGANIC

In order to help the public, choose crops (and meat/poultry) that has been grown without the use of potentially harmful chemicals like pesticides, the US Department of



Agriculture (USDA) has a designation of "USDA Certified Organic." Farmers can apply for this designation for their farms and food producers can do the same for their retail products. Farmers must farm organically for 3 years before they can apply for the certification and they must submit an organic farm management plan, as well as pay a fee. In addition to assurances about not using pesticides, farmers commit to other practices as well. For instance, crops that are designated USDA Certified Organic cannot be genetically modified organisms (GMO), the soil in which the crops are grown cannot have been augmented by sewage sludge, and no pesticides or synthetic fertilizers can be used on the crops. Food processors cannot use radiation to control bacteria.

"As for organic meat [and dairy], regulations require that animals are raised in living conditions accommodating their natural behaviors (like the ability to graze on pasture), fed 100% organic feed and forage, and not administered antibiotics or hormones. When it comes to processed, multi-ingredient foods, the USDA [organic standards](#) specify additional considerations. Regulations prohibit organically processed foods from containing artificial preservatives, colors, or flavors and require that their ingredients are organic, with some minor exceptions. For example, processed organic foods may contain some approved non-agricultural ingredients, like enzymes in

yogurt, pectin in fruit jams, or baking soda in baked goods." (USDA, McAvoy, 2019)

For many small scale, organic farmers who sell their produce via farm stands or farmers' markets, the fees for organic certificate may be prohibitive (\$500 - \$1,200). When purchasing from such places ask about how the produce was grown. Farmers are often eager to share information about their organic practices.

It should be noted that farmers (and gardeners) can use a pest management approach that avoids toxic chemicals called Integrated Pest Management (IPM), even if they are not certified organic. This approach is multifaceted and considers the type of plants you choose (pest resistant), how to weed/cultivate instead of using herbicides, and many practices to reduce the use of pesticides. The [IPM Institute of America](#) provides detailed information on how to enlist IPM strategies.

FARMWORKERS

There are likely over 3 million farmworkers in the US alone, but it is very difficult to know for sure. They are often immigrants, do not speak English or speak it as a second language, are sometime migratory for their work, and, given political concerns are not likely to want to be too visible. On the other, more important hand, they are the ones responsible for feeding us every day and they are treated extremely poorly. Despite the fact that farmworkers feed us, between 45 – 82% of farmworkers can be food insecure, depending on their location and the time of year.

By most measures of social determinants, farmworkers in the United States are considerably more vulnerable than the general population. From the perspective of economics, education, healthcare access, housing, and workplace and environmental exposures, farmworkers' statistics raise significant public health concerns (Sattler, 2019).

Farmworker children are not protected under US child labor laws and can work in the fields early in their childhood. Of children working in the fields, 24% are younger than 14 years old. According to the National Children's Center for Rural and Agricultural Safety and Health, a child dies every 3 days in an agricultural-related accident and 33 children are injured (NCCRASH, 2018). The vast majority (75%) of crop workers lack any form of health insurance. Farmworker families have exposures to pesticides in the fields, in their homes, and in their foods thus experiencing a cumulative impact that is far greater than other populations. They also have a host of other health and safety issues including stress, farm machinery injuries, and sexual harassment.

In this [Farmworker Factsheet](#), many of the important demographics regarding migrant farmworkers are described and [here](#) you can read an overview of the housing challenges faced by farmworkers. As nurses, whether we live in a rural, farming community or not, we should be aware of the unfair burden that farmworkers pay in order to grow and raise our food.

CLIMATE CHANGE

Climate change is covered more fully in its own eText chapter but it merits a few words here. As is true for all living organisms, plants have a temperature range in which they can flourish. As things heat up beyond this range, plants will fail. Many of the food crops that have flourished for centuries are now showing signs of stress and newer varieties are being developed that can withstand the heat. But at some point, it may become difficult to find replacements.

Many forests have been destroyed to make way for beef cattle grazing or growing grains to feed beef and other meat animals. This forest destruction means less trees to absorb CO₂ and create O₂. The massive, intentional fires in Brazil in recent years were often implemented to make room for grazing land.

Flooding and droughts have been disastrous for farmers all over the world and is likely to continue until we make inroads into climate change mitigation. Climate change has already resulted in regional famines and climate-related migrations of people.

On the other hand, there is real evidence that some farming practices can actually sequester carbon while producing food crops. This is something we will be hearing more about and we will be seeing policies to support shifting farming practices with carbon as an important metric.

AGRICULTURAL POLICIES

The biggest and most important US policy affecting agriculture is the Farm Bill, which has the second largest federal budget attached to it – second only to the military budget. See [here](#) for a very simple [primer on the Farm Bill](#). The Farm Bill also provides subsidies and incentives that help, for the most part, keep the industrial farming model in play. Powerful big ag and pharmaceutical/chemical company interests have overwhelming influence on the Farm Bill, which is reauthorized every 5 years. The last reauthorization was in 2018. Very little is budgeted in the Farm Bill that will help move the farm industry to more sustainable, less fossil fuel-intensive, carbon sequestering practices. This has been left to the states and some states

do provide grant and tax incentive programs for farmers to become more sustainable.

The USDA is the federal agency responsible for food production and every state has a state-level equivalent agency. In some agricultural states, like California, every county also has a County Agriculture Commissioner.

Every state has at least one “land grant” university, usually one of the large state universities, that is required to have a significant focus on agriculture, including agricultural research, education and “extension” (Cooperative Extension Service - translating the science into practice). Each of the land grant universities helps to inform the Cooperative Extension Service which, in turn, works with farmers, ranchers, and consumers. They also support the [Master Gardener Programs](#), non-academic programs that are open to the public.

WHAT'S ON THE HORIZON?

Farming has gone through huge transformations in the last half century and has become large in scale with regional monocultures (i.e., wheat, soy). While this is producing lots of food products, it is also slowly destroying the soil, harming humans, and obliterating whole ecosystems. This is not sustainable.

There are many new small initiatives that are helping to slowly shift our food production to more local/regional, integrated (versus monoculture), and sustainable practices. The demand for “organic” produce has helped to provide an economic incentive for some large-scale conventional farmers to shift away from using pesticides and become certified organic.

Some small-scale farmers are moving beyond organic and are trying to fully integrate sustainability practices with cover crops, no-till practices, rotating crops, inclusion of farm animals in food plant production, and other practices that were once mainstay on traditional family farms – the ones with the red barns.

The terms permaculture, agroecology, biodynamic, and regenerative farming all represent philosophies and approaches to sustainable farming that are designed to counter-balance the predominant industrial food model. As you can see by the definitions that the proponents for these approaches propose, there is much overlap among them.

- **Permaculture:** “The conscious design and maintenance of agriculturally productive systems which have the diversity, stability, and resilience of natural ecosystems. It is the harmonious integration of the landscape with people providing their food, energy,

shelter and other material and non-material needs in a sustainable way.” Defined by Bill Mollison, the man who coined the word. (Quote found here: <https://modernfarmer.com/2016/04/permaculture/>)

- **Agroecology:** Is farming that “centers on food production that makes the best use of nature’s goods and services while not damaging these resources” by “improving soil and plant quality through available biomass and diversity, rather than battling nature with chemical inputs” and “improv(ing) food yields for balanced nutrition, strengthen(ing) fair market for their produce, enhance(ing) healthy ecosystems, and build(ing) on ancestral knowledge and customs.” Definition found here: <https://www.agroecologyfund.org/what-is-agroecology>
- **Biodynamic: Farming** is a “holistic, ecological, and ethical approach to farming, gardening, food, and nutrition. It is about reverence for the land and for water, for food, animals, and each other. It goes beyond sustainability – it’s regenerative agriculture. Biodynamic farming practices clean our air by sequestering carbon in the soil and using no chemical fertilizers, pesticides or herbicides. Animals are treated with compassion and respect and given the freedom to lead happier lives.” Definition found here: <https://modernfarmer.com/2016/04/permaculture/> [Biodynamics is rooted in the work of philosopher and scientist Dr. Rudolf Steiner, whose 1924 lectures to farmers opened a new way to integrate scientific understanding with a recognition of spirit in nature. (Biodynamics Association, n.d.)]
- **Regenerative:** “(D)escribes farming and grazing practices that, among other benefits, reverse climate change by rebuilding soil organic matter and restoring degraded soil biodiversity – resulting in both carbon drawdown and improving the water cycle”. Definition found here: <https://regenerationinternational.org/why-regenerative-agriculture/>

Regardless of the approach to farming it is clear that we are going to need more farmers in the US. For every young person entering into farming there are 6 farmers over the age of 65. According to the 2017 Census of Agriculture from the US Department of Agriculture (USDA), there were over 321,000 young farmers (under the age of 35) in the US. That count is up from 2012, when there were 208,000, which is encouraging. They are joining the ranks with new knowledge and often more sustainable approaches to food production. While this number is hopeful, they are not even close to replacing the farmers who are 65 and older.

In order to incentivize young farmers, there are programs to pay for their education which will help them avoid tuition debt and increase their economic chances of purchasing farms and ranches. To further support young farmers, places like New York have created programs like the New Farmers Grant Fund Program that provides \$50,000 grants to farm projects that advance “sustainable agricultural production practices.”

A specific, though smaller trend is the proliferation of urban farms and gardens. (Lots of gardens resulted from COVID’s sheltering in place.) Pediatric Nurse, Atiya Wells, started [Bliss Meadows Farm](#) in Baltimore City a project “at the intersection of environmental and food justice” that helps to build community and introduce urban children to nature and the growing of food. But this form of farming is not likely to put a significant dent in real food needs. In an article entitled, “The real value of urban farming. (Hint: It’s not always the food”, Plumer (2016) contends that “Maybe...urban agriculture is most valuable for how it forces us to be more conscientious about the people who feed us: the farmworkers, the truck drivers, the processors and the packagers, the prep cooks, all of whom work for next to nothing and have little time themselves to play in the dirt.”

In their 2020 Workshop Proceedings: [Innovations in the Food System – Exploring the Future of Food](#), the National Academy of Science, Engineering and Medicine highlights the thinking of international experts regarding trends in food and agriculture. Some of the topics that are covered include meat alternatives, food packaging, water/land use, food waste, and food access/security. (NAS, 20200

[Health Care Without Harm](#) is an international non-profit organization that is helping hospitals to be more sustainable and one of their important programs is bringing healthy foods to health care institutions. They provide excellent resources on how to bring healthy food to health care institutions and for nurses who want to support sustainable agriculture and a sustainable food system, the [Health Care Without Harm’s Food Program](#) can also provide technical assistance and support. They define a healthy food system as one that conserves and renews natural resources, advances social justice and animal welfare, builds community wealth, and fulfills the food and nutrition needs of all eaters now and in the future (HCWH, n.d.). As an example of their resources is this [factsheet on a healthier food purchasing standard](#).

More information on food and agriculture can be found on ANHE’s website [here](#). Also, ANHE sponsors a Food and Agriculture Committee where nurses who have a particular interest in this area meet and work on food/ag issues.

CONCLUSION

This chapter covered some of the agricultural and health basics but the food system is much larger and includes food processing, distribution, marketing, consumption, nutrition, food additives/preservatives, food waste and many more issues which were not covered in this chapter. Also, not covered were food insecurity and the role that poor diets are having on chronic disease risk, really important issues for nurses to consider. All of these components have implications for public health.

As you are eating your next meal perhaps you will think about your food a little differently having read this chapter. The adage, you are what you eat still holds true but in addition, what you choose to eat also is reflected in ecological health and in the health of all those who work in the food system. This is an area where nurses can have a great impact as individuals, as educators, in patient care settings, and in the policy arena. Much work is ahead of us on the public health implications of food and agriculture.

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ENVIRONMENTAL JUSTICE

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In order to understand the multifaceted reasons for health disparities, it is essential to consider the inequities in environmental exposures among various population groups. Inequities that are not evenly distributed among populations are considered unfair or unjust. Environmental exposures are considered one of the [social determinants of health](#): circumstances that occur where people live, learn, work, play, and pray that have an impact on health and well-being. Thus, in response to inequities in environmental exposures and health outcomes, nurses and others seek environmental justice.

“[Environmental Justice](#) (EJ) is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies” (EPA 2019a). Further, this goal will be achieved when everyone enjoys the same degree of protection from environmental and health hazards, and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.

This definition suggests a legal mandate to respond to factors that cause health disparities that are related to environmental policies that fail to address health outcomes related to environmental hazards. The Environmental Protection Agency’s (EPA’s) explanation of fair treatment is that “no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies” (EPA, 2018). The EPA website further indicates that [meaningful involvement](#) means that “people have an opportunity to participate in decisions about activities that may affect their environment and/or health; the public’s contribution can influence the regulatory agency’s decision; their concerns will be considered in the decision-making process; and the decision makers seek out and facilitate the involvement of those potentially affected” (EPA, 2018).

In response to the mounting concerns raised by citizens, scholars and activists, the federal government addressed

[environmental racism](#) (Mikati et al, 2018). Many communities bear the extra burden of waste, pollution and hazardous exposures. These communities across the globe are the homes to persons of color and those living in poverty. Considered a form of institutionalized racism, environmental racism, “refers to environmental policy, practice or directive that differentially affects or disadvantages (whether intended or unintended) individuals, groups or communities based on race and color” (Bullard, 2002). Environmental racism is defined as “the disproportionate impact of environmental hazards on people of color” (Environmental Justice Network, 2015). (See <http://www.ejnet.org/ej/>)

HISTORY

Historically, people of color and those living in poverty have borne the greatest burden of exposure to environmental hazards in their communities, homes, workplaces and schools. Such exposures most often come from landfills, garbage dumps, chemical plants, factories, smelters and incinerators that are built in low income and minority communities (Bullard, Johnson & Torres, 2011). The roots of the movement to address this injustice began in the 1960s with several key events. First, the publication of *Silent Spring* by Rachel Carson (1962) informed the general public of the health hazards associated with pesticides. In addition, during the 1960s [Cesar Chavez and farmworkers](#) protested their exposures to harmful pesticides in their agricultural work in fields treated with chemicals hazardous to human health (Skelton and Miller, 2014). The Civil Rights movement led to the [Civil Rights Act of 1964](#) that prohibited the use of federal funds to discriminate based upon race, color or national origin.

Concerns for civil rights and equal opportunity under the law developed during the 1960s. Public concerns for both health and the environment also gained momentum and culminated with the creation of the Environmental Protection Agency in 1970 under President Nixon. The EPA was charged to protect human health and the environment. Legislation such as the [Clean Air Act of 1970](#) and the [Clean Water Act of 1972](#) launched a series of legal mandates for the EPA to regulate and enforce standards to protect health and the environment. These inequities continue to threaten those living in communities that were unjustly bearing the toxic burdens. Citizens in Warren County, North Carolina began what is known as the environmental justice movement. The dumping of 31,000 gallons of polychlorinated biphenyl (PCB) in 1973 along roadways contaminated large areas of soil. In response to citizen pushback, the state devised a plan to build a landfill for the contaminated soil. The landfill was to

be located in Warren County, a largely African American community that lacked both a mayor and a city council. In addition, it was ranked as one of the three poorest communities in terms of gross domestic product. The local African American citizens protested the plans for the landfill fearing that their water would become contaminated by PCBs. (Click on the links below to watch videos)



[PCB Protest in Warren County 1982](#)



[Robert Bullard - The Genesis of Environmental Justice](#)

Dr. Robert Bullard, currently the Dean of the Barbara Jordan-Mickey Leland School of Public Affairs at Texas Southern University in Houston, Texas, is considered by many to be the “father of environmental justice.” He became active in the environmental justice movement in the early 1980s when he actively investigated the siting of municipal waste sites in predominantly black communities in Houston. His scholarship led to his book, *Dumping in Dixie: Race, Class and Environmental Quality* published in 1990. During the past 25 years of his academic career he has published 18 books and championed topics such as environmental racism, regional equity, environmental justice, climate justice, sustainable development, urban land use, smart growth, industrial facility siting, community

reinvestment, housing, and transportation. <http://www.ejnet.org/ej/bullard.html>

FEDERAL AND STATE MANDATES

Federal and state mandates were developed in response to the growing movement to address environmental injustice. President Bill Clinton signed [Executive Order 12898](#), "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," on Feb 11, 1994. The purpose of the Order was to address the human health and environmental conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed the EPA and other federal agencies to develop [environmental justice strategies](#) to help each agency address how their programs create disproportionately high and adverse human health or environmental effects on minority and low-income populations. The Order aims to provide minority and low-income communities access to public information and public participation in matters relating to human health and the environment through fair treatment and meaningful involvement (EPA, 2017).

At the Federal level, in February, 2014, the EPA's Office of Environmental Justice (OEJ) celebrated the 20th anniversary of the signing of EO 12898. The [OEJ webpage](#) offers links to their environmental justice plan as well as detailing how the Office of Enforcement and Compliance Assurance goes after pollution problems that impact communities through vigorous civil and criminal enforcement (EPA, 2019b).

STATE AND REGIONAL EPA ENVIRONMENTAL JUSTICE (EJ) OFFICES

The EPA also supports 10 regional offices across the United States where each includes an EJ office (EPA, 2019c). During the past two decades, state legislatures have addressed EJ for their communities. In Massachusetts, for example, an Environmental Justice Policy was signed in 2002 that guides efforts to address inequities and injustices for people of color and low income populations. Their services include links to state policies and initiatives, modules to address smart growth/smart energy policies, and case studies. The Massachusetts toolkit is available online. In addition, the Massachusetts Environmental Justice site offers tools such as EJ mapping. With EJ mapping, Geographic Information Systems (GIS) tools can be used to map various toxic exposures to communities that meet the criteria for EJ.

An example of an educational module is Brownfields where the viewer can see examples of how former

brownfields have been revitalized into useful and beautiful additions to the community. According to the EPA, a brownfield is a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant (EPA, 2019d). The Jackson Square case study of a Jamaica Plain neighborhood in Boston, Massachusetts, highlights the development of an 11 acre former urban intersection comprised of brownfields and heavy traffic use into a mixed-income, mixed-use, and sustainable transit-oriented area (Mass.gov, 2019).



[EPA 20th Anniversary Environmental Justice Video Series: Edith Pestana](#)

RELATIONSHIP TO SOCIAL DETERMINANTS OF HEALTH (SDH)

The EPA published their [Plan EJ 2014](#) in 2011 to address the need to put the topic of environmental justice front and center across the entire agency to improve overburdened communities. The Plan includes areas such as community-based programs, decision making, rulemaking, permitting, compliance and enforcement, as well as their work with other federal agencies. Now with the [EJ 2020 Action Agenda Framework](#), the EPA is committed to advance the work to mark progress in achieving environmental justice in overburdened communities.

Environmental justice is essential for the protection of those who live in overburdened communities and to provide legal support to remedy the disparities in their environment. However, an upstream approach is required to more effectively address the needs of EJ communities. To address the root causes of such disparities, a social determinants of health (SDH) approach must be taken. The World Health Organization defines SDH as “the conditions in which people are born, grow, live, work, and age. These circumstances are shaped by the distribution of money, power and resources at global, national, and local

levels” (World Health Organization, 2014b). In response to a charge from EPA to address the impact of social determinants of health upon children’s health, the [EPA’s Children’s Health Protection Advisory Committee \(CHPAC\)](#) sent a letter to EPA Administrator Gina McCarthy in November 2013 urging EPA to “incorporate SDH in all programs, policies and regulatory efforts across all offices of the Agency.”

CASE EXAMPLES OF CITIZENS’ ENVIRONMENTAL JUSTICE EFFORTS

WE-ACT

In 1988, the organization [West Harlem Environmental Action \(WE-ACT\)](#) was founded in New York City to address environmental justice. WE-ACT was the first environmental justice organization in the city and one of the first in the U.S. run by people of color. Issues of environmental racism led to the siting and environmental exposures from the following: North River Sewage Treatment Plant, 6 out of 7 New York City diesel bus depots in Northern Manhattan, a 24-hour Marine Transfer Station in Manhattan, as well as the practice of using Northern Manhattan communities as New York City’s dumping ground.

Currently the organization has grown and serves to inform, educate, train and mobilize residents of North Manhattan on environmental issues that impact their health, lives and community. Recent efforts emphasize citizen participation in public policy and enforcement of environmental regulations. WE-ACT works on the city, state and federal levels to improve policy on environmental health and justice. In 2016, WE-ACT helped to pass the country’s first Safe School Water Act, which mandates testing and remediation for lead in all New York State schools. In 2017, WE-ACT was instrumental in passing NYC’s Environmental Justice Study Bill and Environmental Justice Policy Bill which provides the city and all New Yorkers more information to identify and address environmental injustices.

Jesus People Against Pollution

[Jesus People Against Pollution \(JPAP\)](#) is a grassroots environmental justice organization located in Columbia, Mississippi. The organization was created in response to an explosion in March 1977 at the Reichold Chemical Company. “The explosion wrecked the facility and poisoned the local air, water and land with cancer-causing agents and other dangerous compounds. After the explosion, Reichold abandoned the site and left toxic, deadly substances buried in 55 gallon drums in the earth and around the nearby community and in local landfills”

(Earthjustice, 2015). In time, toxic chemicals oozed into the water tables and soil, causing the ground to spontaneously combust, vaporizing into the atmosphere, and leaving offensive odors making many people sick. The community has sustained health problems ranging from nose-bleeds and respiratory problems to cancers and premature deaths. Consistent with the well documented practice of “waste following waste,” the Reichold site was compounded further by pesticide spraying, oilfield operations, transportation, nuclear waste and incineration. Advocacy by JPAP played a role in the Reichold site being listed as a Superfund Site in the 1980s; however, it has since been delisted. It is now considered a brownfield site and continues to seek remediation in the form of relocation and life-time environmental/primary health care for impacted residents.

JPAP is a grassroots advocacy organization that has also embraced a mission to “educate and inform impacted communities about the availability of toxicology and environmental health information so that communities can better understand the relationship between environmental exposure and disease.” Its founder and primary spokesperson Charlotte Keys, Evangelist and Environmental Justice Advocate, is a national figure frequently speaking in the policy arena and contributing to the EJ dialogue at relevant federal agencies.

Native Americans and Nuclear Waste

During the 1990s a number of Native American tribes fought legal battles to protect their sacred land from radioactive waste disposal. The [Eastern Navajo](#) reservation residents fought to protect their land by filing a suit with the Nuclear Regulatory Commission to block a permit for uranium mining in Church Rock and Crown Point, New Mexico. Likewise, the Western Shoshone tribe in Nevada is fighting the [Yucca Mountain dumping](#) (University of Michigan, 2015). The [Mohave tribe](#) in California and the Skull Valley Goshutes in Idaho are also fighting the construction of radioactive waste dumps on their tribal lands.

One of the most famous recent examples of meaningful involvement not occurring was the indigenous people of Standing Rock and the Dakota Access Pipeline. Energy Transfer Partners proposed a new 1,200-mile oil pipeline from the Bakken oil fields to the Midwest, it chose a route crossing the Missouri River just yards upstream from the Standing Rock Sioux reservation. The Tribe’s principled resistance to the project captured the attention of the entire world, leading to historic protests at the remote site in North Dakota. The Obama administration [vindicated the Tribe’s concerns](#) when it blocked the final

permits to cross the Missouri River and promised a full environmental review that looked at the Tribe’s treaty rights as well as alternative routes.

HYDRAULIC FRACTURING (FRACKING) AND ENVIRONMENTAL JUSTICE

A growing concern for environmental justice is for communities throughout the United States that have hydraulic fracturing (fracking) operations. Studies in Pennsylvania and in Texas indicate that poverty is closely correlated with communities where fracking occurs (Bienkowski, 2015). Many citizens of such communities are taking action to address the concerns in their communities (Carre, 2012) by [addressing public policy](#). New York State and Maryland have banned fracking, while [many cities and counties have enacted legislation to limit fracking](#). In July 2012, Longmont City Council passed a set of regulations governing fracking within city limits, and in November 2012, voters approved an all-out ban of the practice (Earthjustice, 2019).

OCCUPATIONAL JUSTICE

As noted in our discussion of vulnerable populations, workplace exposures vary by type of occupation, location of work, and biologic, physical (including ergonomic), chemical, noise and radiologic exposures. Further, various population groups are more vulnerable, such as pregnant women, children, adolescents, older adults and those from ethnic and racial minority groups. Adverse health effects can occur immediately or many years later. The federal government regulates worker safety primarily through the [Occupational Safety and Health Administration \(OSHA\)](#) within the U.S. Department of Labor.

Other agencies offer guidance and support for education and research to improve workplace safety. One must consider all aspects of a work environment including job stress, opportunities for healthy diet and exercise, violence, and protective equipment, in addition to the specific workplace exposures in any particular occupation. The Centers for Disease Control (CDC) notes in their [Immigrant Worker Safety and Health](#) website that, “Immigrant workers face a disproportionate risk for workplace injury and illness. This is due to a confluence of factors including an overrepresentation in the most hazardous industries including construction and agriculture. Additionally, workplace safety interventions often do not reach immigrant worker populations due to barriers created by social, cultural, and economic issues including language, literacy, and marginal economic status. Furthermore, immigrant workers often lack knowledge of their rights to workplace safety and are reluctant to pursue these rights” (CDC, 2014).

Ethnic minorities are more likely to be employed in physically demanding jobs with hazards such as construction, farming, mining and meat packing (Frumkin, 2010). Immigrants are often employed in more hazardous work settings (Panikkar, et al., 2012). Factors such as language proficiency and access to occupational health services contribute to their type of employment. Murray (2003) studies low-income workers and their health risks. She reports that industries such as forestry, fishing, farming, and machine operators are among those with the highest proportion of workers who live in poverty. She further notes that Black and Latino workers lag behind White workers in both their compensation for their work and job desirability. Arcury and colleagues (2002) looked at the multiple risks of farmworkers from pesticide exposure in farm fields and also in their homes. Study findings indicate that the farmworkers were exposed to pesticides to a great degree in their housing and workplaces. Ahonen and colleagues (2007) note that immigrant workers are not only overrepresented in the most hazardous work conditions but are exposed to the most danger within those jobs.

Although the Environmental Justice movement began in response to communities where residents experienced disproportionate exposures to hazardous chemicals, the federal government recognizes that many people are exposed not only in their homes but also in the workplace. The Department of Health and Human Services (HHS) developed the [HHS Environmental Health Strategy](#) and the Department of Labor the [Environmental Health Strategy](#) to promote environmental justice.

INTERNATIONAL HAZARDOUS WASTE DISPOSAL

In addition to the negative extremes of social determinants of health acting as magnets to environmental justice issues, the rise of economic globalization, liberalized trade rules and the dominance of multinational corporations play key roles in transporting environmental pollution from industrialized to developing countries (Clapp, 2014). Shipping hazardous waste from developed countries to developing countries for disposal is a regular practice. The receiving countries often have inadequate or lax regulations and protocols, inadequate resources, and insufficient training for the safe management and disposal of environmental waste. According to the [Basel Action Network](#), the primary motivation for exporting hazardous waste to developing countries is economic. As the deleterious health and environmental impacts of unsound disposal of hazardous waste have become increasingly apparent, governments of industrialized countries have enacted stringent regulations for waste disposal---a costly endeavor. An economist with the World Bank wrote (and

later retracted) that “the economic logic behind dumping a load of toxic waste in the lowest wage country is impeccable and we should face up to that” (Lipman, 2011). He further noted, “health-impairing pollution should be done in the country with the lowest cost, which will be the country with the lowest wages.” Evidence collected in in the late 1980’s found that ‘the average disposal cost of one ton of hazardous waste in Africa was between US \$2.50 to \$50.00, while the cost in industrialized countries ranged from US \$100 to US \$2,000” (Lipman, 2011).

Dumping of waste in developing countries has occurred in some cases with the consent of government and in other cases as part of an illegal scheme frequently related to strategic motives of the sending country, and corruption of the receiving government (Lipman, 2011). This dumping occurs with little regard for the people who will handle or work with the received toxic waste. Just as the motives for permitting the siting of “dirty industries” in low income, often jobless communities in the U.S. are based on promises of jobs, money and political favor, the same inducements are evident in developing countries.

The Basal Convention on the Control of Trans boundary Movements of Hazardous Waste and their Disposal (Lipman, 2011) is an international treaty that was designed to reduce the movements of hazardous waste between nations and specifically to prevent transfer of hazardous waste from developed to less developed countries (Basel, 2015). It was signed in 1989 and became effective in May, 1992. As of February, 2014, 180 states and the European Union are parties to the Convention. Fourteen (14) of 194 United Nations (UN) member states have not signed, including the United States.

Recently the UN took action to curb the plastic waste crisis by adding plastic to the Basel Convention, a treaty that controls the movement of hazardous waste from one country to another. The [amendments](#) require exporters to obtain the consent of receiving countries before shipping most contaminated, mixed, or unrecyclable plastic waste, providing an important tool for countries in the Global South to stop the dumping of unwanted plastic waste into their country.

E-waste is another environmental health problem of recent ascent (e-Stewards, 2008). E-waste results from the rapid obsolescence of electronic gadgets in response to the high demand for new technology. Electronic equipment contains toxins, including mercury, lead, cadmium, arsenic, beryllium brominated flame retardants, and on burning, dioxins and polycyclic aromatic hydrocarbons. The latter are some of the most toxic substances to humans. Early manufacturers gave little thought to their disposal, the level of toxicity in their

products, or potential reclamation of non-toxic components of the electronic products.

There is little financial value in recycling outdated electronic waste in the U.S. and other industrialized countries. There are few incentives or government regulations at this time to safely manage the disposal of e-waste in industrialized countries. Many have advocated for humanitarian reasons to send old or refurbished computers and computer parts to resource poor countries. Others have found it considerably cheaper to dispose of e-waste in developing countries. The most common destinations of waste from Europe and the US are the Far East, India, Africa, and China (Greenpeace International, 2009). Targeted countries lack the proper infrastructure and regulations/or adherence for disposal of e-waste.

The growing numbers of scrap yards in developing countries seek to harvest parts and precious metals (copper, iron, silicon, nickel and gold) from electronic equipment during recycling and sell them for profit; workers and purchasers are exposed to toxins. In developing countries, children are used in recycling, removing metal and parts by hand. Mislabeling is a common practice in shipping hazardous waste, which is in non-compliance with the requirements of the Basel Convention. Because the U.S. has never signed the Basel Convention, its shipments are not illegal. Additionally, lax maritime and immigration regulations place vulnerable populations at-risk, particularly those who are poor and people of color. The U.S. also sends much of its hazardous waste to prisons in the U.S. to be processed in less-regulated environments without the same worker protections and rights afforded in the private sector (Greenpeace, 2015). These are serious environmental justice issues.

CLIMATE CHANGE AND ENVIRONMENTAL JUSTICE

In recent years, among the most pressing international environmental threats is climate change. The [Center for Progressive Reform](#) provides a thorough overview of international environmental justice and climate change. Global warming and climate change result from the burning of fossil fuels, including coal, gas, and oil for cars and industries. Fossil fuels are primary sources of carbon dioxide that is one of the principal gases responsible for trapping heat in the atmosphere. The release of these gases has increased by one-third since the Industrial Revolution (middle of 19th century). The rate of discharge is expected to double by the end of the 21st century, associated with increasing energy consumption in developing countries. Of significance, the United States is responsible for 25 percent of the world's greenhouse

gases, although it only contains 4 percent of the world's population (Center for Progressive Reform, 2019).

“Greenhouse gases will substantially disrupt ecosystems and water supplies across the globe, intensifying dangerous weather patterns and causing a host of other health, environmental, economic, and social problems” (EPA, 2015b). The effects of climate change are most devastating to populations in urban centers and coastal regions and those dependent upon subsistence fishing. Such populations are overwhelmingly people of color and dwell in poor communities. Contributing to already existing health and environmental problems, heavy rains, floods, and hurricanes occurring over a few days can further compound the health challenges of these vulnerable communities. Similarly, rural areas in developing countries experience droughts and excessive heat, limiting hydration for humans and animals and diminishing the production of food for subsistence and as a marketable crop. According to the World Health Organization's Health & Environment Linkages Initiative (2019), climatic changes already are estimated to cause over 150,000 deaths annually.

Between 2030 and 2050, climate change is expected to cause approximately 250 000 additional deaths per year, from malnutrition, malaria, diarrhea and heat stress (WHO, 2019).

In weather-triggered disasters, people and animals die; homes, crops, and resources are destroyed; and public health infrastructure (hospitals and clinics, roads) are damaged. These catastrophes threaten the health, food security and livelihoods of poor populations across the globe, particularly people of color. Hence, these disparities can be characterized as environmental injustices and/or environmental racism (Environmental Justice Network, 2015).

Policy debates have prevailed over time to have all nations significantly reduce the use of carbon-based fuels. “Developing countries maintain that they should not have to bear social and economic burdens of controlling greenhouse gas emissions disproportionate to their causal responsibilities, particularly when they have yet to achieve a basic level of development” (International Environmental Justice, 2013).

The [Paris Agreement](#) is a landmark environmental accord that was adopted by nearly every nation in 2015 to address [climate change](#) and its negative impacts. The deal aims to substantially reduce global greenhouse gas emissions in an effort to limit the global temperature increase in this century to 2 degrees Celsius above pre-industrial levels, while pursuing means to limit the increase to 1.5 degrees. The agreement includes commitments

from all major emitting countries to cut their climate-altering pollution and to strengthen those commitments over time. The pact provides a pathway for developed nations to assist developing nations in their climate mitigation and adaptation efforts, and it creates a framework for the transparent monitoring, reporting, and ratcheting up of countries' individual and collective climate goals. [Under Trump, the United States pulled out of the agreement](#). However over 30 mayors, 3 governors, 80 university presidents and 100 businesses have pledged to uphold the Paris Accord goals (Tabuchi & Fountain, 2017).

MOVEMENT TO GLOBALIZE ENVIRONMENTAL JUSTICE

Robert Bullard, the father of Environmental Justice, noted that “all people and communities are entitled to equal protection of environmental and public health laws and regulations” (Bullard, 1990). The concept of environmental justice applies to communities where there are perceived disadvantage, whether due to race, ethnicity, socioeconomic status, immigration status, lack of land ownership, geographic isolation, formal education, occupational characteristics, political power, gender, or other characteristics, which puts them at disproportionate risk for being exposed to environmental hazards (Claudio, 2007). The movement to globalize environmental justice parallels a series of environmentally-oriented agreements and global conventions. Following is a timeline of early, progressive milestones in the globalization of environmental justice:

1991: [Principles of Environmental Justice](#), a guide for grassroots organizing, was adopted by environmental justice leaders during the First National People of Color Environmental Leadership Summit, Washington, D.C.

1992: The Earth Summit in Rio de Janeiro, Brazil, lacked a focus on environmental justice within the context of human health; human health and urban centers were not considered part of the environment. However, a promising sign was that the Principles of Environmental Justice (1991) had been translated into Portuguese and circulated to local community leaders at the Summit.

2000: The United Nations Summit in New York adapted the eight UN Millennium Development Goals that included one on “[Ensuring Environmental Sustainability](#).”

2002: The leadership of the [World Summit on Sustainable Development](#) in Johannesburg, South Africa formally recognized the issue of environmental inequity.

Advocates, including grassroots workers for environmental justice, face common concerns around the globe and share a common goal of improving the

conditions for vulnerable populations in their nations. Throughout the world, disadvantaged communities typically suffer the highest burdens of environmental degradation. With increased attention to common international environmental justice issues, grassroots and other community-based advocacy groups have begun to communicate across national and continental borders. Such groups share concerns, approaches to advocacy, and educational materials and approaches, and coordinate strategies for addressing common offenses. Several universal concerns and international strategies are highlighted below:

- Rural farm workers across Latin America, South Africa, among others, suffer from the effects of disproportionate exposure to pesticides and other chemical agents as well as the lack of access to health and education services. Members of the Farmworkers Associations of Florida have exchange visits with citrus farmers in Brazil to trade ideas on how to address environmental justice issues. The problems faced are the same across international borders: literacy, lack of government support, the strong influence of chemical industries that produce pesticides, and lack of access to healthcare and housing. <http://www.floridafarmworkers.org/>
- Global Alliance for Incinerator Alternatives (GAIA), headquartered in the Philippines, aims to coordinate efforts to reduce waste and stop incineration around the world with a particular focus on representing disadvantaged communities in both developed and developing countries. Its approaches include sharing information electronically, coordinating regional meetings, developing joint strategies for community organizing, and hosting international training sessions where skills can be shared. GAIA has members in over 77 countries (Claudio, 2007). <http://www.no-burn.org/about>
- Poor and disadvantaged communities around the globe face similar problems associated with globalization and the advance of multinational corporations. Diamond, Louisiana is home to more than 130 petrochemical facilities, incinerators, and landfills known as the Chemical Corridor or Cancer Alley. Other similar sites are victims of the “waste follows waste” phenomena (<http://www.ejnet.org>). See the following site for images of the Vision Project http://www.visionproject.org/images/img_magazine/pdfs/canceralley_louisiana.pdf
- Grassroots organizations such as Concern Citizens of Norco, established in 1990, engaged and confronted leadership of The Shell Corporation, owner of nearby petrochemical facilities in Louisiana, to take

responsibility for the pollution and to relocate people to cleaner locations. The group used strategies such as highly visible campaigns at the state, national, and international levels, winning the community relocations and a reduction in Shell's toxic emissions by 30%. The persistent advocacy and community organizing earned Margie Richard, founder of Concern Citizens Norco, the Goldman Environmental Prize (Claudio, 2007).

- Similar cases of multiple toxic waste facilities located in the same area have spread internationally and are generally owned by multinational corporations. The Shell Corporation has multiple toxic waste facilities such as plants, landfills, and incinerators in Texas, South Durban, South Africa, the Philippines, Nigeria, Brazil, Curacao, and Russia. Lessons learned about the strategies used by Concern Citizens Norco have been shared around the globe, linking environmental justice issues internationally.
- One grassroots organization is [Friends of the Earth International](#), described as the largest grassroots environmental network with 70 national members and 5,000 local activist groups who are supported in community organizing and finding common grounds for action.

International collaboration and partnering continues to grow. Collaborators share experiences, strategies and educational resources, and engage in collaborative problem solving. Common strategies for class advocacy for environmental justice include the following:

- use of media,
- mediation,
- expert testimony,
- community organizing,
- program development, and
- coalition building (Powell, 1999).

NURSES AND ENVIRONMENTAL JUSTICE

Nurses became involved in environmental justice largely through their work with communities and concern for social justice. Dorothy Powell, EdD, RN, FAAN, retired and Clinical Professor Emeriti of Duke University was one of the first nurses to become involved in the environmental justice movement. Active in the Civil Rights Movement in Vance County, North Carolina, during her youth, she credits her involvement in environmental justice to the events in Warren County, a neighboring county to Vance County. She became aware of the oil dumping there through the work of her uncle and other community leaders. In 1978, when PCB-laced oil was dumped along

the roadways of Warren County, critics claimed that the area was selected because it was rural and a majority of the residents were poor, black and politically unable to determine their fate. However, hundreds of community activists worked alongside environmental groups and civil rights groups to protest the dumping and the plan for a landfill by physically blocking truck access to the landfill. This powerful example led Powell, an African-American nurse, to be professionally swayed by her commitment to equality and justice as a youth and by the discriminatory practices in neighboring Warren County.

The Mississippi Delta Region (219 counties in 7 states) was another example of environmental pollution and environmental injustices. Through a 1994 agreement with the Minority Health Professions Foundation, Howard University Nursing spearheaded a nursing initiative to enhance understanding of environmental health, including environmental justice, among nursing students and practicing nurses in the region. Funding for the work was through the Center for Disease Control and Prevention (CDC) and the Agency for Toxic Substance and Disease Registry (ATSDR). Dr. Powell and nursing colleagues developed a modular curriculum Environmental Health and Nursing: The Mississippi Delta Project (1999), published by ATSDR. Dr. Powell gained recognition as a leader in environmental justice following publication of the modules where she authored the unit on Environmental Justice and was overall project lead. Other modules included: Environmental Health of the MDR (Hansberry & White, 1999); Role of Culture, Race and Economic Development on Environmental Health (Lassister & Mitchem-Davis, 1999); Toxicology: Major Substances Affecting the Delta (Green, Mitchem-Davis, & Richardson, 1999); Assessing Individual, Family and Community Responses to Toxic Substances (Copes & Richardson, 1999); Community Organization, Empowerment, Partnering and Education (Lassister, 1999). The learning modules include learning objectives, content, learning activities, teaching methods and evaluation as well as appendices and references.

Other nurses have written on the topic to advance professional understanding of environment and social determinants, justice, and environmental justice (Butterfield, 2002; Larrson & Butterfield, 2002; Pope, Synder & Mood, 1995). Lillian Mood, RN, MSN, Director of Risk Communication and Community Liaison, Environmental Quality Control, South Carolina Department of Health and Environmental Control chaired an Institute of Medicine committee to study enhancing environmental health content in nursing. The 1995 report, Nursing, Health & Environment, wove environmental justice throughout the curriculum. The report stressed the

importance for nurses to understand the disproportionate risk of economically disadvantaged patients for exposure to hazardous environmental pollutants. Because nurses are accessible to members of vulnerable communities, it is important for nurses to bring the concerns of impacted communities to the policy arena and health systems (Pope, Snyder, & Mood, 1995).

Patricia Butterfield, PhD, RN, FAAN, and Julie Postma, PhD, RN, of Washington State University applied an environmental justice lens to rural environmental health (Butterfield & Postma, 2009) through conceptualization of the Translational Environmental Research in Rural Areas (TERRA) Framework. Rural populations are increasingly challenged by confined animal feeding operations (CAFOs), groundwater exposures, agricultural run-off, as well as exposure to specific hazardous waste sites located in their communities. The framework considers macro determinants as well as family level determinants to better understand the environmental health risks experienced by the rural poor.

Laura Anderko, PhD, RN, the Robert and Kathleen Scanlon Chair in Values Based Health Care at Georgetown University, has served on the National Environmental Justice Advisory Committee Research Workgroup, teaches a course on environmental justice, and worked with communities to address health disparities and justice issues. She has served to advance justice issues at not only Georgetown, but for nurses nationally.

The American Nurses Association in 2007 developed the [ANA's Principles Environmental Health for Nursing Practice and Implementation Strategies](#) that address environmental justice, citing concerns for social justice and health disparities. The nine assumptions upon which the principles are grounded include the following: "environmental and social justice is a right of all populations and assumes that disparities in health are not acceptable."

RESOURCES

Websites

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EPA Plan EJ 2014 Progress Report (2014) <https://www.epa.gov/sites/production/files/2015-02/documents/plan-ej-progress-report-2014.pdf>

National Institutes of Environmental Health Sciences (NIEHS)-Environmental Health Disparities and

Environmental Justice <https://www.niehs.nih.gov/research/supported/translational/justice/index.cfm>

NIEHS-Advancing Environmental Justice http://www.niehs.nih.gov/research/supported/assets/docs/a_c/advancing_environmental_justice_508.pdf

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COMMUNITY SURVEY FOR POPULATION HEALTH

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A Community Survey can be used as a tool for nurses and other disciplines to learn more about the strengths, resources, and gaps in services of a specific community. It can also provide opportunities for nursing students to critically think for the planning of care in meeting critical needs, such as exposure to chemicals of concern, proper nutrition, safety, medical appointments and activity.

A community survey provides a visual overview of a community and looks to explore needs and problems and the community's strengths and resources for the purpose of observing conditions and trends that could affect the health of the population. Conditions and trends in the community that could affect the health of the population are noted and provide background and context for working in and with the specific community.

Community surveys can be part of a more comprehensive community assessment that is a necessary step in planning community interventions. An extensive community assessment examines other factors such as health data, political information and demographics, socioeconomic data, religion, ethnicity, the language spoken in the home, community protective services such as police and fire departments, and other attributes of a community. A comprehensive community assessment requires the gathering of appropriate data from governmental and non-governmental sources. Additionally much can be learned from community forums and interviews with key informants.

This survey is useful for an examination of a community to identify potential and recognized environmental hazards that can negatively impact health as well as factors that improve health of the community members.

Objective: Explore a particular community while thinking critically and identifying potential and actual contributors, particularly environmental impacts to illness and health.

Windshield surveys are systematic observations made from a moving vehicle.

Walking surveys are systematic observations made on foot. For safety-consider completing in pairs.

Alternate clinical assignment: Have the group complete this via city bus and tour area their clinical facility serves.

Keep in mind your safety. It may not be safe to survey particular neighborhoods. Even if there is no real danger, but only a perception of danger, the resulting anxiety can affect the accuracy and completeness of a survey. Please choose another location or consider doing a windshield survey.

WHAT IS THE DEFINITION OF COMMUNITY?

There are many definitions including common and legal definitions. Below are a few:

- Common possession or enjoyment; participation; as, a community of goods.
- A body of people having common rights, privileges, or interests, or living in the same place under the same laws and regulations; as, a community of monks.
- Society at large; a commonwealth or state; political structure; the public, or people in general.
- Common character; likeness. For example a group of local fishermen can be a community
- A group of people living in a particular local area
- A group of people having ethnic or cultural or religious characteristics in common
- Common ownership: "they shared a community of possessions."

To understand the actual hazards that you may have observed during your tour of the community, examine resources such as EPA's Brownfields (<https://www.epa.gov/brownfields>). In particular look at the Brownfields near you (<https://www.epa.gov/brownfields/brownfields-and-land-revitalization-activities-near-you>). If the EPA site fails to identify a site on a map of your community, visit your state Department of Environmental Management. For example Rhode Island has a nice explanation of Brownfields at this link: <http://www.dem.ri.gov/brownfields/documents/browneng.pdf> while Massachusetts offers this map of the sites in the state <https://www.mass.gov/doc/map-of-massachusetts-brownfields-sites/download>. Another source of information is the EPA Superfund site, <https://www.epa.gov/superfund>. Superfund is the term used to describe areas on the National Priorities list for clean-up of toxic substances known to cause harm to human health. A site in Anniston, AL is linked here <https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0400123>.

Finally you can access local data for air quality and water quality in your community through your local or state government. By examining the actual pollution in your community and comparing it with your observations you

can learn more about “what the eye does not see” and can improve your ability to identify environmental hazards.

Finally discuss: Have you “seen” these areas in the past? Are areas of concern more apparent to you as you are taking part in this activity?

WHAT TO EXAMINE IN A GENERAL COMMUNITY ASSESSMENT SURVEY

The age, nature, and condition of the community's available housing

- Are there safety concerns?
- Can you identify healthy home concerns? Area surrounding the homes?

Infrastructure

- Condition of the roads, streets, bridges and highways?
- Streetscape. The streetscape is the environment created by streets and the sidewalks, buildings, trees, etc. that line them. Are there trees and/or plants? Are there sidewalks? Are building facades and storefronts attractive and welcoming? Are the streets and sidewalks relatively clean and safe for foot traffic? Are there trash cans? Is there outdoor seating?
- Is there significant construction in the area? Is it contributing to the noise, traffic or pollution in the area?
- Municipal waste water system?

Transportation

- Availability of public transportation. How much does it cost? Are the vehicles energy-efficient?
- The amount of activity on the streets at various times of the day, week, or year
- The noise level in various parts of the community
- The amount and movement of traffic at various times of day
- Is there much bicycle traffic? Are there bike lanes? Are there bike racks in many places?
- Where are the gasoline service stations located? Could there be run off of chemicals used at the station?
- What about bus stations and taxi stands? Are the vehicles left to idle? Do they burn gasoline or diesel?

Availability of food sources

- Are there large chain grocery stores vs. small markets where food may be more expensive
- Farmer's market?
- Proximity of stores (consider how one would transport a week's worth of groceries)
- Food bank or food pantry in the community? If so do they offer fresh fruits and vegetables?
- Proximity/availability and healthiness of fast food restaurants

Community Resources

Public Spaces

- The amount, location, condition, and use of public spaces
- Is it “black top” or green spaces? Are there public parks? Outdoor athletic opportunities?
- Is it safe for children to attend alone?
- Is there good lighting to extend use in the evening?
- Are the parks located near areas of poor air quality? Near highways?

Community organizations

- What evidence is there of organizations in the community?
- Are there service clubs – Lions, Elks, Masons, etc.? Are there other organizations – centered on community issues, the environment, sports or leisure pursuits, socialization, etc.?
- Is there a Senior Center?

Education

- Public schools. Are schools in different neighborhoods in noticeably different states of repair? Are schools well maintained?
- Are schools located near high traffic areas? Highways?
- Higher education. Are there two- and four-year colleges and/or universities in the community? Where are they located? Do they appear to be open to the community, or do they seem self-contained and isolated?

Health Services

- How many hospitals and clinics are there in the community? Where are they located? How big are they? How easy are they to get to?

- What is the availability of other health care providers?

Community and public services

- Are there identifiable community service providers and organizations in the community – mental health centers, food banks, homeless shelters, welfare offices, etc.?
- Are they concentrated in a particular area? Are they easy to reach by public transportation?

Industry

- What kinds of industries exist in the community?
- Can you identify sources of pollution?
- Are the buildings that are boarded up/not in use?
- Do you know what chemicals might be used or produced by the industry?

Environmental quality

- How much usable green space is there, and is it scattered throughout the community?
- Is there smog or haze? Does the air smell of smoke, garbage, car exhaust, chemicals, industrial waste, etc.?
- Does the water in streams, ponds, lakes, etc. seem reasonably clear? Can you identify safe water sources? Is there a water treatment facility? Or does the community depend upon wells for drinking water?

Differences among neighborhoods or areas of the community

- What are the differences among different parts of the community?
- Are schools, stores, public and other buildings, streets, in different areas in good or inferior condition?
- Do some areas seem neglected, while others are clearly maintained? Are there signs of disrepair, trash or abandoned cars?
- Are there vacant lots or places where rodents or other wildlife might hide?

Advertising that you notice

- i.e. fast food, cigarettes, higher education, etc. What messages are the members of the community getting?
- Communication for informational posters or billboards?

The “feel” of the community. What is your overall impression of the community?

Safety

- Community safety. Where are police and fire stations located? Are they in good repair?
- Is the community well-lit at night? Are there bars on the windows?
- Do you see signs of drug use or trafficking?

Rural areas

- Agriculture: Are there farms? How large? What are they growing? Are there animals-cows, horses etc.? Are there farm stands-do they offer organic foods? Crops that need migrant workers?
- Access to safe drinking water?

HEALTHY HOMES ASSESSMENT TOOLS

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Conditions in the places where people live, learn, work, and play affect a wide range of health risks and outcomes. These conditions are known as social determinants of health (SDOH): [Social Determinants of Health](#). It has been noted that we spend approximately 90% of our time indoors, almost 70% of which is in our homes ([EPA, 2018](#)). Pollutants in the home are often 2 to 5 times higher than typical outdoor concentrations ([EPA, 2018](#)). People who are often most susceptible to the adverse effects of pollution (e.g., the very young, older adults, people with cardiovascular or respiratory disease) tend to spend even more time indoors ([EPA, 2018](#)). Indoor concentrations of some pollutants have increased in recent decades due to such factors as energy-efficient building construction (when it lacks sufficient mechanical ventilation to ensure adequate air exchange) and increased use of synthetic building materials, furnishings, personal care products, pesticides, and household cleaners. Thus, the home in which we live is often a contributing factor to many chronic diseases such as asthma, respiratory, and cardiovascular diseases.

To provide guidance in the assessment of home environments, [the National Center for Healthy Housing](#) assessed 20 key factors across 54 communities. The [study](#) reported that 35 million – 40% – of metropolitan homes in the U.S. have one or more health and safety hazards. The physical conditions of U.S. housing have declined since the U.S. Census' last survey in 2009. That survey found that about 30 million homes (or 35%) had health and safety hazards.

There are common pollutants that are found in the homes. These include combustion byproducts such as carbon monoxide, particulate matter, and environmental tobacco smoke; substances of natural origin such as radon, pet dander, and mold; biological agents such as molds; pesticides, lead, and asbestos, and various volatile organic compounds from a variety of products and materials.

Health effects associated with indoor air pollutants include irritation of the eyes, nose, and throat; headaches, dizziness, and fatigue, and respiratory diseases, heart disease, and cancer. The link between some common indoor air pollutants and health effects is very well established.

- Radon is a known human carcinogen and is the second leading cause of lung cancer ([EPA](#)).

- Carbon monoxide is toxic, and short-term exposure to elevated carbon monoxide levels in indoor settings can be lethal ([NCBI](#)).
- Numerous indoor air pollutants—dust mites, mold, pet dander, environmental tobacco smoke, cockroach allergens, particulate matter, and others—are “asthma triggers,” meaning that some asthmatics might experience asthma attacks following exposure ([IOM](#)).

Populations in inadequate housing are more likely to have environmental diseases and injuries. Substantial disparities in housing have remained largely unchanged. Approximately 2.6 million (7.5%) non-Hispanic Blacks and 5.9 million Whites (2.8%) live in substandard housing and are vulnerable to the health effects associated with indoor air pollutants ([Jacobs, 2011](#)). Thus, many of the health disparities (asthma, hypertension, cardiovascular disease, cancer) among minority populations are exacerbated by their home environment.

There is strong evidence that healthy home environment assessments encourage household behaviors that reduce asthma triggers and exposure to allergens.

The [Green & Healthy Homes Initiative](#) (GHHI) was charged in 2008 by the White House Office of Recovery to lead the national efforts to integrate lead hazard control, healthy homes, weatherization, and energy efficiency work. This project later became the Green & Healthy Homes Initiative that addresses the health and energy efficiency needs of a home through a holistic intervention model. The GHHI describes 11 housing hazards including lead, asthma triggers, household injury, asbestos, carbon monoxide, fire, mold and moisture, pests, radon, tobacco smoke, and volatile organic compounds.

There are a wide variety of healthy home assessment guidance and tools that have been created and are being used to identify hazards in the home. Once identified, mitigation strategies can be taken to decrease the negative health impacts to the occupants from these hazards.

Some of the tools and resources include:

CDC in partnership with the Housing and Urban Department (HUD) have developed a [Healthy Housing Inspection Manual](#). The Healthy Housing Inspection Manual takes environmental health professionals and housing managers, specialists, and inspectors through the elements of a holistic home inspection. It is also a useful reference tool for nurses, outreach workers, and others who are interested in preventing illness and injury due to residential health and safety hazards.

Home Environmental Health and Safety Assessment Tool

This tool from the [Alliance of Nurses for Healthy Environments](#) assesses sources of exposure in the home across ten different areas and provides information on the standards of practice if an exposure is found.

The Healthy Homes Assessment Tool Checklist from [The Yampa Valley Sustainability Council](#) is a tool that can be used to assess sources of exposure in the home as well as safety hazards.

These tools are available online and can be used by health professionals, including community health workers to assess homes to ensure that where people live is healthy and sustainable.

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THE ROLE OF TREES IN CLIMATE CHANGE MITIGATION: A STORY OF COMMUNITY MITIGATION EFFORTS IN CHAPIN, SOUTH CAROLINA

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INTRODUCTION

Recently there has been a great deal of publicity about the fires not only in parts of the United States but also in the Amazon region of South America. While media reports, as well as climate change scientists, note that the rise in wildfires and extreme weather events are often the result of climate change, deforestation is a distinct cause of rising green house gas (GHG) emissions (Galford et al, 2010). Additionally wildfires contribute to the loss of trees that serve to mitigate climate change by reducing GHG emissions through carbon dioxide absorption.. One strategy to address this has been the efforts to plant trees for their ability to reduce these emissions, particularly in vulnerable communities where environmental injustice occurs (Smith et al, 2020; Rudd et al, 2018). Although many people have yet to make the connections between trees, climate change and health (Wolf et al, 2020), one long term environmental health nurse shares her story with us about efforts she led in her community to plant trees. This was an effort that not only addressed climate change but it also brought community members together for a shared goal, involved students who learned about the importance of trees to their community and health and connected young and older community members around a civic issue.

CHAPIN SEQUOIAS

In the January 2014 issue of Readers Digest an article caught my eye titled, “20 REASONS WHY THIS YEAR WILL BE BETTER THAN LAST”. The article contained a collection of indicators including one that told of a large scale effort to plant sequoias and redwoods.

I was intrigued. I had thought that sequoias only grew on the west coast of the USA. In exploring the Internet I learned that sequoias will grow in any temperate climate where they get adequate water and drainage. I began to wonder if we could grow sequoias in my small lakeside community in the center of South Carolina.

There were several reasons for my interest. I spent the final third of my 30+ year career as a public health nurse working in the environmental protection programs of the SC Department of Health and Environmental Control. My position, as the first Director of Risk Communication and Community Liaison in Environmental Quality Control, was the brainchild of Lewis Shaw, PE and Deputy Commissioner. He saw the need for a nurse to bridge the divide between his staff of environmental scientists and engineers and the communities who were often alarmed by real or perceived environmental hazards they feared might be affecting their health. After nearly ten years working to strengthen links between health and environment, I retired with a deep commitment to continuing the work of protecting the environment for the benefit of all communities.

And I love trees! I live in a small log cabin by the lake, and my neighbors are very tolerant of my maintaining a lot of trees, with natural leaf cover on the ground—a home in the woods in the midst of a small neighborhood! They are uncomplaining that many of the leaves they rake in their own yards come from my trees. I am grateful!

It was easy to see the link between planting trees and environmental and population health. The article said, “Sequoias can breathe in CO2 faster and more effectively than almost any other species on earth, mitigating the adverse effects of climate change.” (David Milarch, cofounder of Archangel Ancient Tree Archive, which locates, clones, and archives tree genetics, Readers Digest, January 2014, p. 82)

Spurred on by the benefits of trees to a healthy community—as carbon absorbers, heat island preventers, noise and light pollution mitigators, and additions of beauty to our quality of life—my next step was to meet with four friends to test the idea of planting sequoias around our community. They had many questions about what would be required for the trees to thrive and I had few answers. So my next stop was with James Bryan owner of Botanica Nursery.

I knew James as an environmental enthusiast but I was unaware of his special affection for sequoias, and that he had several in his lakeside yard—the tallest about 60 feet at 20+ years of age—and some for sale in his nursery! He had answers for many of our questions. Sequoia semper virans are disease resistant, insect resistant, and non-invasive. They require lots of water for the first two years after planting—about 4 gallons, 3 times per week—and will get adequate drainage if planted on a slope in our dense clay soil. He offered to be a source for the trees at a minimal price and offered to plant and teach others to plant and care for them. He also knew a professor in a city

about an hour away who was eager to give seedlings he was nurturing to test their adaptation to other communities.

Armed with encouragement from James, the next breakthrough came at my annual physical exam with my geriatric specialist and D.O. primary care provider, Dr. Sarah Schumacher. As always she asked, “What is on your mind these days? What are you into now?” As I told her about my sequoia brainstorm, her eyes lit up! She said I needed to talk with Lisa Maylath who was the faculty sponsor for the Academic Leadership Academy at our local Chapin High School. Dr. Schumacher’s son Adam was a sophomore student in the Academy, and they were interested in projects to benefit the community.

Lisa Maylath was also enthusiastic. She and her family had visited Muir Woods and she was struck by how such mammoth trees could grow from something smaller than a mustard seed. And together we began to think of all the life lessons students might learn from a project that planted sequoias in public places representing all aspects of our community—government, education, business, faith, recreation, non-profits, and neighborhoods. The support and approval of Dr. Akil Ross, principal of Chapin High School, was easily obtained when we told him that eagles, the CHS mascot, loved to roost in high places!

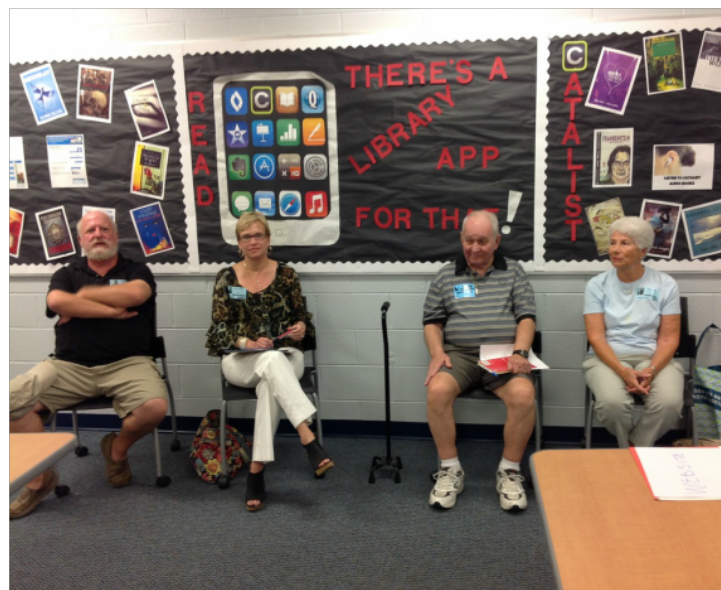
We rounded up a group of community volunteers who were willing to support the student efforts and who brought different areas of expertise and community linkages—Garden Club, Chamber of Commerce, Town government, web site design, event planning, Rotary, and community respect and influence. This was especially important because our community was in a period of upheaval after the unexpected election of a mayor who replaced the long-established and familiar leadership.

Together the students and their project sponsor, biology teacher Karen Walton, with the community volunteers, mapped out a way to proceed. We agreed on a project name, Chapin Sequoias Standing Tall, and several project goals:

1. To bring the community together in an effort everyone could be FOR.
2. To develop a unique feature for our community, one that might make us a destination for visitors.
3. To improve the quality of the environment and the beauty of the town.
4. To demonstrate the wisdom of long-term thinking and planning.

We were clearly embarking on an effort that few, if any, of us would live to see to its full maturity. I had an additional unwritten goal, that students would learn how an idea can become a reality through community networking and cooperation, i.e. that they would learn something about how communities work.

The students divided themselves into teams, each with the support of a community volunteer. There were a total of 30 students involved in the project. I expected that students would gravitate toward the web site team, but the most popular group was Planting! The least sought out was Presentation--no surprise to those of us familiar with people’s general aversion to public speaking. Altogether team participation was fairly balanced with each student participating in one team.



1. Presentation

Speaking to community groups about the project, getting permission to plant in public places, getting sponsors for trees and markers.

2. Planting

Participating in the actual planting of trees.

3. Watering

Watering the trees on campus and developing watering teams in places where new trees did not have access to an irrigation system.

4. Markers

Designing metal numbered markers that identified each tree and linked it to a sponsor. The markers were produced by another group of students in a metal-working class at the nearby Center for Advanced Technology Education (CATE)

5. Website

Developing an accessible computer site Chapin Sequoias informing the public and for tracking the sites where trees were planted, and persons who sponsored trees and markers. chapinsequoiastandingtall.weebly.com

6. Celebration

Planning events to celebrate progress. The first was a student assembly on SC Arbor Day in December of 2014, the key tree-planting time to kick-off the project. The Assembly was festive—the 30 students in the Leadership Academy project team had t-shirts with a tree on the front and a quote from Warren Buffet on the back: “Someone is sitting in the shade today because someone long ago planted a tree.” The students formed a circle showing the circumference of a mature sequoia tree. The community volunteers sat in a place of honor, James spoke about sequoia trees, and I described the project origins and plan. The highlight was the unfolding of a 90 foot artistic rendition of a sequoia, painted by a student artist who was also on the wrestling team! It was done on butcher block paper that “grew” before our eyes attached to a lift borrowed from the construction crew doing renovations at the school. At its peak, an eagle rose from the top of the tree!—in reality, an assistant principal dressed in the school mascot costume! Quite a day!

Refreshments followed and sequoia seedlings were available for persons who wanted to purchase them and plant one for themselves.

The project was to be completed in 2 years. At that point the trees would be sufficiently established to survive without intensive watering and care. And the students would be moving into their senior year and onward.

HOW DO WE MEASURE SUCCESS?

1. A total of 41 marked trees were planted at all of the sites planned to represent aspects of the community.
2. An additional nearly 200 trees were bought and planted by individuals who heard of the project and

wanted to participate individually. Even though the project has been officially completed for several years, people are still planting trees! Recently a friend, who is also the town attorney, told me that she and her husband celebrated their anniversary by planting two sequoias in honor of their two daughters.

3. Watering teams involved others in the community and “ownership” of the trees and the project grew, e.g., at Crooked Creek Park recreation center a women’s



tennis group watered on Mondays, an aerobics group on Wednesdays, and after-school middle-schoolers on Fridays. The middle-schoolers loved the trees so much they gave them each a name and made wooden markers separate from the official project markers.

4. Another watering team at a local church watered the trees planted there—the youth group on Sunday evenings, a women’s group on Tuesdays, and a men’s prayer group on Thursday mornings.
5. A few of the initial plantings did not survive and we learned in replanting to plant first in pots and allow the root system to develop a little rather than putting tubelings directly in to the ground.
6. At the very beginning of the project, the contentious town council was all smiles when Adam’s presentation asking permission to plant at Town Hall reminded them that these trees were “for his grandchildren’s children.” It is possible to find common ground!

7. New connections and friendships were formed that have lasted and carried over into other community initiatives and enriched lives.

And all of us have a story to tell—of community healing and cooperation, of intergenerational friendships, of environmental enhancement, of investing in the future, of Chapin Sequoias Standing Tall.

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ENGAGING WITH NATURE FOR HEALTH PROMOTION

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INTRODUCTION

Human beings are living in increasingly urban, man-made environments and have less contact with the living, natural world than at any point in our history. According to the World Health Organization, 54% of the world population lived in an urban area in 2015, and this is likely to increase to 60% in 2030 and 66% in 2050. This societal change has occurred with astonishing rapidity, particularly in the developed world. As Richard Louv, who coined the term “Nature Deficit Disorder,” remarks in his book *Last Child in the Woods*, “In the space of a century, the American experience of nature—culturally influential around the world—has gone from direct utilitarianism to romantic attachment to electronic detachment.” (2008, P. 16) Further, our lives are focused on and involved with technology at an unprecedented level. In 2012, for example, the CDC estimated that 98.5% of 12-15 year olds in the United States watched TV daily and 91.1% used the computer daily, outside of school (Herrick, Fakhouri, Carlson, & Fulton, 2014).

In this modern urban, industrialized, and technology-driven human society, there exists unprecedented environmental risk. As detailed in this text, industrial contaminants, pesticides, air pollution, and climate change are growing threats to human health. Health risks arising from a sedentary, indoor lifestyle are also well documented and include obesity and vitamin D deficiency, among others. Nurses and other health professionals have historically focused on identifying and mitigating such risk factors, and treating identified problems. Another critical function of the nursing profession and our healthcare systems is the promotion of health for the individuals and communities they serve. Beyond toxicity and risk, growing evidence exists to show that human contact with nature is a valuable, and perhaps essential, avenue for health and wellbeing.

HEALTH PROMOTION

The World Health Organization defines health promotion as “...the process of enabling people to increase control over, and to improve, their health. It moves beyond a focus on individual behaviour towards a wide range of social and environmental interventions.” (World Health Organization, 2018) The American Nurses Association, in a position statement adopted in 1995, calls on the profession to “expand its efforts to design and implement

interventions which support promotion of health and prevention of disease/illness and disability.”

THE HEALTH-NATURE CONNECTION

The positive health effects of nature seem intuitively known; the walls in office buildings, clinics, and dental suites are frequently adorned with paintings or photographs of flowers, trees, bodies of water, or pastoral views. Many hospitals have an internal television channel which cycles through various natural scenes set to music, meant to help calm anxious and sick patients. Popular culture has chimed in as well- these humorous YouTube videos, providing a play on pharmaceutical advertising, have circulated on social media (warning that some adult language and crude humor is present):

<https://www.youtube.com/watch?v=Bf5TgVRGND4>

<https://www.youtube.com/watch?v=TQ8H4EK2vt4>

https://www.youtube.com/watch?v=Bsh_8qxUfDY

Research is accumulating to support this human-nature connection and effects are notable in physiological, psychological, and social domains. Vulnerable populations, including children, the elderly, and low-income communities can be particularly affected by the implementation of efforts to promote health through contact with nature. Organizations and practitioners have begun to use these findings to develop and implement programs and therapies to positively affect health.

Physical Effects

Overweight and obesity are among the primary health risks facing the worldwide population today. In 2016, 39% of adults around the world were overweight, and 13% were obese; these numbers have almost tripled since 1975 (World Health Organization, 2018). Though physical activity in any form has health benefits and can contribute to a healthy weight, exercise in outdoor, natural environments may be particularly associated with consistency and positive effects. Studies have shown that green space is associated with more physical activity and less incidence of overweight and obesity (Coombes, 2009). People who live closer to parks are more likely to exercise regularly than those who live further away from a park (Cohen et al., 2007). Time spent in the outdoors is positively associated with physical activity (Gray, C. et al., 2015), and studies link outdoor natural exercise to greater levels of enjoyment, vitality, and self-esteem (Coon et al., 2011), potentially increasing the likelihood that such exercise routines will be sustained long-term. Some evidence has shown, as well, that diet may improve with active engagement in gardening; Litt et al. (2011) found a