Pork and Pollution

An Introduction to Research and Action on Industrial Hog Production

RACHEL CARSON COUNCIL

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Authors

Zoë Ackerman
Associate Program Director and Campus Coordinator
Rachel Carson Council

Robert K. Musil, Ph.D., M.P.H.
President and CEO
Rachel Carson Council

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Cover photo: Michael Evans[1]

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INTRODUCTION

"Gone are the pastoral scenes in which animals wandered through green fields or flocks of chickens scratched contentedly for food. In their place are factory-like buildings in which animals live out their wretched existences without ever feeling the earth beneath their feet, without knowing sunlight, or experiencing the simple pleasures of grazing for natural food—indeed, so confined or so intolerably crowded that movement of any kind is scarcely possible." [2]

—Rachel Carson, *Animal Machines*

Rachel Carson—most famous for *Silent Spring* and her dedication to scientific research, vivid narrative, and courageous testimony about the effects of DDT—was also a pioneer in increasing public knowledge about the immorality and environmental dangers of factory farms. In the section above, from her foreword to Ruth Harrison's 1964 book *Animal Machines*, Carson lets readers see and feel a Concentrated Animal Feeding Operation (CAFO).

In her writing, Carson questioned humanity's moral right to treat pigs—highly sentient and social creatures—as inanimate objects. She took issue with hogs being raised in artificial environments, "network[s] of whirring, computer-driven machines," as she put it. Carson also pointed out how exposure to diseases, drugs, hormones, pesticides, and antibiotics through animal waste would affect people as well.

Today, our meat economy is no collection of quaint family farms, pastoral scenes, or green fields. Instead, it's a complex and vast industrial system. Though these operations raise and process beef, dairy, swine, and chickens across the United States, here we focus on hog farming—an industry that has been expanding in the last few decades, with the highest density in eastern North Carolina. The Tar Heel state is home to the top two hog-producing counties in the country, Sampson County and Duplin County. The world's largest hog slaughterhouse is in neighboring Bladen County, and the entire region continues to be a site of extreme environmental injustice.

The pig industry of today generates $8 billion a year in revenue by packing ham, bologna, smoked sausage, pulled pork, pork chops, and bacon bits and shipping them all over the world, mainly to Mexico, Japan, and China.[3] These operations still create "wretched existences" for the thousands of pigs confined indoors and for the people living near factory farms who have to deal with the toxic effects. On average, CAFOs produce one million pounds of feces every four seconds.[4] In 2012, livestock excreted 13 times more tons of waste than humans, little of which underwent wastewater treatment.[5] This waste is riddled with microbes that can spread infectious disease and promote antibiotic resistance.

At a time when CAFOs were not yet on the public's radar, Carson called for research, action, and building a movement against factory farms. In her foreword, she suggests that both industrial producers and the public are to blame for a lack of acknowledgement and action:

"…The evils go long unrecognized. Even those who create them manage by some devious rationalising to blind themselves to the harm they have done society. As for the general public, the vast majority may rest secure in a child-like faith that 'someone' is looking out for things—a faith unbroken until some public-spirited person, with patient scholarship and steadfast courage, presents fact that can no longer be ignored."[6]

The economic system of today grows out of a long history of unjust and unhealthy relationships between humans, animals, and the earth. CAFOs thrive and persist in part on a system of alliances between big agriculture lobbies, scientists, and legislators on Capitol Hill. In this "agro-industrial complex," scientists and legislators, through corporate pressure, receive government funds to conduct research and pass laws geared toward industry profit rather than protecting workers, consumers, and people who live near the polluting industries.[7]

Despite rising concerns and consciousness about the social, environmental, and economic problems of industrial meat production, Americans consume 45 more pounds of meat per year than 50 years ago.[8] Over the last 60 years, global consumption has increased nearly six-fold to 200 million tons, according to projections from the United Nations' Food and Agricultural Organization. Over the last few decades, the profits of the hog industry have been further concentrated in the hands of a few at the expense of the many: low-income communities, communities of color, and indigenous communities.

Why does the production and consumption of factory-farmed meat continue to grow? Too few Americans are aware that CAFOs are connected to the spread of infectious disease, antibiotic resistance and asthma. In addition, few people know that families living near factory farms must shut and even seal the windows and doors of their own homes to shield themselves from debilitating stench and dangerous particles. Most Americans are also unaware that algal blooms from CAFO waste suffocate rivers and streams, killing fish by the thousands, or that when a hurricane arrives, trees become cloaked in toxic pig feces. Most Americans live too far from the sources of the pork they eat to know that the industrial farming of animals clears out huge swaths of land, contaminates soil, reduces ecological diversity, dries up wetlands, and contributes to climate change.

This report aims to highlight these disparate and dangerous factors. In "Pork and Pollution," the RCC builds on Carson's passion for research, writing, and advocacy by presenting information about CAFOs and their links to adverse human health effects, environmental justice, and climate change. The barriers to positive change are large: for example, because CAFOs do not pay for environmental and health costs of production, consumers pay less for food from industrial sources than from small- and medium-sized farms.[9] Finding solutions within today's social, economic, and political systems will require us to confront environmental injustice. It will require each of us to rethink the structure of our economy where, in 2010 the bottom 80 percent of households held 4.7 percent of non-home wealth and the top 1 percent held 42.1 percent.[10] Proposed technological fixes such as anaerobic digesters, which convert manure into biogas, are proving to be inadequate for reasons described later in this report. True solutions look to prevention. They require not only facing the short- and long-term social and ecological consequences of a system that succeeds only in polluting the environment and concentrating wealth and power, but also supporting the environmental justice movement, which is already finding new ways of creating change.

Our goal is not to eliminate pork consumption, but rather to empower faculty, graduate and undergraduate researchers, journalists, and community members unfamiliar with industrial animal production to think critically about the complex issues raised by CAFOs and to explore solutions for a just and sustainable food system.

In her foreword, Carson writes that an important argument against industrial agriculture is a humanitarian one: "It is my belief that man will never be at peace with his own kind until he has recognized…a true reverence for life." This ethos contradicts the philosophy of unlimited growth and consumption, and remains at the heart of the struggle against industrial farming today. In Part 1 of this report, we describe the history of factory farms in both North Carolina and the U.S. in general. In Part 2, we explore the social, economic, environmental, and public health effects of CAFOs, and how these will worsen with a changing climate. In Part 3, we lay out ideas for action and possibilities about where to go from here. Throughout, we keep in mind Rachel Carson's call to restructure our relationships with each other and with the earth in our local and global transition beyond factory farms. As we continue to build a campus and citizen's movement, we encourage you to stay in touch with the Rachel Carson Council.

Zoë Ackerman and Robert K. Musil, Ph.D., M.P.H.
Rachel Carson Council

Part 1. The Making and Breaking of the Pork Economy

"The modern world worships the gods of speed and quantity, and of the quick and easy profit, and out of this idolatry monstrous evils have arisen."[11]

—Rachel Carson, *Animal Machines*

The story of CAFOs manifests the danger of the philosophy of unlimited economic growth and consumption. Over the last few decades, a stream of free market policies around agriculture subsidies, consolidation of the industry, and deregulation have yielded toxic effects disproportionately borne by low-income people and people of color. In this section, we begin with a brief overview of hog factories in North Carolina, and then trace how CAFOs came to be, on a national scale.

CAFOs in North Carolina: An Environmental Justice Issue

Throughout our analysis of CAFOs in the U.S., we examine how pork politics have played out in the Tar Heel state. North Carolina's pig population currently stands at around 10 million, on a par with its human population of 9.8 million. Hog production facilities continue to grow rapidly in the eastern part of the state, which holds the top ten counties for hog density in the U.S.[12]

North Carolina is notable because it is the scene of early **environmental justice** (EJ) action. The EJ movement began in North Carolina's Warren County in 1982, when the state government threatened to dump 6,000 truckloads (120 million pounds of soil contaminated with toxic polychlorinated biphenyls (PCBs) near an African-American neighborhood.[14] Residents lay down in front of the trucks and organized marches and nonviolent protests for the next six weeks. Many submitted to arrest for standing against the placement of this landfill in their backyard. Though the state government went ahead and deposited the toxic waste, the EJ movement created a milestone: these were the first arrests in U.S. history made over the siting of a landfill.

The premise of environmental justice, according to the North Carolina Environmental Justice Network (NCEJN), is that everyone has the "right to a safe, healthy, productive and sustainable environment…where 'environment' is considered in its totality to include the ecological (biological), physical (natural and built), social, political, aesthetic, and economic environments."[15] Environmental justice grew out of the Civil Rights movement in the South, and its advocates call not just for "*freedom from* contamination, but also for *access to* environmental and social goods such as safe, well-paying jobs" and political representation.[16]

One of the 17 principles of environmental justice "demands that public policy be based on mutual respect

Concentration of Industrial Swine Operations in the United States

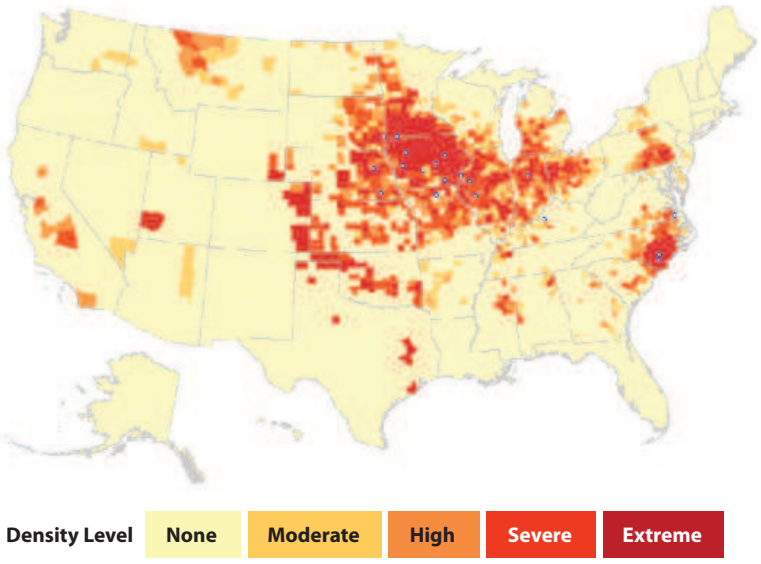

Fig 2. Credit: Food and Water Watch[13]

and justice for all peoples, free from any form of discrimination or bias."[17] This is an important demand for people who experience the effects of CAFOs, as evidence of environmental racism in policy around zoning, permitting, and regulatory abounds. **Environmental racism** describes how "communities of color in the U.S. are more likely to be exposed to hazardous and unsafe environments, whether these take on the form of landfills, polluting industries, or greater vulnerability to climate change. This term acknowledges the political reality that environmental injustices present today are the result of historical processes that continue to promote racial inequality culturally, institutionally, legally and ideologically."[18] Environmental racism is not a thing of the past: today, the percentage of minority residents in a zip code still proves the greatest predictor of a hazardous waste facility siting.

Why are CAFOs an issue of environmental justice in North Carolina? A National Institutes of Health report describes how after emancipation, freed slaves continued to work as sharecroppers and tenant farmers in the "Black Belt" in the eastern part of North Carolina. Large-scale hog farming came to North Carolina in the late 1980s, and by the mid-1990s, the state moved to its current second place in hog production. Around 95 percent of hog farms are still located in the Black Belt, as shown in the map below.[19] Few CAFOs are built in whiter and more affluent areas such as Charlotte, Durham, Greensboro, Raleigh, and Winston-Salem.

Dr. Steve Wing, an epidemiologist at the Gillings School of Public Health at the University of North Carolina at Chapel Hill, has studied how the explosion of hog factories affects mainly poor minority communities. Wing found that African-American North Carolinians were 1.5 times as likely to live within three miles of industrial hog operations as white residents. American Indians were twice as likely, and Hispanic residents were 1.39 times as likely.[21] When Wing conducted the study, twelve of the top 15 hog-producing counties had African-American populations over 30 percent, and income in all but one county was below the 50th percentile.[22] Therefore, in terms of environmental justice, people of color and the poor living in rural communities lacking the political capacity to resist do in fact "shoulder the adverse socio-economic, environmental, or health-related effects of swine waste externalities without sharing the economic benefits brought by industrialized pork production."[23]

North Carolina Enslaved Population in 1860 And Industrial Hog Operations Re-Permitted in 2015

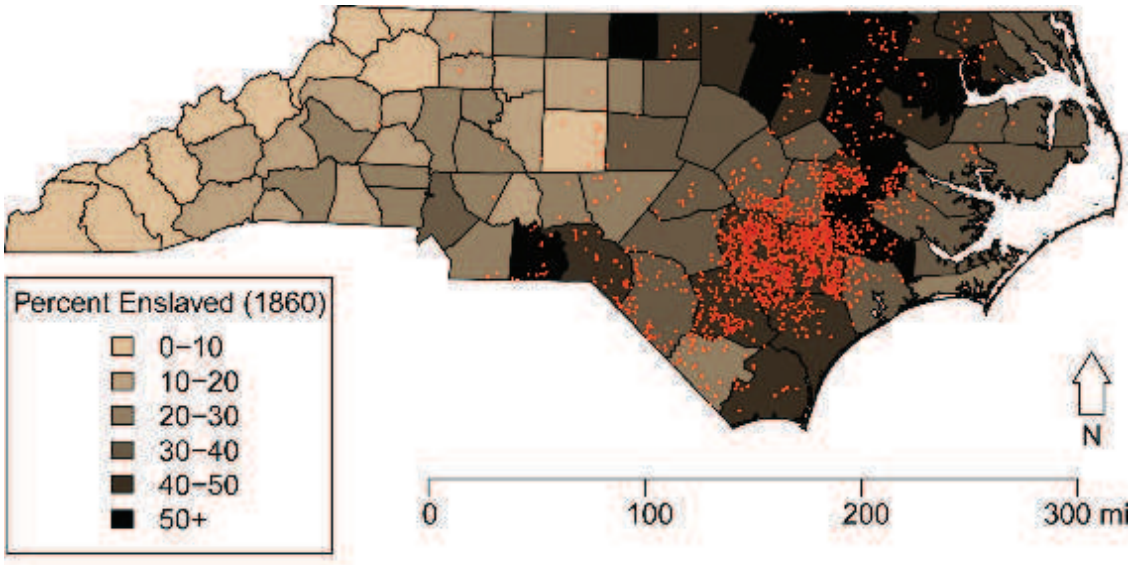

Fig 3. Credit: Nathaniel MacNell, UNC Ph.D. student in the Department of Epidemiology[20]

Duplin County, one of the top two hog-producing counties, is 26 percent African-American and 21 percent Hispanic. The median income is 25 percent lower than the rest of the state, and 26 percent of the residents live below the poverty line.[24] It currently hosts 530 hog operations with a collective capacity of 2.35 million animals. In 2007, the 2.3 million hogs in Duplin County generated twice as much waste as the entire city of New York, according to Food and Water Watch. As shown in the graphic to the right, on a daily basis, the entire state of North Carolina produces as much hog waste as human fecal matter from California, North Carolina, North Dakota, New Hampshire, New York, Pennsylvania, and Texas combined. Even though these operations produce more than ten times as much hog waste as human fecal matter, there is rarely a requirement for ecologically sound sewage treatment practices.[25]

How much manure do pigs in eastern North Carolina produce daily?

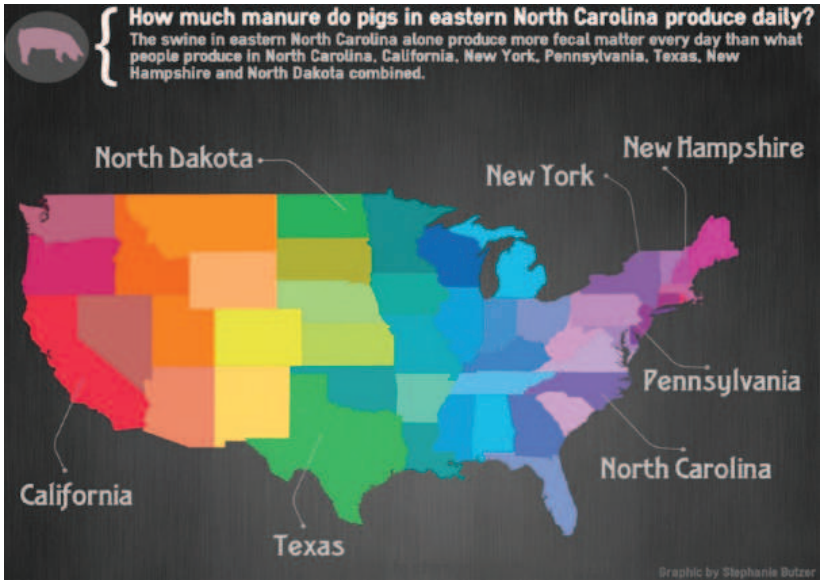

Fig 4. Credit: Stephanie Butzer, Elon University[26]

Complaint with the EPA Office of Civil Rights

In response to the North Carolina Department of Environmental Quality (DEQ) categorizing swine CAFOs as "non-discharge facilities" and issuing permits to allow them to contaminate the water and air, in September 2014, the North Carolina Environmental Justice Network (NCEJN), Rural Empowerment Association for Community Help (REACH), Waterkeeper Alliance, and Earthjustice **filed a complaint under Title VI with the EPA Office of Civil Rights.** Title VI states: "No person in the U.S. shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjects to discrimination under any program or activity receiving Federal financial assistance."[27] The counsels charge that North Carolina's lax regulation of hog waste disposal discriminates against communities of color in eastern North Carolina. The University of North Carolina Center for Civil Rights joined as co-counsel to Earthjustice. In February 2015, the U.S. EPA Office of Civil Rights accepted the complaint and is proceeding with the investigation.

How Did We Get Here?

According to Food and Water Watch's 2015 report on factory farms, "the two largest costs of industrial livestock production—feed and manure management—have been artificially reduced by federal policies."[28] The practice goes back to the Roosevelt Administration, when agricultural subsidies were part of the economic stimulus package of the **New Deal program**. The New Deal set target prices for corn, guaranteeing that the government would buy all of the planted corn. This system stabilized the agriculture sector during World War II, when a large amount of corn was needed. During this regulated era, when excess corn flooded the market, the government set up a system in which farmers could trade corn for loans, and the extra corn was placed in grain reserves.[29]

From Farm to Agribusiness

As corn stockpiles continued to grow in storehouses across the Midwest, the question of what to do with excess crops became more pressing. One solution was to use the large amounts of corn as animal feed. Rather than recognizing the ecological and economic consequences of excess corn production and working to slow it, in the 1970s Richard Nixon's Secretary of Agriculture Earl Butz saw an opportunity to convert American farmers into businessmen. He set up policies that in fact sped up production. From then on, only corn growers who could afford to produce large volumes—not small- and mid-sized farmers, but mega-farming businessmen—could compete.

The 1996 Farm Bill, also known as the "Freedom to Farm Act," did away with all requirements to keep some farmland idle, and further contributed to the epidemic of **monoculture**—the practice of planting only one variety of crop at a time. As farmers devoted all of their land to planting corn, and the government eliminated its reserves, grain flooded the market.[30] The system of loans changed as well: farmers could no longer use corn to repay their loans. This caused farmers to sell their entire crop, further decreasing prices. Between 1996 and 1997, real corn prices dropped by 28 percent, and factory farms—which bought the cheap grain for feed—began to spread rapidly.[31] Whereas small- and mid-size farmers used to graze their animals on the land that supplied their food, now large-scale meat farmers could cheaply import feed to their farms and focus solely on raising animals, often confining thousands of them to the indoors. A 2007 Tufts University study found that factory farms saved $34.8 billion between 1997 and 2005 because they could buy feed below their production cost.[32]

Concentration of the Industry in the Hands of a Few

Subsidies for corn led to the concentration of the animal agriculture industry in the hands of a few larger producers, the "packers." The largest pork-producing company in the U.S. today is the Chinese-owned WH Group (formerly Smithfield, which it acquired for $4.7 billion, the largest Chinese takeover of a U.S. company ever). The Chinese were drawn to hog production in the U.S. when the average cost of hog production doubled in China between 2002 and 2009 and costs simultaneously fell by over a quarter in the U.S. As of 2007 the top four hog packers (WH Group, IBP, ConAgra, and Cargill) control over 65 percent of pig processing in the U.S., a huge increase from the 35 percent controlled in 1982.[33] Today WH Group owns one in four U.S. pigs.

Corporate pig processors quickly achieved success by taking advantage of cheap feed prices and negotiating "bulk rates for drugs, equipment, additives, trucks, vet care, and processing plants that smaller producers could never obtain."[34] The process of taking over each stage of production and processing is called **vertical integration**, and the results can be seen in the skyrocketing numbers of pigs raised on industrial farms. From 1997 to 2012, the total number of pigs raised by these four packers increased by 70 percent, bringing the total to 17.1 million—the equivalent of adding 3,100 hogs per farm per day.[35] In 1992, less than a third of hogs were raised on farms with more than 2,000 head, but by 2012 this figure was up to 97.4 percent. Earl Butz's dream had come true: the only competitive players for pork were not farmers, but agribusinessmen.

Vertical integration of the economy wreaked havoc on small farmers. The demands for fossil fuels and chemicals drove up costs and the spread of larger hog operations caused a bumper crop of pigs, which deflated pig prices. In 1997, the selling price for a 250-pound hog was around $118. By 1998, the price for the same pig dropped to $45. When smaller farmers lost the ability to compete, they were forced to join the ranks of larger corporations or go out of business. Since 1983, almost two-thirds of North Carolinian hog farmers (16,000 of 23,400 producers) have left the business.[36] As small and mid-size farms disappeared, U.S. pork exports doubled to more than two million tons per year, constituting 20 percent of the world production and totaling $2.9 billion in 2012.

Lax Environmental Regulation and Enforcement

Agriculture in the U.S., unlike factories and sewage systems, remains largely free of state and federal environmental regulations.[37] Though the runoff from agribusiness manure is greater than all of the industrial and municipal water pollution in this country, it is not strictly regulated under the Clean Water Act and has no regulations at all under the Clean Air Act.[38] Penalties for violations are minimal, and there is very little oversight by local and state officials, ensuring that the costs of disregarding regulations remain low. Lax environmental regulations result in lower meat production and processing costs because they exclude the negative environmental and health externalities, as well as cleanup costs.[39] However, consumers do not share in the benefit from this system, as prices have not dropped in step with decreased production costs.[40]

Weak environmental oversight of pork production is a direct result of the powerful representation of pork business interests at "all levels of government from local commissions and health boards to state legislatures, environmental agencies, and agricultural departments."[41] As a consequence, when communities try to advocate for zoning requirements, their voices are not heard. In North Carolina, proposed "**Ag gag laws**" would ban undercover videotaping and require videos to be delivered to authorities, making it more difficult for community members to show evidence of pollution to regulating agencies.

Powerful lobbies such as the National Pork Producers Council have been known to "buy" scientists at academic institutions by funding research that supports industry profit rather than protecting workers, communities, and the environment.[42] One example of the industry's influence in academia involves research on **anaerobic digesters**. These digesters are designed to convert animal waste into biogas, which can be processed into electricity, heat, natural gas, and transportation fuels. Studies paid for by the pork industry show that converting manure into energy at factory farms yields a 50 percent reduction in emissions.[43] However, Food and Water Watch's 2015 report asserts that this is a temporary and incomplete solution to a much larger waste problem. Further, the economic and environmental cost of the digesters would likely fall to the government, taxpayers, and communities living near the toxic facilities.[44]

WH Group recently sponsored a $17.1 million research project on waste disposal options at North Carolina State University. The study revealed that replacing current lagoon systems would cost five times as much as retaining the current ones. Funders of the study, along with legislators, expressed concern that "cleaning up the mess would cost jobs, drive out family farms, and drive up prices of pork and chicken."[45] It is important to note, however, that WH Group's seven pork farms in China (311,000 hogs compared to 14.7 million in the U.S.) use a more advanced and ecological process that separates solids from liquids and stores them in oxidized lagoons. Though these more advanced technologies are available, North Carolina lawmakers (at the urging of agribusiness and compromised university and political interests) decided that the changes would be too expensive for the state.

Using such strategies to stymie change and silence critics—academics, regulators, and community members—is long-rooted in the story of factory farms.[46] When scientists, regulatory agencies, and community members come out with studies and data that discredit the pork industry, they are met with the threat of lawsuits and other forms of intimidation.[47] In 2013, the American Farm Bureau Federation and National Pork Producers Council tried to block the Environmental Protection Agency (EPA) from releasing data related to factory farms and pollution by saying it violated the Freedom of Information Act (FOIA). They argued that business names and addresses were private information, and threatened to sue, and thus the EPA was forced to recall the data.[48] Because the industry's interests are represented at every level of education and government, agribusiness continues to get polluting permits and decreased regulations so that its production power may grow.[49]

PART 2. THE EFFECTS OF CAFOS

When a CAFO comes to town, harmful social, economic, and environmental health effects follow close behind. Industrialized animal production greatly reduces the quality of life for those who live nearby by negatively affecting the local economy, polluting the air, contaminating the water supply, increasing the risk of antibiotic resistance, and contributing to climate change.

Economic and Social Inequity

What do CAFOs bring to rural communities? While large operations promise to create economic growth, in reality they do not generate working-class jobs or foster vibrant social and economic relationships. In fact, studies have found that the spread of CAFOs drives up economic injustice and inequality. This is partly because corporations are legally responsible for maximizing returns for their shareholders, and thus are not incentivized to invest in local economies, instead keepings wages and other costs low.[50] Moreover, they often drive smaller farms out of business or force them to join the industrial system. As a result of agricultural subsidies and Farm Bills over the past 40 years, most small- and medium-sized hog producers were unable to remain independent because they could not get access to processing plants without a contract, and large corporations controlled these plants.[51] Thus, many smaller farmers were subsumed into the industry as "contract growers" who bought hogs from corporations such as WH Group.

Fig 5 Credit: Rick Dove, Waterkeeper Alliance

http://www.riverlaw.us/hurricanefloyd/hurricaneisabel.html

In order to raise WH Group hogs, contract growers are required to rebuild their farms to fit the requirements of the multinational corporation. This includes retro-fitting their barns and building confinement facilities, spray fields, and cesspools to accommodate large numbers of animals and to fit "company-approved designs, dimensions, and materials."[52] The growers must then raise the animals according to a specific regimen. The rules include automated feeding, not allowing hogs to touch the ground, administering antibiotics to promote growth and prevent infection, and keeping the confinement facilities at a particular temperature—usually above 95 degrees.[53] Growers are expected to raise heavier hogs, usually buying them at weights of 30 to 80 pounds and slaughtering them at weights of 240 to 270 pounds—a 27 percent increase over 1980 standards. This system allows corporations to deliver at the lowest possible cost per unit.[54] With the increase in weight come thousands of extra tons of manure and urine on a daily basis, which contract growers are responsible for handling.

In the confinement facilities, "hog feces, urine, spilled feed, residues of pesticides and bedding drop through wooden slats and are flushed into giant cesspools," euphemistically called **lagoons**.[55] The pits are three to four acres wide, and run up to 20 feet deep. They have clay plastic liners that slow the movement of fecal waste to the water table. But since there are no barriers separating hog feces and urine from groundwater, the pools

Enhancing Contract Growers' Rights

Recommendations from the Iowa Farmer's Union, concerning the rights of contract growers:[63]

- A federal law to ban any packer from owning or contracting livestock, or from discounting the price paid on the basis of volume, and to enforce violations with penalties
- A "contract grower bill of rights" that would require that contractors have recourse to litigation to redress grievances, instead of the current contractual stipulation of forced and binding arbitration of disputes.
- A ban on confidentiality clauses in contracts, and the rights of growers to obtain all information about prices paid to other growers and about their ranking as producers

Recommendations from Food and Water Watch:

- USDA must enforce and strengthen livestock marketing and contract regulation to allow independent livestock producers access to fair markets.

also frequently drain to nearby rivers and streams. During storms, lagoons overflow and completely submerge towns in waste.[56] On a daily basis, the waste is also sprayed onto fields at a rate of hundreds of gallons of urine and feces per minute. While a small amount of the waste is used to fertilize crops or burned for electricity, most ends up in the Pepto-Bismol colored cesspools surrounding pig factories. The sludge—always out of sight of public view—turns pink because of the "interactions between the bacteria and [pig] blood."[57]

The contract growers bear all of the environmental responsibility, from managing manure and urine to disposing of dead pigs.[58] And yet, they do not partake in critical decisions concerning their farms, such as whether their contracts will be renewed on a yearly basis. They run the risk that a processor will decide to relocate its operations to places with fewer environmental regulations, leaving growers to clean up the cesspools and contaminated environments. Though North Carolina's environmental regulations are lax, they are stricter than regulations in other parts of the world. When North Carolina's ten-year moratorium expired in 2007, for example, legislators decided that if hog farms had been inactive for four or more years and returned to operation, they must meet stricter environmental standards, including a ban on lagoons and spray systems, as well as reduced groundwater contamination and airborne ammonia. Policies like these put pressure on the industry to clean up its act, or close existing operations in North Carolina. The possibility of closing presents a host of further effects including job loss, heavy cleanup costs for the contract growers, and increased environmental and social degradation elsewhere in the world.

While pork processors like WH Group are getting twice the pork for less money, farmers and contract growers make less overall, and are unable to add jobs to the local economy. Promised quick profit by the industry, these "growers" borrow an average of $200,000 to $1 million to finance construction. They quickly become saddled with a serious amount of debt, and can't reinvest in the local economy. One study found that industrial farm owners spend a third less in the local economy than small- and mid-size farmers. A 2003 study of nearly 2,250 rural counties nationwide found that "counties with larger farms had lower levels of economic growth, suggesting that larger farms make smaller contributions to local economies."[59] A University of Minnesota study found that operations with annual profits less than $400,000 spent about 60 to 90 percent of their earnings locally whereas those with profits of greater than $600,000 spent only 50 percent.[60] When CAFOs come to town and increase in number, rural employment and income decline, and the value of properties located near the farms go down.[61] Businesses grow at slower rates, the number of jobs drops, and wages in the meatpacking and processing sectors continue to decline, further depressing economic growth.[62]

Poor Working Conditions

Who works at CAFOs and slaughterhouses? At the 2015 North Carolina Environmental Justice Summit, Daniel Mejia, a student at East Carolina University who organizes with CAFO workers in eastern North Carolina, spoke about how Sampson County not only has the highest density of hog CAFOs in the U.S., but also the fastest-growing Latino population in the country.

The jobs present are largely low skill and low wage offering few or no benefits.[64] Workers, many of whom are migrant workers from Central America, have inadequate housing, a lack of sanitation, and are constantly exposed to hydrogen sulfide and ammonia, toxic gases rising out of cesspools, which affect their families as well. Health and behavioral effects resulting from exposure to **hydrogen sulfide** include nausea, vomiting, headaches, disturbed sleep, upset stomachs, appetite loss, irritated eyes, noses and throats, anger, confusion, tension, depression, fatigue, memory loss and reduced vigor.[65] Mejia described many difficulties in organizing with Latino workers, including distrust in government, educational and language differences, a lack of confidence in organizers, a sense of exclusion, as well as the secrecy and invisibility of operations hidden from public view.[66]

The industry, through its history of power and intimidation, is exempted from labor laws that cover other industrial workers.[67] According to a report commissioned by the United Food and Commercial Workers union (UFCW), which examined working conditions at Smithfield's Tar Heel Plant, workers are expected to keep pace with processing lines that move extremely fast. Those who "fall behind have reported being verbally abused or even fired."[68] Workers may suffer repetitive trauma injuries, carpal tunnel syndrome, blunt traumas, infections, asthma, respiratory diseases, fractures, burns, hernias, rashes, and swelling, but if they complain about health impacts, they face being fired without legal recourse.[69] In addition, CAFO workers run the risk of swapping antibiotic resistant bacteria with the livestock, which they may then bring home to their families.[70]

The UFCW charged Smithfield (now WH Group) with "exploiting racial divides as a tactic to prevent plant workers—most of whom are African American and Latino—from organizing."[71] The union presented evidence that Smithfield kept workers at separate stations, held separate meetings, and tried to turn them against each other during elections through threats, "telling the Latinos that if they voted for the union they would be deported and telling African Americans that if they voted for the unions the Latinos would replace them."[72] From 2000 to 2005, Smithfield employed its own police force at slaughterhouses, adding to an environment teeming with intimidation and violence.[73]

Improving Working Conditions

Recommendations, pertaining to worker and contract grower's rights, from the Iowa Farmers Union.[74]

- Establish a nationwide temporary moratorium on new industrial animal confinements until the issues of human health risks are properly analyzed and dealt with
- Enact a requirement to protect CAFO workers with written warnings (in their own language) on the health impacts of working in these facilities, and for employees to be at least eighteen years old, receive health insurance, and be covered for up to five years after termination for any health costs arising from working in the CAFO

Unclean Air

Hog CAFOs pollute the air when odors, gases, and airborne particles escape from buildings during ventilation. Particulate matter carried through a number of pathways may contain toxic substances, as described below:[75]

Particulate matter originates from decomposing material like	Reaches people through	May contain
Feces **Urine** **Skin cells** **Hair** **Feed** **Bedding**	**Mist** **Spray** **Water droplets**	**Endotoxins** **Steroids** **Gases**

Researchers have linked air pollution with increases in asthmatic symptoms among nearby schoolchildren.[76] In a survey conducted from 1999 to 2000, teachers and staff were asked about the odors in buildings and the prevalence of asthmatic wheezing among 576 children in three schools.[77] The study found that rates were 23 percent higher in the schools where staff reported odors more than twice a week.[78] Airborne toxins such as endotoxins can affect the central nervous system by interfering with the brain's signaling system to the lungs, and for those allergic to the contaminants, this can result in permanent lung damage.[79]

The quality of life for people who live near CAFOs suffers because of airborne odors and toxins. Activities such as walking, gardening, cooking out, playing games, line-drying clothing—especially important for people who do not have access to fitness centers, vacations, public facilities, or air conditioning—becomes impossible.[80] The mental health of people living near factory farms is also greatly compromised: A study by Duke University professor Susan Schiffman showed that "people living close to commercial swine farms were less energetic, and more depressed and fatigued."[81]

As described above, CAFOs emit hydrogen sulfide and ammonia as well as carbon dioxide and methane. As much as 80 to 90 percent of the nitrogen in a hog lagoon is released into the atmosphere as **ammonia**. Studies in the Netherlands suggest that 94 percent of all ammonia there originates from factory farming, "mostly from manure applications, animal confinements, and waste lagoons."[82] Although ammonia is not a major GHG, it can create **acid rain** when it binds to hydrochloric acid, nitrous acid, and sulfuric acid, all of which can also be carried over great distances, depositing nitrogen up to 300 miles away.[83]

The **Clean Air Act (CAA)** does little to regulate CAFO air pollution; the CAA only covers "major sources" and CAFOs do not fall under this category.[84] In 2005, the EPA announced a compliance agreement in which it would study air pollution from factory farms, but would also exempt CAFOs from air quality violations if they agreed to participate in the study. Some 90 percent of the largest factory farms signed the agreement, and thus were exempted from inspection. Only a small number participated in the study, which ended up not providing enough information about whether CAFOs were "major sources" or not.[85] This outcome reflects a common trend with environmental regulation: the EPA or other agencies carry out studies, and then decide that they do not have enough information to enforce regulations. As of 2008, all but the largest factory farms do not have to report emissions.[86]

Contaminated Water and Soil

Water runoff from CAFO processes is far from clean, drinkable, or even healthy for crops. It is often contaminated with parasites, viruses, hormones, pharmaceuticals, and antibiotic-resistant bacteria.[87] The largest sources of water contamination are fertilizer from feed crops and hog manure.

A hundred years ago, nitrogen "could only be accessed by certain soil bacteria and bolts of lightning," and therefore farmers rotated crops to allow the bacteria to do their work.[88] In 1909, Fritz Haber created an **inorganic nitrogenous fertilizer**, which allowed farmers to forgo crop rotation; they could now devote all of their land to planting corn, which increased the concentration of infectious microbes and nutrient pollution running into the water.

Factory farms pollute the water when waste leaks or overflows from cesspools, or runs off from oversaturated spray fields. Urine and feces that seep into the groundwater and well water affect both nearby residents and those living hundreds of miles away. Three years of water quality testing in North Carolina found that hog feces are leaking out of open-air, unlined cesspools, and draining from the waste disposal fields into the Neuse, Tar-Pamlico, and Cape Fear Watersheds. Another study in Duplin County found high concentrations of harmful bacteria immediately downstream of feedlot spray fields in the spring and summer. Of the 187 samples, 40 percent exceeded state and federal water guidelines for **fecal coliforms,** harmful bacteria from animal feces.[89] Pollution from factory farms also affects peoples' ability to draw water from their wells. Gary Grant of Concerned Citizens of Tillery in North Carolina described how "waste pits in his community were dug into the water tables where rural residents, who lacked connections to municipal water supplies, drew their well water."[90]

Poor water quality also leads to algal blooms and fish kills, affecting people's ability to swim and to harvest and consume local shrimp, oysters, and crabs. **Algal blooms** occur when there is too much nitrogen and phosphorus in the water. This can lead to the death of millions of fish that can no longer breathe in polluted rivers and streams. When fish die before they migrate out to the sea, the nitrogen and phosphorus released from their decaying bodies further upsets the nutrient balance of the rivers.

Rick Dove, a Waterkeeper Alliance member, became the first Waterkeeper of the Neuse River Basin, named after the Neusiok Indians, who lived along its southern banks before the English began exploring the area in 1585. In 1991, Dove witnessed one of the largest **fish kills** in recorded history, described in David Kirby's book *Animal Factory*:

Fig 6 Credit: Rick Dove, Waterkeeper Alliance

http://www.riverlaw.us/fishkills.html

"Rick first noticed a smattering of dead fish along the riverbanks in the weeks leading up to the run, but nothing too serious. Within the first two days after the fish began migrating, however, the kill was on in full force. Rick and his neighbors woke up one morning to the stench of hundreds of millions of dead menhaden lining the banks for miles. In the following days, bass, stripers, mullets, crabs, and shrimp also turned up dead. They were all pocked with round red sores, as though some specter had sucked the lifeblood from their flesh."[91]

Cleaner Water and Soil

The following is a statement from the Waterkeeper Alliance on the Clean Water Act, as implemented in North Carolina. Waterkeeper Alliance is responsible for suing Taylor Finishing Swine Facility in 2012, and J.C. Howard Swine Facilities in 2013 for violations of the Clean Water Act, and sued Stantonsburg Swine Facility and Stilley Swine Facility in 2014.[97]

"Despite extensive evidence demonstrating significant contributions of nutrient and bacterial pollution from CAFOs to state waters, the Clean Water Act (CWA) has not been fully implemented in North Carolina and regulatory responses have failed to address water quality problems. This is largely because most CAFOs do not possess CWA permits and their pollution loadings are not addressed in water quality restoration plans.

Out of the over 2,000 swine CAFOs in North Carolina, only 14 have been required to obtain a CWA permit. The vast majority of these operations operate under a State General Permit that inexplicably assumes no discharge from these facilities. Poultry operations are not required to obtain any permit from the state, but are "deemed permitted" when they begin operations.

These state permits allow waste disposal in excess of crop needs on the vulnerable coastal plain where discharges are facilitated by artificial drainage systems of underground pipes (tile drains) and ditches. While the state acknowledges CAFOs as a major source of pollution in public documents and the Clean Water Act defines them as point sources, the state continues to ignore reality and this industry remains ineffectively regulated."[98]

Recommendations from the Iowa Farmers Union

- A minimum **one-half-mile setback** from animal buildings and lagoons to streams, lakes, drainage wells, and other waters; and a ban on all new confinements "within the watersheds of lakes or a source of drinking water for a town, city, or residence."
- A ban on confinements being built in **flood-prone areas.**
- A requirement for **manure to be applied as close to planting ti**me as possible, and never when the ground is frozen or when soil temperatures are fifty degrees and falling. Disposal of waste through gun methods should be prohibited.

In terms of regulation, the **Clean Water Act (CWA) of 1972** states that all polluters must have a permit to release pollutants, and this includes "agricultural waste."[92] However, for the CWA to apply, the pollution must enter the "waters of the U.S." As defined under the CWA, these waters do not include groundwater—only navigable waterways. Storing waste in lagoons means the waste is not technically distributed into the water system unless the storage facilities overflow or leak. The EPA's 2008 regulations state that CAFO owners can "determine if they discharge or intend to discharge and thus whether they should apply for a permit."[93] By 2011, only 41 percent of eligible CAFOs nationwide held a permit, and fewer than 10 percent in North Carolina.[94] Moreover, even when CAFOs do possess permits, or violate the CWA, there is a cooperative component of the law that allows states rather than the federal government to administer enforcement. A lack of resources and incentives to regulate on the part of the states has led to a great deal of "self- or un-regulation."

In a video produced by the NCEJN, Elsie Herring, a resident of Duplin County, recounts her experience with poor water quality and threats from the industry when she complained about the conditions:

"My first concern…when we found out about the hog housing was, why are they behind our house? Because all of the property behind our house, all the way to Rockfish Creek, belongs to my family, so no one should be building on our property. […] One day I was sitting in the yard…and the postmaster came up in the yard and he had a certified letter telling me that if I did not cease from calling water quality, that I could be made to pay the hog farmer money for the money that he's losing because of my groundless complaints, or I could be made to serve time in jail."[95]

At a "Community Speak-out and Government Listening Panel" at the 2015 NCEJN Summit, three residents from Snow Hill, North Carolina, voiced their concerns. They began with footage showing a pit filled with water running off from a nearby landfill. They proceeded to describe how their water supply was being polluted from multiple sources, including this landfill and nearby CAFOs.[96] Residents affected by CAFOs, including Elsie Herring and many others, have been resisting and organizing around the effects of factory farms for decades. From a climate justice perspective, a guiding question is: how can we make the experience and resistance of communities directly affected by CAFOs central to activism?

Antibiotic Resistance

"The menace to human consumers from the drugs, hormones, and pesticides used to keep this whole fantastic operation somehow going is a matter never properly explored…Diseases sweep through these establishments, which indeed are kept going only by the continuous administration of antibiotics. Diseased organisms then become resistant to the antibiotics…"[99]

—Rachel Carson, *Animal Machines*

Carson's concerns about antibiotic resistance and the spread of disease were indeed valid. **Antibiotic resistance** occurs when the usual antibiotics used to treat human infections no longer work. Microbes that cause those infections (microbes we share with animals) develop resistance to treatment by antibiotics through overuse. Drugs that were originally intended to help hogs digest corn and treat infections have since taken on nontherapeutic roles. This practice has led to an explosion in the number of antibiotic-resistant bacteria in both hogs and people.[100]

Nontherapeutic use of antibiotics involves administering the drugs to prevent diseases and especially, to promote growth. In 2011, the Food and Drug Administration (FDA) reported that 80 percent of antibiotic use in the U.S. was for these purposes. The Union for Concerned Scientists estimated that around 24.6 million pounds of antimicrobials are used as growth promoters in animal agriculture (compared with only about 3 million pounds in humans).[101] The extreme overuse of antibiotics in livestock becomes a major problem when bacteria resistant to drugs begin to evolve and reproduce at a rapid rate. Studies have found that antibiotic-resistant bacteria easily spread through a variety of pathways: animal-to-animal, animal to worker, and through food and water.[102] The Centers for Disease Control and Prevention (CDC) estimate that more than 400,000 antibiotic-resistant infections from pathogens have spread through food alone.[103]

The unceasing use of antibiotics in factory farms continues to undermine the treatment of human infection. Methicillin-resistant staphylococcus (MRSA), for example, is a type of bacteria resistant to certain antibiotics. It formed in humans, migrated to pigs, became antibiotic resistant with overuse, and then began to infect humans again. CAFO workers and pigs have been found to have the same strain of MRSA (located in workers' nasal mucosa) on farms where the antibiotics are used—and different strains on farms where

Preventing antibiotic resistance

The FDA insists that "voluntary guidance" will solve the antibiotic resistance problem; these firmer policy recommendations come from Food and Water Watch:[106]

- Congress should pass the **Preservation of Antibiotics for Medical Treatment Act** (PAMTA)/ **Prevention of Antibiotic Resistance Act** (PARA), which would ban nontherapeutic uses of antibiotics in livestock, thereby avoiding the cumbersome drug-by-drug process currently required of the FDA to achieve the same goal. City Councils across the country have passed resolutions urging Congress to pass PAMTA, and more are joining their ranks.
- Congress should also pass legislation to greatly **improve available public data** on antibiotic use in livestock.
- The FDA should assess the impact of its voluntary strategy and start the regulatory process now to **withdraw drug approvals** for injudicious uses. The FDA also should strongly enforce the existing bans on certain uses of antibiotics.
- Government agencies should collaborate to **increase research on antibiotic resistance**, including the mechanisms of resistance emergence, spread and remediation as well as alternative means of preventing illness in livestock.
- The U.S. Department of Agriculture (USDA) should **provide training and technical assistance** to livestock producers that are transitioning away from nontherapeutic antibiotic use. The USDA should address contract stipulations that require livestock producers to use feed with antibiotics already added.

they are not used, which shows that a human-animal exchange is happening.[104] Rural residents can contract MRSA if they live near fields treated with infected swine manure and fertilizers, or through exposure to animal vectors such as rodents and birds.[105]

Climate Change and Climate Justice

Global food production is responsible for more than 70 percent of freshwater consumption, 80 percent of deforestation, and the release of greenhouse gases (GHGs), such as carbon dioxide, into the atmosphere.[107] Earth's climate is regulated by GHGs, which prevent infrared heat radiation from returning to space. As GHG emissions from human activity increase, more heat is trapped, causing global warming or global climate change. **Climate change** is defined as a disruption of global and regional climate patterns attributed largely to the increased levels of atmospheric carbon dioxide, methane, and nitrous oxide produced by fossil fuel combustion, agriculture, and industrial processes.[108]

The slaughtering and processing of 9.5 billion animals for industrial food production accounts for 7 percent of the GHG emissions in the U.S. and at least 18 percent worldwide—with estimates ranging as high as 51 percent.[109] These emissions have many unseen impacts on environmental health over spatial scales from the local up to the global. In this section, we explore the effects of industrial agriculture on climate change, the disproportionate impact on the health and well-being of low-income people and people of color, and sustainable alternatives.

On a global scale, industrial agriculture emits three types of GHGs: carbon dioxide, methane, and nitrous oxide. According to a 2006 United Nations Report, industrial animal operations contribute more GHGs than all of the transportation industry. Factory farms receive less attention as contributors to climate change, partly because of the stranglehold of meat interests at all levels of government.

As a GHG, **methane** is 84 times more effective than carbon dioxide at trapping radiation. In the case of hogs, methane originates from heavily concentrated manure and urine in waste cesspools. It also comes from other disposal processes, including the burning of animal waste for biogas during anaerobic digestion. Methane emissions and associated environmental health risks would be lower if the animals and disposal of their waste were handled in a less intensive and concentrated manner.[110]

Nitrous oxide released from industrial agriculture processes accounts for 65 percent of global emissions. Nitrous oxide forms when nitrogen fixation does not occur in the soil. Industrial agriculture thrives on practices of monoculture**,** which degrade plant-soil relationships, resulting in the need for more synthetic fertilizer. This, in turn, decreases the amount of natural nitrogen fixation, and releases nitrogen into the air. Nitrogen—even before it turns into nitrous oxide—presents a "myriad of health concerns due to respiratory impacts of air pollution, ingestion of nitrate-contaminated groundwater, and impacts on algal blooms and eutrophication of surface waters."[111]

As the table below shows, almost every stage of the production process contributes to a warming climate:[112]

GHG	Percent of global emissions from industrial food production	Strength compared to carbon dioxide	Sources
Carbon Dioxide	18%	N/A	Petroleum-based fertilizers Transportation of feed/waste Lagoons Animals Slaughtering and processing Waste disposal
Methane	37%	84x	Lagoons Waste disposal
Nitrous Oxide	65%	300x	Synthetic fertilizer Manure and urine Waste disposal

The disproportionate effect on the world's most vulnerable populations renders climate change a **climate justice** issue. Climate justice recognizes that "those who will be hit first and hardest by climate impacts have contributed least to the problem."[113] A climate justice framework suggests that the solution to climate change lies in addressing social, economic and political systems that perpetuate discrimination and heat up an already fevered planet. Shoring up local resources and building a mass movement for a just transition to sustainable food production are vital to combatting climate change, a symptom of inequitable political, economic and social systems.[114] A position statement from the NCEJN describes how the fight for climate change must, at its core, also be a struggle for a just system for all:

"Although these communities will be disproportionately impacted by climate change over generations, to get to that issue, we need to address the everyday concerns that people face right now. Slowing GHG emissions cannot occur without a mass movement, and it must be a movement that puts justice first."[115]

In places like coastal North Carolina, climate change will bring more frequent and powerful storms, sea level rise, increasing temperatures, and many social and public health impacts.

After extreme weather events, such as Hurricane Floyd in 1999, hog waste cesspools overflowed, cloaked trees in manure, and released toxins into rivers and streams.[116] State regulatory agencies have a history of failing to respond to such events. Though local and state governments had been warned of Floyd's impending devastation, they did not develop emergency plans for containing and disposing of the waste and dead animals.[117] Agencies also tend to downplay the impacts of weather. After Floyd, the North Carolina Department of Water reported only 45 flooded CAFOs, while concerned citizens counted hundreds.

Fig 7 Credit: Rick Dove, Waterkeeper Alliance

http://www.riverlaw.us/hurricanefloyd.html

In addition, powerful economic interests benefit primarily in the "rebuilding" process following extreme weather events. After Hurricane Katrina, for instance, many low-income people of color were permanently displaced after state and federal governments declared their neighborhoods "uninhabitable" and bequeathed the land to corporations. City University of New York Professor Ashley Dawson describes how such plans after Katrina generated huge controversy since they "called for the demolition of all housing in predominantly African American neighborhoods." The neighborhoods would be converted into "urban parkland that would double as a containment zone in the event of future flooding" but the plans contained "no provision for housing and resettlement of the residents of these areas."[118] The dynamics of this disaster, as Dawson writes, "were perhaps the first clear-cut instance of the toll that climate change may take on domestic soil, revealing with horrible clarity the way in which increasingly extreme weather events will magnify already existing inequalities."[119]

Over the next few decades category four and five hurricanes are predicted to strike North Carolina every two years. This will result in the loss of homes, incomes, access to medical care, and livelihoods. As **sea levels** continue to rise, transportation to and from coastal areas will become more difficult as a result of compromised infrastructure. If precautionary measures are not taken now, continuous flooding of lagoons into local waterways will result in such effects as a decrease in available fresh drinking water, as well as increase the spread of infectious diseases from pathogens and antibiotic-resistant bacteria. With time, certain locales will become uninhabitable, triggering migration to cities and further straining resources.

Just as extreme weather causes land loss and displacement among certain populations, global temperature changes increase exposure to toxic substances and mental stress. During **colder winters**, when manure is applied to frozen spray fields and not absorbed, it leaks into surrounding waterways. The manure

contains pathogens and antibiotics that contaminate the groundwater and wells of residents who are not connected to a municipal water supply. **Mental stress** will continue to be a problem as climate change brings **higher daily temperatures**. A rise in extremely hot days in summer (above 95 degrees in North Carolina) already affects the well-being of laborers who spend all day in overheated CAFOs, do not have time to recover between shifts, and lack access to public health services.

The changes brought about by global warming will affect the pork industry as well. From 1996 to 2006, a total of 14 tropical storms and hurricanes in North Carolina caused agricultural damage totaling $2.4 billion.[120] Global warming will impact crop growers through increases in agricultural pests, drought, and dwindling snowpack. Droughts result in lower rivers and reservoirs, yielding less water for irrigation, and greater inputs of fertilizer.[121] The 2002 drought in North Carolina, for example, resulted in a $398 million loss for the industry.[122] Colder winters will diminish pollinator efficiency, slow feed production and produce smaller harvests, all of which will drive up the price of corn.

In order to build economically and environmentally sustainable communities, and redeem our individual and planetary health in the process, we will need to look for solutions including, but not limited to, policy and technological changes that are far-reaching. Local responses to crises offer guidance about how to prepare for and deal with a changing climate. Immediately after Katrina—and long before the Federal Emergency Management Agency (FEMA) arrived with unsatisfactory relief—small-scale food production in the form of micro farms and community gardens offered the displaced a source of nourishment. Sound strategies for increasing food security in the wake of extreme weather events lie in firming up these local resources and downscaling industrial agriculture.[123] As we look towards an economy that fosters a sense of connection to the environment, health, and community, there is a great need for research about the impacts of industrial animal production and agriculture, and preparatory action, especially in low-lying coastal areas.[124]

Part 3. Where Do We Go From Here?

Even though hog factory farms—along with dairy, beef, and poultry operations—are deeply embedded in the local and global industrial system, there are still many ways to conduct research and take action to make a significant difference. The depth of the questions we ask can determine the strength of our solutions. Guiding questions for a transition away from CAFOs include:

- How can we design a just, equitable and ecological pork economy and food system?
- How can the climate justice movement focus more on environmental injustices and support communities that suffer the most from polluting industries?
- How can we build a stronger movement by acknowledging environmental racism and working to dismantle systems that perpetuate it?
- Are the solutions we find designed by, and catering to, those who are and will be affected most by climate change?

One solution lies in supporting the growth of small- and mid-size farms. Such sustainable farms exist today and are defined by sound ecological, social, and economic practices. Rainbow Meadow Farms in Snow Hill, North Carolina, for example, raises livestock and crops simultaneously, adding to the biodiversity of the soil. Livestock waste, in small amounts, fertilizes the grains that will become next year's feed, reducing the amount of methane produced and the need for storage of animal waste.[125] Animals—when raised in proportion to available resources—"play an important role in scavenging crop residues that remain in the fields after harvest, reducing insect populations, and conditioning soil."[126] These farms improve the feed grain's efficiency through better irrigation techniques such as **conservation tillage**, which leaves wheat stalks and corn stubble from last year's crop on the ground to prevent runoff of nutrients, and decreases the need for fertilizers. Conservation tillage ensures that as many nutrients as possible return to the soil year after year.

Sustainable farmers also may employ **integrated pest management**, a practice that uses fewer toxic pesticides. Some farms lower the amount of methane emitted from animals by feeding them less corn and more easily digestible feed such as oats, alfalfa and flax, and preferably allowing them to graze freely on grasslands.[127] Such diverse and sustainable farming practices make the agriculture—and livestock—more resistant to periodic climate-induced problems such as pests, drought, and temperature fluctuations in addition to reducing risks from flooding and erosion.

In terms of social and economic practices, such farms employ local citizens and pay them fair wages. In this way, small- and mid-size farmers contribute more to the local and state economy. They also produce meat that is affordable. Discussions are under way about reforesting land currently used for livestock, or leasing it for wind and solar, which would sequester carbon and produce renewable energy. In the transition to a greener economy, policymakers and the public should look to supporting the growth of small- and mid-size farms that are already creating a more just and ecological pork economy.

In addition to conducting research and supporting local and regional farmers, we can have a direct impact on the **court of public opinion**. Drawing on the success of actions taken by the Waterkeeper Alliance, Food and Water Watch, and the NCEJN, we have compiled several ways to engage wider audiences. We encourage you to build on this list as you take what you learn back to your community, and consider these questions: What do you see as valuable to sustain in our current food system? What needs to change? What barriers do we face in shifting toward a more just and ecological economy?

Possible strategies include:

- Organizing and attending rallies, workshops, conferences, summits, town hall meetings, and briefings on environmental justice issues
- Organizing and attending "toxic tours," non-commercial trips "intended to highlight people and locales polluted by poisonous chemicals…by reducing the cultural and physical distance between hosts and visitors."[128]
- Creating and signing petitions on websites such as Change.org or Credo Action
- Visiting relevant political leaders in your state and in Washington, DC
- Inviting national media or documentary filmmakers to visit the scenes of environmental and human rights violations
- Taking photographs of federal violations, i.e. breaches of the Clean Water Act
- Staying vocal on social media
- Writing a letter to the editor for a local, regional, or national newspaper
- Joining and supporting the efforts of local, regional, and national organizations like the Rachel Carson Council, the North Carolina Environmental Justice Network, Waterkeeper Alliance, Earthjustice, Food and Water Watch and others.

To keep in touch with updates, organizing strategies, and resources, send your contact information to:

RACHEL CARSON COUNCIL

Zoë Ackerman
Associate Program Director and Campus Coordinator
Rachel Carson Council
zoe@rachelcarsoncouncil.org
(434) 964-8030

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The Rachel Carson Council is the national environmental organization envisioned by Rachel Carson and founded in 1965 to carry on her work after her death. We promote Carson's ecological ethic that combines scientific concern for the environment and human health with a sense of wonder and reverence for all forms of life in order to build a sustainable, just, and peaceful future.

The Rachel Carson Campus Network (RCCN) links students, faculty, staff, and administrators at campuses nationwide to the Rachel Carson Council to provide and share information and resources, recruit environmental leaders, and work on and off campus to create lasting changes in policy and practice for a sustainable future.

RACHEL CARSON COUNCIL

8600 Irvington Avenue
Bethesda, Maryland 20817
www.rachelcarsoncouncil.org
office@rachelcarsoncouncil.org
Twitter: @RachelCarsonDC
Facebook: Facebook.com/RachelCarsonCouncil
Rachel Carson Campus Network: (434) 964-8030
Main Office: (301) 214-2400