

Concentrated Animal Feeding Operations and Planning in the United States: Evidences from North Carolina

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Abstract—This paper aims to reconsider relationships between animal feeding operations (CAFOs) and planning. It stresses the idea of the necessity for a methodological revolution in order to increase the chances for dialogue between different actors and various planning agencies and create possibilities to manage conflicts. The explored case of North Carolina shows limitations in environmental agencies' actions and methods. It also calls for a more integrated approach among agencies including the local agencies.

Keywords—(CAFOs), North Carolina, Planning, United States.

I. INTRODUCTION

CONCENTRATED animal food operations (CAFOs) is a controversial issue of environmental planning. Controversial in its nature, the practice of concentrated animal food operations occupies the center of the debate on sustainability in the U.S. The practice of industrial farming is under the lens of observation of environmentalists, who complain about the consequences of (CAFOs) also on a variety of aspects including public health, soil erosion, water pollution, social justice/injustice, and animal ethics.

The seemingly simple practice of industrial feeding of animals (hogs, cows and chickens), has a butterfly effect on the environment as a whole. How to address issues related to (CAFOs) is a question that needs complex answers. This paper considers to study (CAFOs) in the US, with a special gaze to the situation in the Southeast. The farming industry plays a big role in boosting regional economy; however, who pays the price (in term of quality of life and sustainable planning and policies) of our hunger for meat? The specificity of the case of the US southeast is due to the fact that a study explains intense relationships between (CAFOs) and racial issues. In the past decades, planners have shown concern for the emerging diffusion of the practice of concentrated animal feeding operations (CAFOs).

A market-driven phenomenon, (CAFOs)'s dissemination have been under different lenses of observation. Before and after being established as a national and global trend, (CAFOs) have been observed and discussed also for their multiple implications with the planning practice and the discipline.

Community planners have warned of (CAFOs)' actual and potential negative impact on the community, environmental planners have been debating (CAFOs)'s Sustainability, human

rights' activists have raised up concerns for wide-spread cases of inhuman, animals' treatments within (CAFOs). This paper calls for a more holistic approach to the study of (CAFOs) and planning. It stresses the idea of the necessity for a methodological revolution in order to increase the chances for dialogue between different actors and various planning agencies and create possibilities to manage the conflict. This approach; therefore, reveals several aspects of (CAFOs)' butterfly effect together with focusing on the relation between (CAFOs) and the surrounding environment.

II. MAPPING (CAFOs) IN NORTH CAROLINA

Employed methods include the definition of the case study of North Carolina. The study will be conducted by a systematic operation of mapping (CAFOs) within rural North Carolina. This operation will spot points of actual or potential conflict between the existing (CAFOs), the North Carolina's rural community and the main rural landscape features. The intersection of (CAFOs) and landscape will show a map of the complexity of the interaction of (CAFOs) and the surrounding landscape. The emerging regional geography will be analyzed and then proposed as operative document for decision-making process and participatory planning.

The explored case of North Carolina shows limitations (technical, institutional and methodological) in some environmental agencies' actions and methods (institutional planning approaches vs. participatory planning; post-disaster planning vs. planning for emergency preparedness). The study laments the limited participation of local actors in the decision making/ planning.

The case of North Carolina is a pilot investigation and shows the necessity to rethink (CAFOs)'s geography. This map shows a surprising variety of the intensity of the conflict and interdependence between (CAFOs) and landscape. The emerging landscape requires the necessity to retool the planning approaches to (CAFOs). The study aforementioned calls for a more integrated approach among agencies including the planning agencies. The paper calls for a renewal of (CAFOs)'s study framework and claims the centrality of (CAFOs) in the current debate on Sustainability.

Moreover, the distinctive human geography of rural North Carolina (African-Americans, Latinos, Low Income Caucasians) offers a rare opportunity to explain intense relationships between (CAFOs) and contemporary issues in social marginalization; reasons that open a new set of questions with respect to the relation between meat industry and the dynamic geography of poverty in the United States.

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III. TALKING ABOUT THE BIG PICTURE

The farming industry is a prominent subsidized industry of the Country. Preference of meat amongst consumers increases meat production. Demand for meat consumption has increased since the end of World War II. Pre-war cereal-based diet was substituted by meat-based diets in consumers' preferences, and as a consequence, (CAFOs) diffused throughout the US [3]. Livestock once lived on pastures and the open field, however, pasture' livestock productivity was not sufficient to supply increasing demand for meat among American consumers, while meat consumption has caused externalities according to environmentalists. The omnivore human character started to be conceived as dangerous for the environmental health. So, what to do? Stopping to eat meat (and becoming vegetarians), or keep eating meat, with the consequence of the environment.

At the base of environmentalists' concerns for increasing demand of meat, there is the industrial practice of concentrated food operation. Increasing demand of meat in the market creates a need for changing rural land uses, which change from pasture to CAFOs. This revolution of traditional land use has consequences, which will be enumerated in the following paragraphs.

IV. CONSEQUENCES OF (CAFOS)

A. Consequences on Public Health

Among other listed consequences, the impact of CAFOs on Public Health is under the lens of observation by American physicians. Public Health alerts include salmonella outbreaks sickening hundreds in multiple States. How CAFOs become a problem with epidemic infections? The answer is simple. In order to keep animals healthy, factory farms give them antibiotics –and the animals eventually breed resistance to those drugs. From one hand, [1] shows that meat consumers should be aware that they ingest all drugs when eating the meat, on another, meat producers are not required to report the types or quantities of antibiotic they are using in order to quantify the implications of the practice of feeding animals with antibiotics.

Furthermore, CAFOs contribute to the burden of respiratory diseases among children and neighboring residents [5]. Potential adverse health effects of concentrated animal feeding operations (CAFOs) are also of public concern. Pulmonary health effect of neighboring residents comes from ammonia emission from CAFOs and from surrounding fields. Exposure of nonfarm subjects to high annual ammonia levels show that exposed participants were more likely to be sensitized against ubiquitous allergens compared to lower exposed subjects. A more comprehensive approach to CAFOs shows links between CAFOs and Public Health—including children welfare. Studies alert of the fact that CAFOs' are scattered throughout rural areas in the US. However, after a more careful analysis, one can find patterns. Patterns are of socio-economic nature. CAFOs' spatial distribution and spatial analysis show a regional gradient of operations'

distribution. However, CAFOs' presence grows in specific and disenfranchised areas.



Fig. 1 A Resident from a Community in NC Wears a Facemask When He's in His Backyard Because of The Dust From Adjacent CAFO [5]

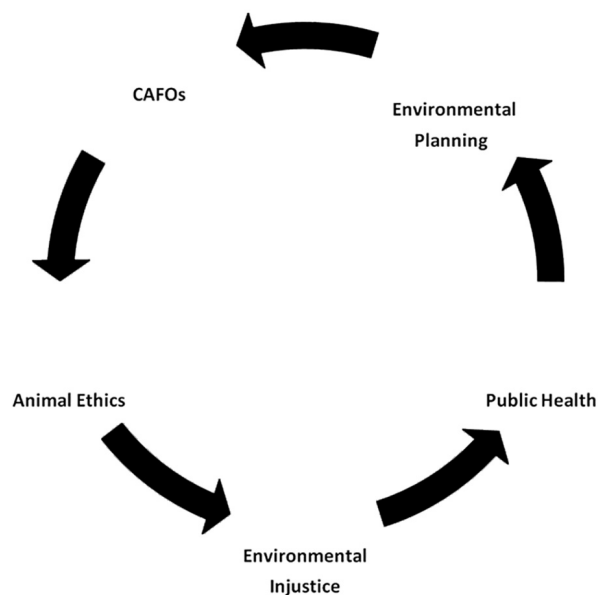


Fig. 2 CAFOs' Butterfly effect, links and implications [2]

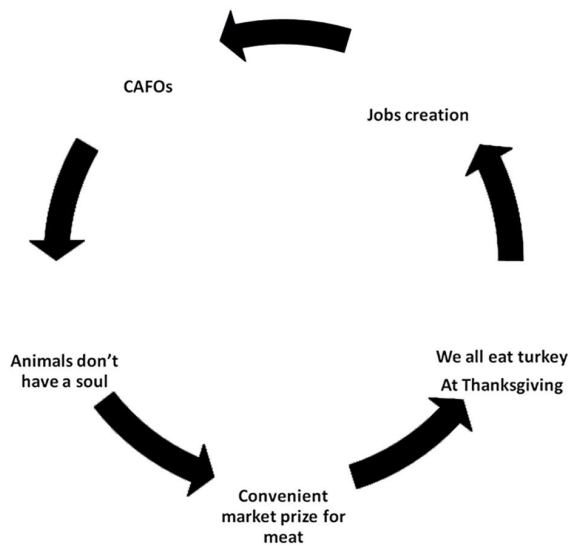


Fig. 3 Counter argument [2]

B. CAFOs' Environmental Implications

Never heard of a death zone? A dead area is an area in which life is temporary extinct. One of the largest is, in fact, in coincidence to the Mississippi estuary. This area, a large one, covers the equivalent of the size of a state as big as Switzerland. As a matter of fact, the estuary is a large collector of nutrients that Midwestern farmers' use to grow animals so as to increase meat production and profits. Hundreds of CAFOs' are scattered throughout the Mississippi's watershed, which drain Hormones and Nutrient in the Gulf of Mexico. Nutrients feed Gulf's algae which thrive at a high reproductive speed. As a consequence, vast submarine areas are covered by algae. Decomposition of algae creates a sulfuric environment that consumes large quantity of oxygen in the water, and the consequent death of marine species in the water.



Fig. 4 CAFOs Manure Cesspool in North Carolina. Source [4]

V. ANIMAL ETHICS

In recent decades a question arises if animals have rights or not. Debates on such issue were first implemented by the American philosopher Martha Nussbaum. Concentrated feeding operations reached a political dimension, with ethicists' humanized animals. Popularization of the phrase "animal rights" has reached a point of interest among environmental planners also.

The body of the animal is a subject of rights according to ethicists. That is to say, those animals need appropriate places where to live following their natural instincts. The word 'concentration' is, in animal rights activist's mind a synonym of abuse. This theory is, in part, enforced by some arguments that state a relation between animals and human health. Concentrated feeding operations subtend the lack of "living spaces" for farmed animals. Animals are often constrained living in small boxes, in order to maximize productivity and to reduce costs of operations. In some cases, farmers and operators are called to 'mutilate' part of animals' body (chickens' beaks) to avoid that they could harm each other. Animals' concentration may favorite rapid spread of infections, which can harm both animals and humans (see the case of the crazy cow). Animalists consider CAFOs a controversial practice at the present day.



Fig. 5 (CAFOs) is often criticized for the unhuman treatment of animals [5]

VI. IMPACT ON THE COMMUNITY

Environmentally speaking, as opposed to the utopian image of rural America as a place free of industrial pollution, it has nevertheless been a target for urban, industrial and military wastes that are unaccepted by communities with larger population. In North Carolina, the hog industry has employed 886 workers in 1996 to 2.109 in 2006, which is an outstanding increase as the maps below show. Comparing these two maps from 1996 to 2006, there is a widespread of hog industry in an area that is in close proximity to Samson co Company.

A brief history of (CAFOs) in North Carolina shows that "big is getting bigger". Indeed, within the hog industry, animals are raised until they reach the stage of slaughter. Big

corporations contract with local individual farmers to breed animals and they have to comply with housing conditions, food standards and antibiotics criteria set by the corporations. The hog industry rapidly grows since the 70s. This growth follows the passage of “Murphy’s laws” legislation. This latter eliminates sales tax on hog farm equipment and prevents local authorities from using zoning authority to deal with odor nuisances [8].

The maps from older studies first reflect the transformation of North Carolina from local farming production to large industrial one. This means that in terms of numbers there is an increase of density, number of animals on land surfaces. What changes is not the land use per se, but the pressure on the land.

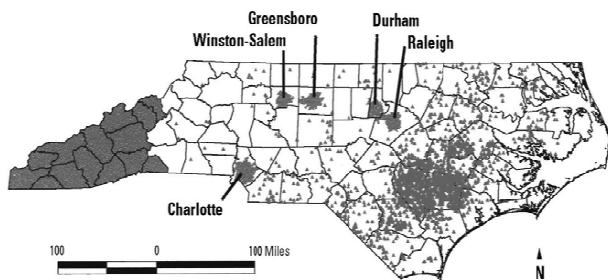


Fig. 6 CAFOS and Environmental Justice: The Case of North Carolina. Hog Operations are showed as dots in the figure. Excluded block groups are showed as darker stains [5]-[10]

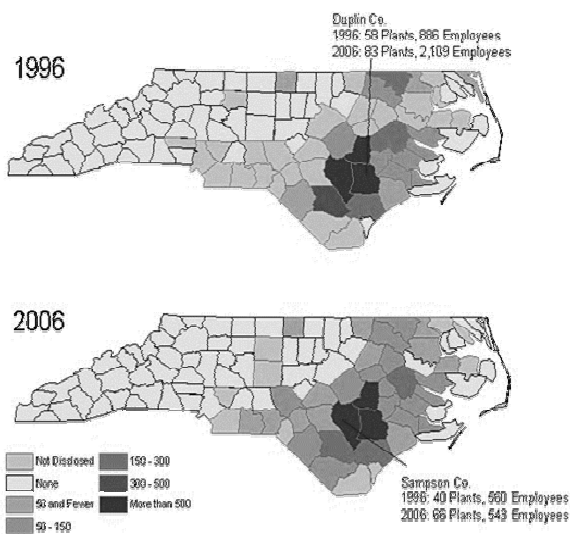


Fig. 7 CAFOs Practice Sprawls in North Carolina [5]-[10]

VII. HOG INDUSTRY IN NORTH CAROLINA

In the case of North Carolina, when the Mayor Wendell Murphy, an originally successful hog farmer who has been elected to the State Senate in 1988, where he passes “Murphy’s laws” promoting intensity of farming in North Carolina, specifically in the Black Belt area. This latter has

historically been occupied by a high rate of African American minority. This legislation Mayor Murphy passes attracts industries who can locate without paying taxes on hog industry equipment. Hence, for big corporations these are favorable conditions in addition to the presence of labor pool (minorities) and secondary businesses that define the term agglomeration economies.

Today, North Carolina has big manures as a result of the hog production that has not changed much but continues to put a hazard on the environment. The cesspools where the waste of pigs is stored contain pathogens, insecticides, pharmaceuticals, and nutrients that pollute the water, the soil and the air. (CAFOs) remain in these basins without treatment until the time it is used to spray on the fields. During hurricanes and severe weather condition, the (CAFOs) can spill onto the water table and contaminate it; the (CAFOs) can seep into the groundwater and reach the water table, specifically in the coastal plain where the water table is in proximity to the surface.

The geographical proximity of North Carolina to the largest metropolitan area in the nation, namely New York-Washington-Baltimore, invites to think that North Carolina is a highly favorable locality generating meat production for a big metropolitan market need. This geographical proximity, as it may appear to a first sight analysis, can be that North Carolina is designed to be the dumping place for the aforementioned states, especially that NC employs low income people residing in rural areas, which prevent sudden drifts to other adjacent states and hence several issues that come with migration.

Due to the high demand of meat production from neighboring states, environmental, social externalities are created and hidden costs of (CAFOs) are not paid.

VIII. DO WE KNOW THE REAL COSTS OF CAFOs?

CAFOs create complex sets of health, environmental and ethical problems that society as a whole pays in term of externalized costs. The fact that the federal farm bill funds tax payers for grain farmer has indirectly supported CAFOs by not paying the right cost is not wise.

Also important about the hidden costs of CAFOs, it creates a very costly water and air pollution. Manure is kept in cesspools without treatment; hence, a leakage, runoff or any bad weather condition can reach the ground water and the surface water [6]. Also, ammonia in cesspools pollutes the air causing respiratory diseases as well as acid rain. It is extremely difficult to quantify the real cost of cleaning of 300 million tons of CAFOs pollution each year, but we can have a sense of some of the individual costs. However, we are aware that the total costs of CAFOs pollution to human health, the environment are enormous. The cost to clean up the contaminated soil under every U.S. hog and dairy CAFOs is almost \$4.1 Billion.



Fig. 8 Industrial Farms in North Carolina, aerial view [5]

IX. IS THERE A CASE OF ENVIRONMENTAL INJUSTICE?

What these cases teach us in term of environmental planning? In a nutshell, the case of North Carolina epitomizes a condition that is common throughout the industrialized part of the world and the U.S. As in many other cases, North Carolina shows links. Links include animal ethics, environmental injustice, public health, natural resources depletion, epoxy zones creation, algae proliferation, chemical pollution, Methane, Ozone, and CO₂ [4].

Furthermore, North Carolina shows a set of contradiction in regional development. It shows regional dis-equilibriums among rural and the urbanized part of the state. (CAFOs) is part of the rural landscape of North Carolina, which is also home of one amongst the most important university nationwide, as well as it houses one amongst the most advanced industrial sectors of the country, including technology. State's boundaries circumscribe a kind of reality that is conditioned by land uses and land use policies. Policy and policy makers consider (CAFOs) pollution as a "mere" industrial externality. Issues related to the presence of (CAFOs) are limitedly addressed in the presence of the post-industrial dilemma, namely job creation versus a cleaner environment [7].

North Carolina's contradiction is evident if we look at (not only the land use) but also the environmental and the human geography. The size of the state is (relatively small). The location and the relative position of the state with respect to big metropolitan areas give North Carolina a semi-isolated geographical condition. Also, the presence of different types of environments such as marine-costal, mountains (Appalachian), and rural (northern tip of the Black Belt) makes the land use richer.

To unfold issues related to CAFOs and environment, we need to look at the big picture, considering planning as sets of operations in the landscape, including floodplains, wetlands and coastlands. Policies and decisions should be informed by science in the end, Participatory processes need to be included to help convince different stakeholder of the general character of the threat. In the next paragraph, the focus will be on one aspect that is believed to be of relevance or at least important to address more issues related to CAFOs/environmental planning.

X.(CAFOs) AND PLANNING: A STRATEGIC APPROACH

A. Local Government Empowerment

"How Factory Farming and The Government Shutdown Collided to Create a Serious Public Health Issue", is an article that caught my attention just before the data collection of this paper is complete regarding information on CAFOs. At the end of October 2013, both the United States Department of Agriculture (USDA) and the Center for Disease Control (CDC) issued a public health issue alert. They reported three hundred people sick due to a viral, salmonella, outbreak from a number of CAFOs throughout the Nation. Salmonella came from concentrated chickens food operations. However, CDC was unable to implement any kind of public health measures due the government malfunctioning (i.e. The Government Shutdown of 2013).

Furthermore, CDC reported an increase in the rate of hospitalization from salmonella during the shutdown. Antibiotic resistance, as seen in this outbreak, was associated with an increased risk of hospitalization or possible treatment failure in infected individuals, according to CDC's officials. CDC's spokesperson, John O'Connor, also noted that ninety-five percent of chickens were reared in precarious conditions, standing on litter and infected with salmonella.

After this reading, few additional questions emerge. What would happen if local representative would have more action power? What is the nature of the link between CAFOs, public health and the local community? Are local agencies able to respond to public health emergencies in the absence of government (as the case of the Government shutdown showed us)? Is the local power able to collect data, then make reports and write quantified data to address a quicker, efficient, response?

B. Inclusion of Diversity in Planning

1. Subsidize Women in Agriculture

Recent studies in brain cognition show evidence of differences among men and women in the perception of suffering in others. Furthermore, women seem to be more compassionate towards animal sufferings. Women are more responsive to "scenes of illness". Women are more empathetic than men [2]. Differences between men and women are evident according to Harvard biologist E O Wilson's book *On Human Nature* [9]. Wilson argues that there are interpersonal differences shown at the baby stage when baby girls smile more than baby boys. To him, men and women have two

divergent evolutionary sexual attributes in term of mating and parenting.

Men and women differ so much in their attributes and feelings that some researchers describe them as possessing “two human natures” [2]. A 2008 study on the same topic shows that two thousand Americans believe that women are more compassionate than men. Women have tendency to eat less meat, to purchase organic food, to make sustainable decision in feeding their families, according to 2013 Food and Health Survey [2].

C. Nutrition as Public Policy

What would happen if we substitute meat with a more vegetarian diet? Middle Eastern and Mediterranean food culture established their diet on a vegetarian basis. Meat is part of the diet; however, it is not the principal ingredient. Legumes such as lentils and chick peas contain the same amount of protein in meat. Furthermore, legumes and vegetables can be farmed in a more sustainable way, including urban orchards and urban farming. The water that is necessary to produce one pound of meat is two-three times bigger than the water needed to grow the same quantity of legumes and vegetables. Some of CAFOs' issues can be addressed by considering a nutritional approach to our diet.

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