Food Security and Nutrition in West Africa: Bushmeat, Overfishing, Industrial Agriculture and Alternatives to the Consumption of Animal Protein

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Introduction

West Africa is one of the most food-insecure regions in the world, which means, according to the World Food Summit held in 1996, that households do not at all times have "access to sufficient, safe, nutritious food for an active, healthy life." (WHO 2009) To the US Department of Agriculture (USDA), food security includes "the ready availability of nutritionally adequate and safe foods" and "assured ability to acquire acceptable foods in socially acceptable ways," meaning without "resorting to emergency food supplies, scavenging, stealing, or other coping strategies." With approximately 15% of the region's people suffering from undernourishment, West Africa certainly fits the definition of a food-insecure region. (Flores 2004, 3) While per-capita food production has risen dramatically throughout much of the developing world, in Africa it has fallen by 20% since the 1960s. (Pretty 1999, 254)

In addition to the scarcity of food, another major concern in the region is the poor nutritional quality of the food. A significant portion of the population in West Africa has only a small number of staple foods available to them on a regular basis. Many of these staple foods are rich in starch but offer little protein, a macronutrient vital for good health. Therefore increasing per capita protein intake is at the top of the agenda for many governments, NGOs, and multilateral institutions such as the World Bank fighting against poverty, hunger, and malnutrition. (Sansoucy 1995, Allen 2002) However, much of the dialogue has concentrated on increasing animal protein intake, even though a number of nutritional studies have found that plant protein is just as nutritious, with some suggesting that the healthiest sources of protein are beans, nuts, grains and other plant-based sources. (Millard 1999, 249, Willett 2001)

For all their good intentions, many of these advocates calling for increased per capita consumption of animal protein neglect to consider where the animals to supply this increase will come from and how this increase will impact the long term health of West Africa's people and ecosystems and the planet at large. Over-fishing by industrialized European and West African fishing fleets is putting a huge strain on fisheries in the Gulf of Guinea and the surrounding waters. The over-consumption of terrestrial wildlife, or "bushmeat," has led to "empty forest" syndrome in many of West Africa's remaining forests. Importing cheap frozen meats from industrialized nations undercuts small-scale

rural farmers and jeopardizes public health. In light of these problems, some observers have advocated that West Africa adopt the West's model of animal factory farming, yet as I will argue in this paper, establishing industrial animal agriculture could further exacerbate climate change, land degradation, deforestation and water pollution and consumption, spread zoonotic diseases such as avian influenza, increase grain prices, and harm rural economies, thereby undermining food security in the region. (Nierenberg 2005)

Furthermore, the emphasis on increasing per capita animal protein consumption is detracting attention from fixing many of the more urgent agricultural problems in West Africa, including low yields, insufficient access to produce, poor storage facilities, high rates of waste and spoilage, inadequate processing facilities, deforestation and vulnerable water supplies. (Nellemann et al. 2009) Resources invested in industrial animal agriculture are resources not being devoted to addressing the roots of West Africa's food insecurity problems, which lie in poor governance, unfair trade policies, gender inequity, political corruption and instability, inadequate infrastructure and many other factors. (Paarlburg 1996)

Because programs to promote increasing per capita animal protein consumption in West Africa may actually contribute decreased food security, poorer health, and environmental degradation, it is crucial to re-evaluate many of the agricultural policies currently being pursued in the region by governments, multi-lateral agencies, industry, agricultural institutions, and NGOs, such as the World Bank, UN Development Program (UNDP), and others.

Methods

This paper will use qualitative methodology and a case study approach to explore the problems that may result from policies to increase animal protein consumption in West Africa and recommend potential solutions. It is based on interviews with representatives of some of the institutions involved with food and agriculture issues in West Africa and on review and analysis of secondary analytical materials, including

academic journal articles, media articles, and governmental and NGO reports and websites.

Intended Audience

Many corporations, agricultural institutions, international aid agencies, non-governmental organizations, and governmental agencies are searching for sustainable solutions to improving food security in West Africa and throughout the developing world. This research examining the impacts that policies which promote increased animal protein consumption will likely have on food security and the environment and the alternative policies that could ensure a more secure future for the region is intended to be of practical use for such institutions.

Overview of Chapters

Chapter 1 provides an overview of food security and the environmental and social impacts of the primary sources of animal protein in West Africa, including fisheries, bushmeat, and animal agriculture and questions whether efforts to increase animal protein intake is truly in the best interest of the people in the region. It concludes by discussing some of the alternative ways to increase nutrition and food security in West Africa, such as innovative agricultural projects based on sustainable and organic methods. Chapter 2 discusses the ways two West African nations, Ghana and Nigeria, are impacted by the issues of food security, declining fish stocks, over-exploitation of terrestrial wildlife and industrial animal agriculture. It will compare some of the solutions they are pursuing and the resulting consequences. Chapter 3 analyzes each nation's approach and suggests policy strategies, such as further investment by the international community in sustainable agricultural projects, that can be used to improve food security, public health and environmental protection in the region.

Chapter 1

Fisheries, Bushmeat and Animal Agriculture in West Africa: History and Current Status

For centuries, people in West Africa have depended on fish and terrestrial wildlife for their protein needs. However, over-fishing by foreign fleets, rapid population growth and rising incomes have lead to over-exploitation, putting the potential of these sources to provide adequate quantities of protein to West Africans in jeopardy. In response, a number of governmental, NGO, and business interests have promoted animal agriculture as an alternative to wild protein sources, often with devastating consequences. This chapter will provide some historical context, discuss the problems associated with each source of animal protein and explore more sustainable means to increase food security and nutrition in West Africa.

Bushmeat and Fisheries an increasingly unreliable form of protein in West Africa

The Bushmeat Trade in West Africa

One of the primary sources of animal protein in many parts of West and Central Africa is bushmeat. Targeted wildlife includes common species such as the grasscutter and several species of duikers as well as rarer species such as the red colobus monkey and even chimpanzees. In these regions, animals are hunted heavily for both subsistence consumption and commercial trade, though researchers do not have adequate data breaking down which portion of hunting is done for each category. In the tropics, especially tropical forests where the rate of wildlife extraction is six times the sustainable rate, hunting and poaching have become in recent years even more of a threat to wildlife conservation than the loss of habitat. While many governments in West and Central Africa have made serious efforts to establish networks of protected areas (PAs) in the tropics, they have been less successful at controlling poaching activity on these lands, causing many PAs to experience “empty forest” syndrome. (Bennett et al. 2002)

Wildlife populations have been declining so quickly in the past several decades that the future sustainability of this food source is uncertain. Though humans have been hunting bushmeat for generations, the bushmeat trade has become highly unsustainable in many regions across the tropics in recent years. Though there are a number of causes contributing to these high hunting rates, such as forest fragmentation, reduced park security because of civil war, improved weaponry, a growing wealthy elite who can afford luxuries such as bushmeat, loss of traditional hunting controls, economic desperation, and increased access to remote areas because of resource extraction activities, one of the most important influences is the growing population densities. This is particularly a threat in tropical forests, which are less productive in terms of biomass than savannas. Research has shown that in tropical forests, human population densities of over 1 person per square kilometer are unsustainable if people are depending only on wild animals for protein. In many tropical forests areas of West and Central Africa, densities of 99 people per square kilometer are frequent observed. (Milner-Gulland and Bennett 2003, 351)

The loss of so many wild animals to the bushmeat trade heavily impacts the dynamics of forest ecosystems. In some areas, the ecological change that results from the loss of keystones species such as elephants, apes and monkeys, which act as seed dispersers, can be profound. (Milner-Gulland and Bennett 2003, 351)

The hunting of wildlife for the bushmeat trade is not only a conservation concern, but is also a serious public health concern. The handling of freshly butchered meat from wild animals may contribute to the spread of certain zoonotic diseases. Some viruses that cause no health problems in animals can severely impact humans. Increased contact with wildlife through the building of mining and logging roads raises the risk of the spread of pathogens from animals to humans. Highly contagious diseases such as anthrax and influenza are of particular concern. (UK Parliamentary Office of Science and Technology 2005) Other diseases include the simian foamy virus, which has been identified as a zoonotic retrovirus that infects people who have direct contact with fresh nonhuman primate bushmeat. Two new retroviruses, human T-lymphotropic virus types 3 and 4,

have also been found in people who hunt, butcher, or keep monkeys or apes as pets in southern Cameroon. (Chomel 2007) In 1994, a small ebola virus epidemic broke out at a gold mining camp in a remote forest in the Makokau region of Gabon. Twenty eight of the forty-four people who contracted the disease in the mining camps died. It is widely thought by experts that the people at the mining camp contracted the disease through the consumption of chimpanzees or other primates living in the forest. (Garrett 2001)

Fisheries in West Africa

Globally, as well as regionally in West Africa, the future of marine fisheries is exceptionally grim. In 2006, a group of widely respected fisheries biologists and economists announced in the journal *Science* their prediction that a global collapse of all marine species currently fished would occur in 2048 if humanity continues to exploit fisheries at the present levels. (Worm et al. 2006) West Africa's waters are especially plagued by mis-management and threats of fishery collapses. Since World War II, Europeans, Russians, and more recently, the Chinese, have systematically exploited West Africa's fisheries to meet the increased demand for seafood in their countries. The region's marine fisheries catches have increased from an estimated 600,000 tons in 1950 to more than 4.5 million tons in 2000. Despite this increase in catches by primarily foreign fleets, the countries that host these fleets seldom gain economically or socially, yet their food security is threatened when their fish stocks, especially valuable demersals (bottom-feeding) fish and invertebrates such as crustaceans and cephalopods, become depleted. Particularly troubling is the data from recent ecosystem modeling of the northwest coast of Africa which found that, excluding low trophic level and small fishes, the area's fish biomass has declined by a factor of 13 since 1960. (Alder and Sumaila 2004, 156, 168-169)

One of the major factors contributing to fisheries depletion in West Africa's waters is the unfair fisheries policies of the European Union (EU), which heavily subsidizes its fishing fleets by providing financial compensation to West African governments for fishing rights. This subsidy makes EU fleets the preferred users of West Africa's fisheries, displacing the fleets of West Africa's coastal states and putting

unsustainable levels of pressure on the region's fisheries and marine ecosystem. Furthermore, the access agreements that the EU formulates with the coastal states are established without any prior scientific study to determine if the proposed levels of fishing are sustainable. Making the situation even more perilous is the fact that few West African governments have the resources to effectively monitor the activities of the European fleets, allowing the fleets to get away with such irregularities as catching an excessive amount of by-catch, underpaying for tuna licenses, and failing to provide statistical information to authorities in a timely manner. (Kaczynski and Fluharty 2002, 75, 82)

This overexploitation by foreign fleets has resulted in hardship for West African coastal states' domestic industrial fishing fleets and small-scale fishing fleets. Fish has thus become excessively expensive for many of the people living in the interior rural areas of West Africa. In Senegal, a growing number of people in the countryside are experiencing protein deficits because the growth in fish exports has reduced domestic supplies. (Alder and Sumaila 2004, 158) If reforms to the EU's current policies are not made soon, fisheries experts predict that West Africa's coastal states will have few fisheries resources still available for exploitation by either EU fleets or domestic industrial fleets. (Kaczynski and Fluharty 2002, 75, 82)

In addition to having devastating impacts on the marine ecosystem, over-fishing in West African waters has grave impacts on the region's terrestrial wildlife, according to recent research. Brashares et al. documented a direct link between the levels of consumption of fish and bushmeat in Ghana over a thirty year period. They noted that in years of low fisheries production, the price of fish at the markets climbed significantly and in response people in Ghana increasingly relied on bushmeat taken from wildlife reserves for their protein intake. (Brashares et al. 2005)

Is Industrial Animal Agriculture the Solution for a Food-Secure West Africa?

In response to concerns over the future health of terrestrial wildlife populations and fish stocks, a number of voices, including some prominent conservationists, are

calling for large scale investment in animal agriculture as a means of providing this increased demand for animal protein to the African population. While some conservationists such as Rowcliffe et al. are more cautious about the potential of livestock to reduce pressure on marine and terrestrial wildlife, calling for a cost benefit analysis of increased livestock production, others such as Dr. Terese Hart, have asserted that having "large scale animal husbandry and pisciculture projects close to all centers of population" will be one of the most effective ways to conserve wildlife. (Leakey 2008) Milner-Gulland and Bennett suggest that to scale back the bushmeat trade, "consumption of livestock must increase relative to wild meat" and that consumer access to domestic meat should be increased and livestock meat prices must be reduced. (Milner-Gulland and Bennett 2003, 354)

In addition to conservationists, a number of agricultural scientists are encouraging investments in animal agriculture throughout Africa and are calling for African governments and international institutions to make promoting livestock development and research capacity a national priority. For example, Sansoucy with the United Nations Food and Agriculture Organization (FAO) believes that "improved efficiency of animal agriculture, with its various commodities and service products, is crucial to achieving sustainable agricultural development and food security, particularly in low-income, food-deficit countries." (Sansoucy 1995) Apantaku et al. promote the poultry industry as "the fastest means of bridging the protein deficiency gap prevailing in Nigeria." (Akpabio 2007, 298) Simeon Ehui, the World Bank's Sector Leader for Sustainable Development in Nigeria, stated that while most World Bank-supported efforts to strengthen food security in Nigeria involve improving crop yield, the bank also invested in the poultry industry because of the importance of having a reliable source of protein and the potential for the poultry industry to increase the standard of living for the rural poor. (personal comm. June 11, 2009)

Yet this call for the intensification of animal agriculture in Africa is misguided for a number of reasons. While concentrated animal feeding operations (CAFOs) are just beginning to appear in parts of West Africa, many have been developed near urban areas

in Latin America and Asia, mainly as a result of high population growth rates, urbanization and larger incomes. The development of industrial animal agriculture in these nations, most of which are notorious for their weak public health, occupational, and environmental standards, has created numerous food security, environmental, animal welfare and public health problems across the developing world, from the Philippines to Brazil. (Nierenburg 2005, 5) The following sections will explore some of the impacts of industrial animal agriculture is having around the world.

Exacerbating Grain Scarcities

While animals raised using traditional methods typically feed on fodder or leftover food scraps, animals raised in industrial systems typically are fed grain, a commodity often in short supply in West Africa. If industrial animal agriculture becomes more commonplace in the region, meeting the increased demand for animal feed will require the use of greater amounts of pesticides and fertilizers for producing more grain and larger amounts of land to be converted to growing the grain, since importing grain from outside the region would be prohibitively expensive for most West African nations. While the recent increases in grain prices around the globe are frequently attributed to the spike in demand for ethanol, the increasing demand for grain-fed meat in China, India and across the developing world is also considered to be a major factor. (Peterson 2007) Ironically, efforts to promote industrial animal agriculture in West Africa may result in more food insecurity, not less. According to the UN FAO 2006 report *Livestock's Long Shadow*, "livestock actually detract more from total food supply than they provide. Livestock now consume more human edible protein than they produce….As the livestock sector moves away from feed and other resources that have no alternative value towards using crops and other high value inputs, it enters into competition with food and other uses of commodities and land.…It [livestock] raises overall demand and prices for crops and agricultural inputs." (Steinfield et al. 2006, 270) The people that are the most impacted by these higher grain prices are impoverished people living in developing nations that depend mainly on food imports, such as Benin and Niger. (Peterson 2007)

Moreover, when land and water are dedicated to producing more meat, these resources are diverted from producing foods that require less water and can be grown with far fewer resources. Additionally, land, water, and other resources used for raising animals are resources not being use to raise foods more important than meat for nutritional security, such as beans and high-protein grains. (Nierenburg 2005, 26)

Pollution and Over-Consumption of Water

Some of the regions in Africa where the increases in meat consumption are predicted to be the highest are in areas that already face wide-spread water scarcity. While livestock accounts for over eight percent of human water use globally, in some semiarid African countries such as Botswana livestock rearing accounts for twenty-three percent of total water use. (Steinfield 2006, xxii, 129) Moreover, only four percent of Africa's cultivated land is irrigated. (Paarlburg 1996) Thus these regions will likely face even more water scarcity if they choose to meet this demand with locally raised meat, since to produce just eight ounces of beef can require up to 25,000 liters of water. (Nierenburg 2005, 18) Moreover, water can become even scarcer when it is polluted by the tons of manure produced by large-scale animal agriculture operations and large cattle ranches. This manure contains high amounts of nutrients such as nitrogen and phosphorous as well as drug residues, heavy metals, and pathogens. (Steinfield 2006, 136, Nierenburg 2005, 18, 24-26)

Climate Change

A 2006 FAO report found that the livestock sector produces an estimated 18% of global greenhouse gases, which is more than all the SUVs, cars, trucks, planes, and ships in the world combined. (Steinfield 114, 2006) Globally, the livestock sector contributes 9% of carbon dioxide emissions. (Steinfield xxi, 2006) This carbon is released through a variety of processes throughout the production of animal products, most dramatically through the destruction of forests for conversion to pastures and to the growth of feed crops and through the use of large amounts of carbon dioxide-releasing fossil fuels during

the production of fertilizers, pesticides and herbicides to promote the growth of these feed crops. (Steinfield 90, 2006)

Furthermore, the livestock sector contributes 37% of global anthropogenic methane, which is 23 times more powerful than carbon dioxide. The methane mainly comes from the enteric fermentation of ruminants such as cows, goats and sheep. (Steinfeld xxi, 2006) Methane also is produced during the decomposition of organic material in livestock manure. When the manure is held in liquid form in lagoons, a common practice in industrial agriculture, methane emissions are higher than if deposited in dry form on fields and pastures. (Steinfield 93, 2006) Globally, livestock manure produces 65% of anthropogenic nitrous oxide, which is 296 times more powerful than carbon dioxide. Nitrogen is also emitted from the application of fertilizers to grow feed crops. Lastly, livestock is responsible for 64% of anthropogenic ammonia, a chemical that contributes to acid rain. (Steinfeld xxi, 2006)

Since climate change could heavily impact agricultural productivity in many parts of West Africa, especially the regions where farming practices have evolved as a response to climate risks, such as variable rainfall, policies to increase food security and nutrition that produce substantial amounts of greenhouse gases are particularly reckless. (International Workshop on Adaptation to Climate Change in West African Agriculture 2009) It would also be reckless for governments and the international community to invest in the very type of agriculture that will be one of the most impacted by the increases in temperature expected to accompany climate change in Africa. Environmental and agricultural economists with the World Bank have predicted that livestock revenues will significantly fall across Africa with warming temperatures, while revenues will rise with irrigated crops. (Kurukulasuriya et al. 2006)

Land Degradation and Scarcity

Approximately two-thirds of the world's agricultural land is devoted towards the raising of livestock. (Nierenburg 2005, 7) In addition to the conversion of land to pasture, the conversion of forests to the growing of crops such as soybeans and maize for

animal feed is happening at a growing rate across the developing world. (Steinfield 83, 2006) The majority of these soybeans and maize crops are processed into animal feed and exported around the world. (Steinfield 62, 2006) The loss of forest cover due to both the conversion to pasture and to feed cropping results in a lower quantity of trees and soil to act as carbon sinks. Soil acts as the largest carbon sink in the terrestrial carbon cycle. (Steinfield 92, 2006)

There's little room in West Africa for significantly more agricultural land to be used for livestock rearing or for growing the grain to feed animals on industrial animal operations, without serious impacts on agricultural productivity, climate change and biodiversity. More than 12 million acres of forests are cleared each year for agriculture in Africa and vast areas of African cropland and grazing land have already been lost through degradation. More than 250,000 square miles of once-productive land on the southern edge of the Sahara have experienced desertification over the past half century. (Paarlburg 1996)

Poor Animal Welfare Standards and the Spread of Diseases

With the development of industrial animal agriculture around the world has come a exponential increase in the spread of zoonotic diseases. Tropical areas are especially conducive to the spread of zoonotic diseases, making the establishment of industrial animal agriculture especially inappropriate in West Africa. The scale of livestock rearing in some parts of Africa has been limited thus far by diseases such as trypanosomiasis (Milner-Gulland and Bennett 2003, 358) and efforts to overcome these diseases will likely be futile. Many zoonotic micro-organisms and multi-cellular parasites that can harm human health, including E. Coli O 157:H7, cam-Pylobacter, and salmonella, are found in the livestock excrement. (Steinfield 2006, 140) Of particular concern are those diseases that are frequently fatal to humans, such as bovine spongiform encephalopathy (BSE), foot and mouth disease, and avian influenza. (Nierenburg 2005, 5)

With their cramped cages, poor air quality, unnatural lighting regimes, stressful handling and transportation, and inadequate stunning and slaughter procedures, factory farms and slaughterhouses create the ideal conditions for diseases to spread from animals to people, especially industrial poultry farms, where tens of thousands of birds are often confined to massive sheds where they stand in their own wastes. Highly stressed animals with compromised immune systems make ideal disease incubators. In August 2007, the World Health Organization's annual World Health Report cited intensive poultry production as one of the primary reasons why new infectious diseases are now emerging at a rate unprecedented in the history of medicine. (Greger 2006)

Mr. Ehui, the World Bank's Sector Leader for Sustainable Development in Nigeria, characterized avian influenza as mainly only a problem in the Asian poultry sector (personal comm. June 11, 2009), yet with highly stressed animals with weakened immune systems being shipped across international borders with greater frequently, diseases like avian influenza and BSE become truly global problems. (Greger 2006, 131) Indeed, some African nations such as Nigeria and the Ivory Coast have already experienced outbreaks of avian influenza. (Couacy-Hymann et al. 2009) The potential of zoonotic diseases to cause high mortality in the human population becomes even greater when the overuse of antibiotics in factory-farmed animals reduces the ability of these vaccines to work effectively in humans. If avian influenza were to become transmittable between humans, West African nations, with their limited health and biosecurity infrastructures, would be among the nations the least likely to control the spread of the virus.

The FAO's Sancoucy and others argue that donor agencies should not just fund ruminant-focused projects but should increase their support for projects involving monogastric animals, such as pigs and chickens. (Sansoucy 1995) Yet some public health advocates view the spread of pig and poultry factory farming as a potential public disaster not only for Africa but for the entire planet. The virus receptors in chickens and humans have a high degree of similarity, enabling bird flu viruses like H5N1 to more readily infect humans. (Greger 2006, 172) Greger warns that the spread of animal

agriculture, especially the raising of swine and poultry, to the developing world has dramatically increased the risk of avian influenza viruses such as H5N1 mutating into viruses that can be easily spread from person to person. He therefore asserts that if animals are going to be reared for human consumption, humanity should "break the feathered link in the chain." (Greger 2007, 344)

In addition, the threat of a strain of H5N1 developing that could be easily transmitted between wild birds may pose more of a danger to some species of birds than bushmeat hunting. According to a 2007 statement on avian influenza by the bird conservation NGO Bird Life International, H5N1 could cause serious problems to species that are already threatened or congregate in just a few localities. (Bird Life International 2007)

Greger also warns that higher rates of intensive pig production around the world could increase the spread of diseases such as the Nipah virus. Pigs are thought to be "potential 'mixing vessels' for gene segment reassortment due to the existence of both 'bird-like' receptors and 'human-like' receptors in porcine respiratory epithelium, a hypothesis supported by documentation of genetic reassortments between avian and human influenza viruses in both US and European pigs." (Greger 2007, 266) In Malaysia, where pig production has developed rapidly in recent decades, a Nipah virus outbreak spread so quickly that farmers needed the Malaysian army to assist with the killing of millions of their sick pigs. The virus was deadly to humans as well, killing 40% of Malaysians who became infected. In 2004, the death rate was even higher in Bangladesh, where the virus killed 75% of those infected. Though the virus is mainly transmitted from animal to human, in the Bangladesh outbreak there was some evidence that the virus was being transmitted from human to human. (Greger 2006, 106)

The Displacement of Small-Scale Farmers

The increase in the consumption of animal products in Africa and throughout the developing world has rarely benefited small-scale rural farmers. In West Africa, the

increase in demand for animal products for the fast food chains has been met largely by an increase in the importation of eggs and cheap cuts of pig and chicken meat from America, South Africa, and nations within the European Union. In each of these areas, industrial animal agriculture is heavily subsidized by the government. The artificially cheap prices of the imported frozen chicken make it difficult for small domestic poultry farmers to compete. Domestically grown eggs and chicken meat may cost up to twice as much as the imports. (Panos 2005) In Senegal, the number of poultry farmers has decreased by 40% because they can not compete with the cheap imports from abroad. (Atarah 2005)

The consumption of large amounts of imported poultry products has created a number of public health problems in West Africa. Few West African health service agencies have enough resources to detect and prevent the salmonella outbreaks that frequently accompany chicken imports. In Cameroon, two local NGOs conducted tests on 200 imported chicken samples in 2004 and found that 15% of the samples were contaminated with salmonella. (Atarah 2005)

When the domestic supply of animal products increases in the developing world as a result of increased demand from fast food companies, it is usually only the large-scale animal agriculture operations that expand substantially, not the small-scale rural farmers. These large-scale animal agriculture operations rarely result in additional jobs for people in the community. As automation increases on industrial animal farms, workers are frequently laid off. (Atarah 2005)

Could a food system based on sustainable, mostly plant-based agriculture provide food security in West Africa?

Most food experts agree that food production increases in Africa will have to come from existing farmland. (Pretty 1999, 254) Thus, crop yields will need to increase to keep up with the growing population. Sustainable agriculture expert Jules Pretty at the Centre for Environment and Society at the University of Essex believes that sustainable

agriculture, which he defines as agriculture that "emphasizes productive values of natural, social and human capital," is the system that has the most potential to meet this need for increased crop yield and to substantially improve food production and household food security in Africa. In his review of 45 projects and initiatives spread across 17 countries in Africa, over 730,000 households were found to have substantially improved their food production and household food security. In 95% of the projects in which increased yields were the aim, cereal yields improved by 50-100%. Total farm food production increased in all projects. (Pretty 1999, 253, 270)

Similarly, research conducted by the UN Conference on Trade and Development (UNCTAD) found that "organic agriculture is a good option for food security in Africa – equal or better than most conventional systems and more likely to be sustainable in the longer term." UNCTAD's analysis of 114 cases in Africa revealed that a conversion of farms to organic or near-organic production methods boosted agricultural productivity 116%. In one of the projects analyzed, maize yields in Kenya increased by 71% and bean yields by 158%. The research found that the project increased the diversity of food crops consumed by farmers, resulting in more varied diets and improved nutrition. (UNCTAD 2009)

What made the sustainable agricultural projects that Pretty and UNCTAD analyzed different than conventional agriculture was how the projects "integrated natural processes such as nutrient cycling, nitrogen fixation, soil regeneration, and natural enemies of pests into food production processes, minimized uses of non-renewable inputs, and made better use of farmers and their knowledge, so improving capacities and self-reliance." (Pretty 1999, 259) Other sustainable land and water management techniques include composting, cover crops, mulching and crop rotation. Some of the other environmental and social benefits of organic farming include the improvement of soil fertility and structure by restoring carbon and nutrients to the soil, reduced pollution, reduced illness and death as a result of exposure to harmful chemicals, reduced fossil fuel use and the protection of biodiversity. (UNCTAD 2009) According to Pretty, in addition to the benefits of increased crop yields and environmental protection, the positive impacts

of sustainable agriculture projects on "social and human capital in African communities help build a base for future agricultural improvements." (Pretty 1999, 253)

Pretty views the call for the intensification of agriculture in Africa as unwise because increasing food security in Africa should not simply be a matter of developing new technologies since with intensification comes a higher level of reliance on costly external inputs. Pretty believes that solutions to food security must be based on existing resources because most farmers are often too poor to afford to purchase large quantities of inputs such as animal feed and fertilizers. (Pretty 1999, 254)

Pretty and UNCTAD both lament that much of the progress in the movement towards sustainable agriculture in Africa has "occurred without, or even despite, significant or intentional policy support." (Pretty 1999, 256, UNCTAD 2009) While it is true that investment in sustainable agriculture has received little support from national governments in Africa, a growing number of foundations and even some government agencies in the West have confidence in the potential of sustainable agriculture to provide higher levels of food security in West Africa and are providing funds to NGOs working across West Africa to improve crop yields using sustainable methods and to promote better nutrition through crop diversification.

One such NGO is the innovative UK-based Tree Aid, a forestry-focused organization that works with 164 communities in the Sahel region of West Africa to plant and protect trees, which reduce vulnerability to drought and provide valuable products. Tree Aid believes that tree varieties, such as cashew, cassia, mahogany, mango, moringa oleifera, neem, pigeon pea, shea, and wild tamarind can help "plug nutritional gaps." They also work to "develop better preservation and storage of tree foods to tide people over the lean months, and even have enough left over to sell, using the income to buy other food." (Tree Aid 2009)

One of the foundations that has provided funding to some of the NGOs working on projects to promote more sustainable, mostly plant-based forms of both commercial

and subsistence farming is the UK-based Turing Foundation, which has made sustainable agriculture one of its two major platforms. The Foundation has provided hundreds of thousands of Euros to promote sustainable agriculture in developing countries, especially those in West Africa. Some of their projects include providing €58,000 to local associations in Burkina Faso for the promotion and improvement of biological shea nut farming, an activity that provides one of the most important sources of income to women in Africa. Also in Burkina Faso, the Foundation has provided € 94,000 to the Hunger Project, an NGO that works with communities on agricultural programs which "focus on the improvement of sustainable agricultural techniques, the protection of affected parcels of forest, the establishment of food banks for times of scarcity, and the provision of micro credits to women." In 14 communities across Burkina Faso, the Hunger Project and their partners have improved crop yields up to 50 percent through the implementation of microdose technology, the application of a small dose of fertilizer inserted directly into the seedbed. Additionally, the Foundation has provided €85,000 for courses in organic farming and replanting in Tanzania, supplying the seeds, trees and plants. The program has helped promote reliable incomes and food supply for 20 communities comprised of 5,000 households. (Turing Foundation 2009)

A New Way Forward

The success of these projects in providing food security and income to African farming communities through sustainable methods shows that feeding Africa's growing population and improving nutrition does not have to involve relying on the industrialization of animal agriculture. In fact, around the world, people are re-thinking the wisdom of relying on industrial animal agriculture. For example, the European Union, a number of individual European nations, and several US states has passed a variety of laws banning or phasing out certain factory farming practices in response to growing consumer concerns about animal welfare, the environment, health and food safety. For example, the European Union has required egg producers to phase out the use of battery cages by 2012. (Anon 2008) During the 2008 elections, 63.5% of voters in California passed Proposition 2, which takes effect January of 2015 and ends the practice of confining certain animals raised for food in crates and cages so small the animals can

barely move. Arizona, Colorado, Florida, and Oregon have passed similar laws, which were backed by numerous environment, animal welfare, labor, community and public health organizations. (Jones 2008)

In addition, a number of major corporations have adopted policies to end or reduce their sourcing of animal products from industrial animal farms. Chipotle Mexican Grill, a restaurant chain with 830 locations in the US and Canada, implemented a policy against purchasing pork from industrial pig farms and is preparing to implement a policy on purchasing only dairy products from pasture-raised cows. (Kuchment 2008) American grocery retailer Safeway announced in 2008 that it will establish a purchasing preference for cage-free eggs, a policy which is "intended to favor producers who are converting away from battery-cage confinement systems" and for pork from producers who do not confine breeding sows in gestation crates, which are cages so small the animals are unable to turn around. On American university campuses, more than 350 schools have created policies to either eliminate or reduce their use of battery eggs from their dining facilities. (HSUS 2009)

As an increasing number of governments, corporations, and consumers in the Global North reject industrial animal agriculture, hopefully countries in West Africa and other parts of the developing world will learn from the West's mistakes, decline to venture down the unsustainable path of industrial animal agriculture, and instead embrace sustainable agriculture.

Chapter 2

Case Studies of Two West African Nations, Ghana and Nigeria

To illustrate some of the food security dilemmas faced by West African nations, this chapter will examine the paths taken by two West African nations, Ghana and Nigeria. Both nations are experiencing declines in the availability of seafood and bushmeat, as is common throughout West Africa, but Nigeria is unique in that it has ventured much further down the path towards industrial animal agriculture than Ghana and most other West African nations. Comparing the two nations can shed light on how investing in industrial animal agriculture on a large scale can impact a nation.

Ghana Case Study

Ghana, a densely populated country of 20 million people located on the Gulf of Guinea, is a West African nation that is experiencing many of the food security and environmental dilemmas discussed in the previous chapter. Ghana has a long national tradition of bushmeat trading and of fishing. Both activities are proving to be increasingly insecure sources of protein. (Mendelson et al. 2003, 76) Like many West African nations, the consumption of domestic meat is increasing in Ghana, along with the environmental and public health problems associated with animal agriculture. For example, according to a 2007 WHO report, Ghana, with 3 million overweight citizens, has one of the highest obesity rates in Africa, in part because of the increasingly westernized style of eating in urban areas. (The Point 2007) At the same time, a growing number of Ghanaian farmers are taking different approaches to cultivating the land to produce foods that provide nutrition and security to Ghana's citizens in ways that protect the environment, biodiversity and public health.

Ghana and the Bushmeat Trade

Ghana has humid tropical forests in the south and arid savannahs in the north that were once rich in wildlife. Bushmeat has historically been an important source of protein

for Ghanaians, particularly those living in the rural areas, and has helped feed families during lean agricultural seasons. (Milner-Gulland and Bennett 2003) Bushmeat is also an important source of cash income for many families and is estimated to be worth $US350 million, of which $US83 million is sold commercially. Bushmeat is hunted by commercial hunters who operate full time as well as by farmers who use the meat of the animals caught in the snares they set for crop raiders to supplement their agricultural income. While bushmeat is a staple food in many rural areas in Ghana, a significant portion of harvested bushmeat is consumed in cities, where 60% of bushmeat sales occur. In the cities, bushmeat, the most expensive source of animal protein for urbanites, is not consumed regularly by most residents, but is frequently purchased for festivals and holidays. (Mendelson et al. 2003, 73, 76-80)

While the commercial and farmer hunters in the rural areas are primarily male, the urban actors in the bushmeat trade in Ghana and throughout West Africa, which include wholesalers, retailers, and restaurant owners, are primarily female. The urban aspect of the trade is often not as profitable as the rural side of the trade. This work is considered difficult, is perceived to be low status work, and yields very little financial reward to the actors. Frequently, the women must take out loans through banks to pay for the high costs of running a bushmeat trading business. Additionally, with the increasing scarcity of bushmeat in Ghana, the urban side of the bushmeat trade does not offer a secure future to those involved in the trade, and most traders hope their daughters will find other occupations. (Mendelson et al. 2003, 79, 91)

Empty Forest Syndrome

While hunting rates may once have been relatively sustainable, after years of unrestricted hunting, bushmeat is becoming scarcer in Ghana according to national surveys. An estimated 385 million kilograms of bushmeat were collected each year in the late 1990s in Ghana. Ghana's protected areas experience high rates of local extinction because of over-hunting and some species, such as Miss Waldron's red colobus monkey, are facing global extinction. With vulnerable species already depleted in many parks, the

primary animal groups targeted by hunters include rodents, small antelopes, invertebrates such as crabs and snails, as well as birds and bats. Ecologists fear that the structure and viability of Ghana's forests will be altered as more species continue to decline. (Mendelson et al. 2003, 76, 77)

The bushmeat trade throughout Ghana is unregulated by local or state institutions. Theoretically, bushmeat utilization in Ghana is governed by the Wild Animal Preservation Act (1961) which lists those species that may be hunted and those species that are protected and specifies the seasons in which species may be hunted. However, surveys have found that throughout Ghana, the majority of hunters are unfamiliar with the details of the legislation. Though no violations of the legislation were observed by the researchers, they presumed that this was more likely because of local extinctions of the protected species than because the hunters were consciously following the law. Further complicating enforcement is the fact that a number of autonomous government agencies oversee various aspects of the bushmeat trade. Shotgun liscences are issued by the police, bushmeat trade licenses are issued by District Assemblies, and hunting licenses are issued by the Wildlife Department. The Wildlife Department is particularly known for its very limited capacity because of low budgets and lack of staff. This poor governance is one of the reasons why wildlife populations have declined so heavily in many areas of Ghana. (Mendelson et al. 2003, 92)

Ghana and the Fisheries Industry

Ghana has historically been one of the leading fishing nations in the West African region. (Atta-Mills et al. 2004, 12) Fish**,** which comprises 15% of the protein consumed nationally, is one of the cheapest sources of animal protein in Ghana. (Atta-Mills et al. 2004**,** 13) Commercial fishing, as well as small-scale fishing, developed in Ghana in the early 20th century, allowing both inland and coastal populations to make fish a regular part of their diets. However, demand soon exceeded supply and many easily accessible fishing grounds became over-exploited. Still, the Ghanaian fishing industry continued to expand and by middle of 20th century, Ghana had developed a semi-industrial fishing

presence in foreign waters, establishing Ghana as a fishing power throughout West Africa. With independence in the 1950s, the new government saw the successful Ghanaian fishing companies as security threats and expelled them, starting the decline in Ghana's regional fishing power. In the mid 1960s, Ghanaian semi-industrial fleets continued to struggle, as over-exploitation meant that there were no new inshore fishing areas to develop and the fleets were not equipped for fishing in offshore waters. In the late 1960s and 1970s, the government provided loans to the fishing industry to upgrade their industrial offshore fishing vessels, but the investments were poorly managed and the four major companies that received the loans all lost large sums of money. Lack of supporting infrastructure, lack of human capital, lack of finance and operating capital were all sited as causes of failure of the investments. In the 1980s, the Ghanaian fishing fleets lost even more access to distant fishing grounds, leaving them with no money to replace gear and equipment. Since 1980, declining catch per unit of effort in both semi-industrial and industrial fleets in Ghana has been documented. Today, Ghana no longer has fishing vessels in foreign waters. (Atta-Mills et al. 2004**,** 14)

Foreign fleets from many European and Asian nations still ply the Gulf of Guinea though Ghanaian fleets are largely absent because they are not able to compete with subsidized European vessels for access to West Africa's Economic Exclusion Zones (EEZs). The coastal countries in the region lack the financial or technical resources to operate effective monitoring, control, and surveillance programs, further depressing the state of fisheries in the region. The enforcement of Ghana's EEZs and fisheries laws are particularly weak, and the foreign vessels take advantage of this, resulting in high numbers of unlicensed intruders. (Atta-Mills et al. 2004, 16, 19)

The fishing industry in Ghana has suffered as a result of this overexploitation by foreign fishing vessels as well as by its own domestic fleets. Ghana's domestic distant-water fleets have significantly declined. Though Ghana's fish landings peaked in 1992, research showed that as early as 1973, inshore demersal stocks, pink shrimp, and flat and round sardinella were heavily exploited. A 1997 report showed that trigger fish almost disappeared after a peak of abundance in the early 1980s and that chub mackerel was also

showing signs of depletion. For a growing number of Ghanaian fishers, commercial fishing is not an option and instead they must make do with subsistence fishing. (Atta-Mills et al. 2004**,** 12, 15-16)

The decline in so many of these fish species has resulted in a significant shortfall between domestic demand for fish and the total domestic marine and freshwater landings. (Atta-Mills et al. 2004**,** 13) This imbalance requires the country to spend foreign exchange on importing higher-priced and lower quality fish from other nations. Yet even with the importation of fish, domestic demand is still not being met. Few West African countries like Ghana are willing to reduce exports of fish because of the huge amount of hard currency generated to repay international loans. Increasing domestic supply of fish is not a feasible option because most fisheries in the Gulf of Guinea have already been over-exploited and there are virtually no fish resources to develop. (Alder and Sumaila 2004, 158, 171)

Like the bushmeat trade, the contribution of the fishing sector to food security in Ghana is therefore coming under question. (Atta-Mills et al. 2004, 12) Many fisheries experts in the region are unsure of the ability of the Ghana's oceans to continue to provide Ghanaians with any meaningful amount of protein in the coming decades given the precarious state of so many of the region's fish species. A number of conservationists have called for more responsible fisheries management as a way to increase food security in the region, but Atta-Mills et al. predict that any gains in fish landings resulting from policy reform are likely to be mitigated by the country's high population growth rate of 2.4% a year. (Atta-Mills et al. 2004, 16)

Animal Agriculture in Ghana

Most animal rearing in Ghana is currently being done at the extensive, rather than intensive, level. About 66% of households in Ghana raise backyard chickens, guinea fowls or ducks for meat and eggs. These households possess a total of 25 million free-roaming birds. (Aning 2006, 4) However, a growing number of large and medium scale

industrial egg farms, as well as some industrial broiler (chicken meat) farms, have been established in six of Ghana's regions. For example, the Atwima Nwabiagya district in the region of Ashanti is home to Asare Farms, Mfum Farms, and Darko Farms, the largest industrial poultry operation in the country. (Aning 2006, 7)

Though industrial animal agriculture's reach in Ghana is not wide-spread to date, there are signs that Ghana may invest more heavily in factory farming in the future. Support for the industrial poultry sector is coming from a variety of sources, including the World Bank, the Ghanaian government, international agricultural organizations, American agribusiness interests, and even NGOS. (Aning 2006, 29)

The UN FAO has advocated for expanded poultry production in Ghana in response to depleted fish stocks. This expanded production, they believe, is necessary for nutritional security and job creation in the rural areas of the country. (Aning 2006, 19) The World Bank provided a loan of $29.1 million to Ghana's National Livestock Services Project (NLSP), a project carried out between 1992-1999 whose goal was to increase meat, egg and milk production by 50% by the year 2020. (World Bank Project and Operations database 2009)

The Ghanaian government has also provided a number of subsidies to the poultry sector. In partnership with the Agricultural Development Bank (ADB), which is owned by the Ghanaian government and the Bank of Ghana, the government financially supported the growth of industrial poultry farms through funding a program that facilitates capitalization and marketing of broiler birds. The program helped bring 552,000 chickens to market over a six month period in 2003. Ghana's Ministry of Food and Agriculture (MOFA) imported 20,000 mt of corn on behalf of poultry farmers during a severe corn shortage in Ghana in 2005. Also in 2005, the government established the Poultry Development Board, whose mission includes advising the government "on the growth, modernization and sustainability of the poultry industry." (Aning 2006, 28)

In the NGO sector, the Italian development organization Ricerca and Cooperazone has provided funding since 1994 to support industrial egg farms in Ghana's Western and Eastern regions. (Aning 2006, 29)

Additionally, support for industrial animal agriculture is also coming from American agribusiness. For example, the American industrial agricultural institutions such as Georgia's Agricultural Technology Research Program, the Georgia Poultry Federation, the National Chicken Council, and the National Turkey Federation have been recruiting agricultural officials from developing nations such as Ghana to their events and trainings. (ATRP 2004) In 2008, the US Department of Agriculture sponsored an Agribusiness Trade and Investment Mission in Ghana's capital of Accra. Attending the mission were 16 American agribusiness companies, including the meat and poultry sector. (Accra Mail 2008)

America-based Tyson Foods has set up a joint venture with Darko Farms in Ashanti, which produces five million day-old-chicks, 30 million table eggs, 780,000 chicken units, and 30,000 tons of animal feed each year. (Atarah 2005) Tyson Foods is a multi-billion dollar food processing corporation that has experienced countless environmental, labor, animal welfare and public health controversies in the past several decades. For example, Tyson has been fined millions of dollars by the U.S. Environmental Protection Agency for polluting the Chesapeake Bay and other waterways and by the U.S. Occupational Safety and Health Administration for worker safety violations, some of which have resulted in fatalities. (AP 2009, NY Times 1998)

Though Ghana's quantity of industrial farms is still relatively small compared to some other developing nations, they have experienced a number of problems. In the 1990s, Gumboro disease caused high mortality among Ghana's poultry population, leading to significant economic losses in the sector. (Aning 2006, 31) In May 2007, Ghana's National Veterinary Laboratory detected the nation's first outbreak of the H5N1 strain of bird flu among chickens on a poultry farm in Tema. The outbreak prompted the slaughtering of 1,678 chickens in the area. With larger outbreaks of avian influenza in nearby Burkina Faso, Ivory Coast, Cameroon, Niger and Nigeria, the threat of more

deadly outbreaks in Ghana's modest number of medium and large-scale poultry operations is very real, (IRIN 2007) especially since biosecurity practices are reported to be poor on Ghana's industrial poultry operations. Free-range and wild birds are reported to have access to the buildings. (Aning 2006, 14) Ghanaian consumers heavily reduced their consumption of eggs and poultry following these bird flu outbreaks in neighboring countries, leading one Ghanaian commercial egg farmer to destroy 60,000 chicks due to lack of demand. (Aning 2006, 32)

Another potential problem on the horizon for Ghana's industrial poultry industry is the sourcing of poultry feed. Currently the industry depends on imported corn, soy, and fishmeal. If any of these commodities become more scarce or costly, the industry may be faced with feed shortages as has happened in other West African nations. As mentioned above, in 2005, the government was forced to intervene to help procure the raw materials for poultry feed. (Aning 2006, 13) The institutions that are financially supporting industrial poultry operations in Ghana would be wise to consider whether this is the really the safest and most economically sound and sustainable means to increase the food security and nutrition of Ghanaian citizens.

West Africa's proponents of medium and large-scale animal agriculture frequently site job creation as a benefit of this type of agriculture. (Akpabio et al. 2007, Ehui, personal comm. June 11, 2009) Yet in Ghana, automation has caused massive worker layoffs at industrial chicken farms such as Ghana's Darko Farms, the largest poultry operation in the country, where the staff was reduced from 600 to 260 in 2005. (Atarah 2005) Moreover, these operations typically import cheap animal feed from North or South America, rather than supporting local feed producers. For example, in 2002, Darko Farms cut back on its orders of white maize from farms in Ghana and started ordering cheaper yellow maize from abroad to save on production costs. (tve Productions 2003) In June 2009, a US Grains Council senior official traveled to Ghana to investigate the possibility of becoming Ghana's "lead feed grains supplier." (The Poultrysite 2009)

Industrial animal farms have only appeared in six of Ghana's provinces to date, allowing the nation to escape thus far some of the negative impacts associated with this industry. Fortunately, the economic losses caused by the 2007 outbreak of avian influenza in Ghana's poultry sector were minimal compared to those suffered by many other countries that have experienced outbreaks, likely because of the relatively small number of large-scale poultry farms in Ghana. (Aning 2006, 31) Ghana's situation thus contrasts with that of Nigeria, whose heavy investment in industrial poultry farming has been a mixed blessing for the nation.

Nigeria Case Study

Nigeria, with a population of more than 124 million people, is another densely-populated nation located on the Gulf of Guinea. Like Ghana, Nigeria is facing steep declines in its terrestrial wildlife because of overexploitation for the bushmeat trade as well as declines in its marine life because of overexploitation of both marine and inland fisheries.

Nigeria and the Bushmeat Trade

Nigeria, like Ghana, has a long tradition of killing wildlife for bushmeat. The trade is highly commercialized and unregulated, with observers noting that animals are shot and sold with little respect for existing wildlife and hunting laws. (Anadu 1988) Villages and towns in close proximity to protected areas are especially reliant on wildlife for protein. One study focusing on the Cross River region in South-Eastern Nigeria estimated that in one year, about 76 carcasses/km^2 were killed in the region, primarily ungulates, rodents and small primates, though even some chimpanzee, gorillas, and forest elephants carcasses were also recorded. This estimate was thought to be lower than the actually quantity, since the study was based on carcass counts at markets, and an unknown but likely significant quantity of carcasses are consumed by hunters and their families before reaching the market. The study also found that the distance to the main national park in the region, Cross River National Park, was inversely correlated with the quantity of bushmeat carcasses collected per inhabitant. Consequently, many species of

larger mammals in the park are seriously threatened and some animals, including the elephant, drill and red colobus monkey, may have already been seriously reduced. (Fa et al. 2006)

Nigeria and Fisheries

The people who live in Nigeria's coastal states, such as the Ilage people in Ondo state, have been depending on marine fisheries for animal protein for centuries. Yet over-exploitation threatens the reliability of many of the marine and inland fisheries, such as shrimp, that have been a mainstay of the Nigerian economy. The over-exploitation of fisheries resources in Nigeria, like Ghana, has been enabled by lack of an operational fisheries patrol and weaknesses in prosecuting violations of fisheries regulations. According to the FAO, "the output level of the shrimp fishery [is] considerably beyond the potential long-term yield estimates." Rising fuel costs are another factor that could limit the profitability of Nigeria's commercial fishing industry, given that the Nigerian government, along with a number of other West African governments, have discussed ending fuel subsidies. The over-exploitation of resources by the commercial fishing sector has had a negative impact on small-scale fishing industry in Nigeria since they often target the same species, and the trawlers frequently damage the small vessels' gear. (UNFAO 2008, 253-4)

The fishing sector in Nigeria also has to contend with the environmental impacts of the many oil companies operating in Nigerian waters who have reduced the health of the fisheries with their frequent oil spills. The environmental degradation caused by the oil companies has decreased fish catches along with income, with more than 90% of the people living below poverty level. (Abumuyi 2008)

Nigeria and Animal Agriculture

While animal agriculture remains largely extensive in Ghana, Nigeria has increasingly embraced industrial animal agriculture in response to expected declines in

the fisheries and bushmeat sectors. Nigeria is reported to have seven industrial poultry farms, with one of the largest, Obasanjo Farm, housing over one million birds. (BBC 2006) Some Nigerian agricultural experts view inadequate levels of animal protein in the diets of a large proportion of the Nigerian population as one of the country's greatest nutritional problems and have called on the government to subsidize the development of intensive animal agriculture. With the support of institutions such as the World Bank, Nigerian Federal Ministry for Women's Affairs and Social Development's Better Life Programme, and the United Nation Development Programme (UNDP), animal agriculture in Nigeria has rapidly intensified. Government-subsidized programs aim to "train farmers on improved and modern rearing and production methods of livestock." (Ojo 2003, 459)

The World Bank, through its Commercial Agricultural Development Project, has provided loans and capital grants of US$150 million to the Nigerian government in 2008 to "strengthen agricultural production systems and facilitate access to market for targeted value chains among small and medium scale commercial farmers" in 5 Nigerian states. Included in the targeted value chains are the poultry and dairy sectors. The grant was available to those who institutions conducting research to "support the adoption of known and superior technologies." Activities could have included "hatchery technology, processing, packaging, branding and quality control, and cold chains" for the poultry industry and "artificial inseminations, milking technology, milking processing, packaging, branding and quality control" for the dairy industry (World Bank 2008, 5)

Those who have supported subsidies to the industrial egg industry have touted the egg as the "perfect food" because of its affordability and "unsurpassed nutritive excellence" (Okpabio et al. 2007), though a 20 year long Physicians' Health Study published recently in the American Journal of Clinical Nutrition found that the consumption of 7 or more eggs per week was associated with a significantly greater risk of total mortality. (Djoussé and Gaziano 2008) Nigeria now has the largest poultry industry in West Africa, with a stock of 140 million chicks which produced 476,000

metric tons of eggs in 2004. Between 2003 and 2004, the industry's growth rate rose from .3% to 10.3%. (Akpabio et al. 2007)

This rapid intensification has not come without consequences. Ironically, in addition to the above mentioned $150 grants and loans for the support of animal agriculture in Nigeria, the World Bank also provided $50 million in 2006 to the Nigerian government to minimize the threat of the avian influenza virus after an industrial broiler (chicken meat) operation in the northern Nigerian state of Kaduna experienced a case of Highly Pathogenic Avian Influenza sub type H5N1. (World Bank Press Release 2006) The virus subsequently spread to 30 other chicken farms in the country, as well as to neighboring backyard flocks, requiring many small farmers to kill their birds. (Akpabio 2007, 298) Mr. Ehui, the World Bank's Sector Leader for Sustainable Development in Nigeria, defended the World Bank's support for Nigeria's poultry sector by claiming that strengthening the poultry industry would improve the livelihoods of many rural farmers, (personal comm. June 11, 2009), yet the outbreak reportedly led many of the country's poultry farmers into psychological breakdown as a result of the huge financial losses. (Akpabio 2007, 298)

This incident highlights the dangers of intensifying animal agriculture in Africa and throughout the developing world, where there is often inadequate levels of biosecurity. After the 2006 outbreak in Nigeria, local officials reported that the workers culling and disposing of the birds were not wearing protective equipment, increasing the chance of the spread of the virus to humans. (ENS 2006) There were also reports of desperate villagers collecting bird flu-infected chickens from burial pits. (Phillips et al. 2006) Nigerian authorities reportedly kept the existence of the bird flu strain secret for up to nineteen days before informing the public. (Sturcke 2006) Nevertheless, there have been calls for the Nigerian government to "institute far reaching measures to revamp the poultry enterprise industry in Akwa Ibom State and Nigeria." (Akpabio 2007, 298)

Agricultural research institutions in Nigeria, such as Obafemi Awolowo University's Institute of Agricultural Research and Training, are also promoting

industrial pig farming as a way to increase animal protein consumption. At the same time, some pig farmers in Nigeria are decreasing their stocks because of the scarcity and sometimes outright non-availability of raw materials for animal feed. Some Nigerian farmers have even withdrawn from pig production altogether because of the huge increase in their feed bills. Pig feed prices have escalated in recent years because of the increases in price of the raw materials of feed, including corn, guinea corn, groundnut cake, soybean products and fish meal. With the prices of many of these raw materials expected to continue to increase around the world, Nigeria's agricultural community should question whether the industrial animal farming is an economically sound model to pursue. (Adesehinwa 2008, 4798)

Another consequence of the increased amount of animal protein in Nigeria is the growing rates of obesity and diabetes. A 2008 study conducted by the Olabisi Onabanjo University Teaching Hospital screened 512 volunteers and found that two-thirds of them were overweight or obese. Dr. Olusegun Ajuwon, the Chief Medical Director of National Hospital in Abuja, recently stated that obesity was reaching an "epidemic level" in Nigeria. (Odeh 2008)

Chapter 3: Analysis

Nigeria and Ghana are two West African nations that have experienced sharp declines in their marine and terrestrial animal protein sources in recent decades. Both nations are struggling with poor nutrition and food insecurity and both have voices in their governments and agricultural communities that are calling for further investment in the industrial animal agriculture model. Nigeria is further along this path than Ghana, and has suffered from many more of the problems that accompany the intensification of animal agriculture, including the spread of deadly diseases like avian influenza and soaring feed prices. The agricultural community in Ghana could learn from the experiences of farmers in Nigeria and instead pursue the sustainable agriculture model as the means to increase nutrition, especially protein intake, and food security. This chapter will analyze some of the actions that policy makers in West African nations like Ghana and Nigeria, as well as decision makers in international agencies, NGOs and agricultural institutions, can implement to reduce the exploitation of marine and terrestrial wildlife and promote the development of sustainable agriculture.

Short Term Policy Actions

Many conservationists have called for more scientifically sound management of fisheries in West Africa. (Brashares et al. 2005) Yet even with more effective management, Rowcliffe et al. question the ability of the heavily depleted Gulf of Guinea to provide the people of Ghana with enough fish to meet the increased demand should the bushmeat trade be substantially reduced. While Rowcliffe et al. suggest that formalizing the bushmeat trade, which remains primarily artisanal and poorly regulated, could limit over-consumption, they recognize that lack of good governance and the low rates of implementation and enforcement of existing wildlife legislation lower the likelihood that effective management could mitigate the trade's impacts. (Rowcliffe et al. 2005) And conservationists such as Milner-Gulland and Bennett assert that even if bushmeat hunting were brought down to more sustainable levels, forests would not be productive enough to supply a significant quantity of protein to West Africa's growing population. (Milner-

Gulland and Bennett 2003**,** 354) While serious efforts to stop the decline in fisheries and terrestrial wildlife in West Africa may improve food security in the very short term, neither wildlife nor fisheries should be viewed as the solution to addressing West Africa's food security and nutritional problems in the coming decades. Clearly, alternatives to wild proteins must be found for the people of West Africa if a collapse of marine and terrestrial ecosystems is to be avoided.

Strategies to Improve the Health of the Fisheries and Wildlife Populations

Though it is unlikely that terrestrial wildlife and marine fish populations will recover to such an extent that these sources could provide a substantial quantity of protein to West Africa's growing population, a number of actions can be taken to prevent the collapse of these populations.

Bushmeat

Some conservationists and development experts have promoted increased foreign aid as a strategy to combat the bushmeat trade, believing that reducing poverty will decrease hunting rates. Yet, Bennett and Milner-Gulland assert that while poverty reduction programs targeted towards the rural poor may in the long term reduce bushmeat hunting, programs targeted towards urban areas may actually increase hunting levels because the demand for bushmeat frequently rises when African urbanites experience upward mobility. (Milner-Gulland and Bennett 2003, 351)

Instead, most conservationists agree that increasing the size and number of no-take protected nature preserves in West Africa could be one of the most effective means to further protect wildlife from the bushmeat trade and other threats. (Brashares et al. 2004, Milner-Gulland and Bennett 2003**,** FA et al. 2005) Additionally, they have called for international agencies and NGOs to help develop the capacity of West African governments to better safeguard wildlife and habitats within West Africa's protected areas. (FA et al. 2005)

Strengthening the legislation regarding the hunting of wildlife and enhancing enforcement can reduce the hunting of wildlife within and around protected areas. A bioeconomic analysis conducted in Ghana's Ashanti region found that an increase in the expected fine for hunting protected species and an increase in enforcement significantly lowered hunting effort. When the fine rate of 100,000 cedis on two vulnerable species was implemented and more dedicated enforcement increased the probability of detection at the point of sale, reductions in the hunting of these species were observed. (Damania 2005, 7)

Campaigns to educate the hunters and the buyers of bushmeat can also yield positive results in the short term. In Ghana, local NGOs, led by Conservation International, and traditional authorities joined together on an awareness campaign to reduce commercial hunting. The campaign emphasized the need to preserve Ghana's cultural heritage. The tactics also included educating citizens about existing wildlife laws and promoting discussion throughout the different levels of society about hunting and consumption of bushmeat. (Milner-Gulland and Bennett 2003, 355)

Fisheries

As there has been a 50 fold increase of EU fleets in the waters off West African coast since 1950, Brashares et al. call for legislation in West Africa to reduce access of the large and heavily subsidized foreign fleets. They also call on the EU to reduce their subsidization of European fishing fleets, which in 2001 amounted to more than $350 million. (Brashares et al. 2004) There are signs that the EU may be headed in this direction. Recently, the European Commission called for substantial reductions in subsidies to the EU's more than 90,000 fishing fleets, recognizing that such a move will be necessary to ensure the future productivity of fish stocks. Yet, the call for reduced subsidies and others policies to limit overfishing by European fleets have been met with strong protests by the fishing industries in Europe's key fishing nations, particularly France and Spain. Moreover, the Commission's proposals must be reviewed and

discussed by the industry, environmental groups and fisheries scientists before EU member states make any decisions on them, a process that is expected to take many years. (Casert 2009)

Even if the EU fishing fleets were to be reined in, the resulting reductions of foreign catches may not be sufficient to protect West Africa's fish stocks if West African commercial fleets were only to increase their catches. Brashares and his colleagues therefore suggest that the region work together on implementing intensive management to enhance fish stocks and stabilize harvests. (Brashares et al. 2004)

West African governments can also better manage the fisheries by increasing their enforcement capacity, with an emphasis on reducing the amount of pirate fishing vessels operating in nearby waters, nearly all of whom come from foreign ports. These pirate vessels land fish of high commercial value and dump 70-90% of the haul as bycatch. If West Africa's fisheries ministries increased policing of exclusive fishing zones and stepped up the enforcement of quotas, local fisheries would have a much greater chance of recovery. (Brashares 2004)

Long Term Policy Actions

Investing in Sustainable Agriculture

One of the most promising options in West Africa for increasing nutrition and food security is the development of sustainable agricultural projects, especially those that emphasize crop diversification. A recent UNEP report warned that up to 25% of the world's food production may become lost due to environmental breakdown by 2050 unless urgent action is taken. It pointed out that small and medium scale farmers in Africa have little opportunity to increase yields through conventional means because of the high price of inputs such as fertilizers and seed and therefore suggested that instead of simply focusing on increasing production and efficiency, farmers shift to more "eco-based" production. The report provides seven options for improving food security in

response to the potential for environmental breakdown, including "supporting farmers in developing diversified and resilient eco-agriculture systems that provide critical ecosystem services (water supply and regulation, habitat for wild plants and animals, genetic diversity, pollination, pest control, climate regulation), as well as adequate food to meet local and consumer needs. This includes managing extreme rainfall and using inter-cropping to minimize dependency on external inputs like artifcial fertilizers, pesticides and blue irrigation water and the development, implementation and support of green technology also for small-scale farmers." (UN 2009)

The implementation of sustainable agricultural methods has been occurring at modest levels in both Ghana and Nigeria. These projects have attempted to diversify the types of foods available to citizens, especially those in rural areas, so that nutrition and protein intake is enhanced.

In addition to increasing the sustainability of farming for domestic consumption, a number of projects are working to promote environmentally sound methods of farming cash crops such as cocoa. The Turing Foundation has provided € 66,000 to the Ghana Organic Agriculture Network (GOAN) for the promotion of sustainable cocoa production in the Eastern and Ashanti Region**.** The farming of cocoa has long been associated with deforestation and forest degradation in Ghana and throughout West Africa. In the two pilot projects in these areas, GOAN designed the cocoa farms to form a shield for several nearby forest reserves. The projects cover 2700 hectares and involve 1,600 farmers. (Turing Foundation 2009)

The sustainable agriculture movement, mainly supported by the NGO sector, is developing at a slow but steady pace and could benefit from increased funding by the government and the international community. Several sustainable agriculture projects have been financed by the international community and some have already shown success. A 2004-2005 project funded by the US Agency for International Development seeks to "to improve livelihoods in selected areas of Nigeria" by promoting agroforestry and "other sustainable land-use practices to further enhance on-farm productivity and

increase the area under community forest management plans in critical environments." (USAID 2004) Promoting Sustainable Agriculture in Borno State (PROSAB) NIGERIA, a project financially supported by the Government of Canada provided through the Canadian International Development Agency (CIDA), resulted in "new varieties of maize, sorghum, cowpeas and groundnut [that] have continued to maintain high productivity even under the poor weather conditions experienced in the 2007 cropping season." The data revealed that compared to the baseline data obtained in 2004, the project more than doubled agricultural productivity through the new crop varieties and management practices such as cereal-legume rotation system while reducing the hazard of Striga, a millet parasite, reducing soil degradation and improving environmental sustainability. (The International Institute of Tropical Agriculture 2008, 11)

Many in Nigeria would like to see the sustainable agricultural model more widely adopted. A 2007 editorial by This Day, one of Nigeria's major daily newspapers, called on policy makers to pass a bill in favor of organic farming, agroforestry (the inter-cropping tree seedlings with food and cash crops), crop rotation, and practices such as using crop residues, legumes, green manure, farm organic wastes, mechanical cultivation and aspects of biological pest control to maintain soil productivity and to control pests. (This Day 2007) In 2007, Nigerian President Olusegun Obasanjo announced plans to launch the Nigeria Organic Agriculture Network (NOAN) with the mission of encouraging Nigerian farmers to more widely adopt organic farming methods. (Daily Champion 2007)

Overcoming Barriers to Establishing Sustainable Agriculture

For sustainable agriculture to become a widespread and reliable source of food in West Africa, substantial institutional, policy, and professional reform is desperately needed. (Pretty 1999, 253) One of the largest problem facing proponents of sustainable agriculture in West Africa and across the globe is that agro-chemical, feed, and seed companies are well aware that they will be the losers if sustainable agriculture is successful and thus spend many resources lobbying governments so that they will not

loose their market. (Pretty 1999, 272) In addition, agrochemical subsidies create an uneven playing field for organic producers. (UNCTAD 2009) Another obstacle is that government officials in developing nations are often concerned that sustainable or organic agriculture projects will allow more local decision making by local communities and groups, which often results in reduced opportunities for rent-seeking and corruption. Additionally, organic agricultural methods are often absent in agricultural education, extension services, and research and development groups, most likely because research and extension agencies often oppose moves towards sustainable agriculture, as they may have to work more closely with farmers and learn new methods. (Pretty 1999, 272) To improve the chances of more sustainable agricultural practices developing in Africa, UNCTAD calls on the international community to increase financial support of African sustainable agriculture projects, reduce organic market entry barriers, and explore programs to provide compensation to smallholder organic farmers in Africa for carbon sequestration and other ecosystem services. (UNCTAD 2009)

Other Options to Increase Food Security and Nutrition in West Africa

Promoting Reduced Meat-Consumption in West Africa

A growing movement calling for the reduction of meat consumption has developed in a number of Ghana and Nigeria's urban areas. In the Livestock's Long Shadow Report, the UNFAO cited the growing rates of vegetarianism as a positive trend that may help reduce the pressure that livestock is putting on environmental services and grain supplies and prices around the world. (Steinfield 2006, 276)

On May 1, 2008, West Africa's first Vegetarian/Vegan library and resource center was opened in Accra by the Vegetarian Association of Ghana (VAG) on the premises of Assase Pa, the first vegetarian restaurant established in Ghana. According to VAG, the popularity of eating a plant-based diet has been steadily grown over the past few years in Ghana. They hope that the opening of the VAG Library will further raise awareness about vegetarianism in Ghana, where the public is increasingly conscious of health issues. (IVU 2008) The vegetarianism movement is also gaining a higher profile in

Nigeria, where the Nigerian Vegetarian Society hosted the 1st West Africa Vegetarian Congress in December 2007. (IVU 2009)

Reducing Waste

Throughout Africa, the post-harvest losses of food cereals are estimated at 25% of the total crop harvested. For some crops that are less durable than cereals, such as fruits, vegetables and root crops, post-harvest losses may reach 50%. In some regions of Africa, economic losses in the agricultural sector due to spoilage and waste could average as much as US $990 million/year country. Therefore, there is a tremendous opportunity to increase food security in Africa by increasing efficiencies on existing farms and processing centers. In Africa and many other developing nations, agricultural and food production losses are particularly high between field and market. According to the report, "governments can provide support and an enabling policy environment in terms of awareness raising, technology innovation and transfer, and agricultural extension to farmers" to reduce food wastes. (Nellemann et al. 2009, 29, 32)

Conclusion

The majority of people in Ghana, Nigeria and throughout West Africa are at the margins of the cash economy. They have over-exploited the regions' fisheries and wildlife because they have few alternatives for feeding themselves and earning an income. In response to these declining sources of protein, a variety of actors, including agricultural institutions, multilateral institutions, national governments, industry, and NGOs, have heralded industrial animal agriculture as a way to prevent wide-spread species extinction, improve nutrition and food security and improve rural incomes. These are all worthy goals, but these can be achieved through mostly plant-based sustainable and organic agriculture, an alternative agricultural model that does not so heavily degrade the environment, contribute to climate change, increase grain prices for the poor, cause extreme animal suffering, encourage the spread of zoonotic diseases, and increase rates of diseases of "affluence" such as diabetes and obesity as the industrial animal agriculture model.

The fact that many in the developed world are questioning the industrial animal agriculture model should serve as a warning to political, business, NGO and agricultural leaders in West Africa that this model is filled with dangers. In an era of raising animal feed and fuel prices, climate change, and increasing outbreaks of deadly zoonotic diseases, investing in mostly plant-based sustainable agriculture in the developing world rather than industrial animal agriculture is not only the more environmentally and socially just course of action, but also the most economically and politically sound. If sustainable agriculture can become widespread in West Africa, a healthier environment, food security, and high levels of nutrition can become not just a dream but a real possibility. The time to ramp up investment in sustainable agriculture in West Africa, where 43% of Africa's sub-Saharan population live, is now, before the industrial animal agriculture model becomes too entrenched and costly to walk away from, as it has in the Global North and in many other parts of the developing world.

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