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**NAVAL WAR COLLEGE
Newport, R.I.**

“OIL AND AGRICULTURE: CAN THEY MIX?”

by

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GS-14, USAF

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Paper Abstract

“OIL AND AGRICULTURE: CAN THEY MIX?”

According to the Fund for Peace, Nigeria is in the top 20 failing states. Though their nation is awash in oil, the citizens of Nigeria are among the poorest in Africa. In fact, Nigeria’s standards of living have actually decreased since the discovery of its vast petroleum wealth. However, Nigeria has the potential to revitalize its economy to become less dependent on oil for its revenues. One way to accomplish this is through revitalization of the nation’s agricultural industry. This paper will propose that the Government of Nigeria should implement and enforce a regulatory framework to revitalize the nation’s agricultural industry and support enhanced economic prosperity and stability in the country. The paper will briefly explore the history of agriculture in Nigeria, detail the challenges currently faced by the industry, address possible solutions, and consider alternate points of view. Finally, recommendations will be made with respect to implementation of this proposal.

“Nigeria, Africa’s most populous nation and the source of 8-11% of U.S. oil imports, has very recently experienced a significant decline in security, including a steep increase in the number of terrorist attacks by Boko Haram.... We seek to work with our Nigerian partners to strengthen their capability in civil-military affairs to facilitate interaction between military forces and civilians in northern Nigeria and to improve their ability to counter improvised explosive devices. These tailored efforts will enhance Nigerian capabilities to effectively provide security to the Nigerian people and to address conditions conducive to the growth of Boko Haram. The insecurity in northern Nigeria will not be solved solely by military action. An enduring solution will require addressing the underlying conditions which lead individuals to support Boko Haram.” Gen Carter Ham, U.S. Army Commander Statement before the House Armed Services Committee, February 29, 2012¹

INTRODUCTION

Though their nation is awash in oil, the citizens of Nigeria are among the poorest in Africa. In fact, Nigeria’s standards of living have actually decreased since the discovery of its vast petroleum wealth. Due to the preeminence of oil, a country once comprised of a multi-product economy is now becoming a mono-product economy. This trend is aggravated by the instability of oil prices, which in turn causes concern about the stability of the country. However, Nigeria has the potential to revitalize its economy to become less dependent on oil for its revenues. One way to accomplish this is through revitalization of the nation’s agricultural industry.

Once the cornerstone of the Nigerian economy, agriculture has been allowed to dilapidate into a shadow of its former self. With the discovery of oil in Nigeria, other economic sectors, to include agriculture, began to weaken in significance. The Government of Nigeria’s (GON) continued neglect of rural infrastructure and transportation is exacerbating agricultural deterioration. Unable to keep up food

¹ General Carter Ham, U.S. Army Commander. “Statement of General Carter Ham before House Armed Services Committee.” Written Statement before House Armed Services Committee, Washington DC, February 29, 2012, 8-9.

production to match its exploding population, Nigeria has now begun importing a majority of its food. The land tenure system also discourages farmers from increasing their crop capacity due to inaccessibility of financial credit. Today, the largest portion of the agricultural industry is subsistence farming and the GON's lack of funding and training for agricultural enterprise development are resulting in low agricultural productivity. In addition, the oil industry is degrading and damaging the agricultural industry through gas flaring and oil spillage and leakage. This paper will propose that the GON should implement and enforce a regulatory framework to revitalize the nation's agricultural industry and support enhanced economic prosperity and stability in the country. The paper will briefly explore the history of agriculture in Nigeria, detail the challenges currently faced by the industry, address possible solutions, and consider alternate points of view. Finally, recommendations will be made with respect to implementation of this proposal.

BACKGROUND

Nigeria was once one of the largest exporters of agriculture commodities before the oil boom of the 1970's and early 1980's. It was the mainstay of the Nigerian economy, contributing an average of sixty to seventy percent of GDP. The country was self-sufficient in food production with farmers producing enough food crops to feed the population and enough left over to export crops to help finance the country. When petroleum wealth was discovered, the windfall was invested in commerce, construction, and manufacturing not agriculture. This further exacerbated the decline of agriculture with the subsequent migration of people from the rural areas to urban sectors, seeking higher paying jobs. Nigeria has neglected

several areas of the agricultural industry resulting in a decline of the agricultural industry making this a nation dependent on imports for their food supply.²

DISCUSSION / ANALYSIS

“Oil fouls everything in Southern Nigeria. It spills from the pipelines, poisoning soil and water.”³

GAS FLARING AND OIL SPILLAGE OR LEAKAGE: Not so long ago, Nigeria was a breadbasket nation but with the discovery of petroleum this nation has declined into an economy dependent on oil revenue. This dependence is resulting in environmental degradation. Experts visiting the Niger Delta in 2006 estimate the figure for oil spilt, onshore and offshore, in the range of nine to thirteen million barrels of oil over the last 50 years.⁴ To put this into perspective, this equates to the Exxon Valdez spill every year for the last fifty years.⁵ In addition, when crude oil is brought to the surface there is also a gas brought to the surface.⁶ If the oil is produced in those areas of the world that lack gas infrastructure or a nearby gas market, a significant portion of the associated gas may be released.⁷ This releasing of gas is known as gas flaring.⁸ Nigeria has the second highest gas flaring rates and oil spillage or leakage in the world.⁹ This flaring is estimated to waste one-third of

² Abiodun O. Folawewo and Olakojo A. Solomon. “Determinants of Agricultural Exports in Oil Exporting Economy: Empirical Evidence from Nigeria.” *Medwell Journal*, 2010, 84-87.

³ Chizoba I. Okpara. “Right to a Clean and Healthy Environment: The Panacea to the Niger Delta Struggle.” *Journal of Politics and Law*, 2012, 4.

⁴ Amnesty International. *Nigeria: Petroleum, Pollution, and Poverty In The Niger Delta*. Professional Organization Report, London: Amnesty International Publications, 2009,16.

⁵ *Ibid.*, 16.

⁶ O.O.I Orimoogunje et al. “Perception on Effect of Gas Flaring on the Environment.” *Research Journal of Environmental and Earth Science*, 2010, 188.

⁷ *Ibid.*, 188.

⁸ *Ibid.*, 188.

⁹ Oluduro Olubisi Friday. “Climate Change – A Global and National Perspective: The Case of Nigeria.” *Journal of Politics and Law*, 2012, 34.

annual production and constitute more than two billion in lost revenue annually.¹⁰ The GON have numerous laws and regulations to regulate oil company activities and generally protect the environment, however, these regulations are not being enforced.¹¹ Enforcing existing regulations will prevent the oil industry from degrading and damaging the agriculture industry through oil spillage and leakage and gas flaring.

Section 20 of the 1999 provides” the state shall protect and improve the environment and safeguard the water, air, and land, forest and wild life of Nigeria.”¹² However, the GON are not ensuring the Constitution is being followed. A failure to address the long-term impacts on soil fertility and agricultural productivity is contributing to the decline of the agricultural industry. When oil spills on agricultural land, it is usually devastating. The existing crops rarely survive, and associated fires often increase the spread of damage.¹³ The long-term impacts from oil spillage or leakage can best be described by looking at Ebubu in the Niger Delta region. Although the exact date and the cause are a matter of controversy, sometime between 1967 and 1970 an oil spill occurred. Twenty years later a scientific study of the site found the area still unrecovered. The study found the site still seeping oil into the nearby river, and the ground still contained a burnt oil crust with vegetation

¹⁰ Lauren Ploch. *Nigeria: Current Issues and U.S. Policy*. Report for Congress, Congressional Research Service, 2012, 8.

¹¹ Okpara, “Right to Clean and Healthy Environment”, 5.

¹² Friday, “Climate Change – The Case of Nigeria”, 33.

¹³ Amnesty International, *Nigeria: Petroleum, Pollution, and Poverty In the Niger Delta*, 30.

not fully recovered. Today this same site, forty years later, has still not been adequately cleaned up.¹⁴

Gas flaring is another example where dependence on petroleum is resulting in environmental degradation. Gas flaring has been illegal in Nigeria since 1984 (United Nations Development Programme 2012), with the Associated Gas (Re-Injection) Act.¹⁵ However, the act contains a provision that grants the GON authority for exemptions and current fines are too small to be a deterrent.¹⁶ Gas flaring, a major source of environmental degradation, impact the agricultural industry through both acid rain and water pollution.¹⁷ Gas flares in Nigeria are said to release forty-five point eight billion kilowatts of heat into the atmosphere daily resulting in raised temperatures and rendering large areas uninhabitable.¹⁸ The process of flaring gas releases carbon and other gaseous substances, serious implications for Nigeria and the rest of the world.¹⁹ Acid rain, a byproduct of gas flaring, is resulting in soil fertility loss and damaging crops.²⁰ Studies of soil in areas where gas flaring is occurring show the soils are losing productiveness and capacity for continued agriculture due to the acidification of the soil.²¹ Gas flare sites produce residue which accumulates on buildings, when it rains this residue runs into water aquifers and pollutes the water.²² These environmental degradations have already resulted in depleted areas

¹⁴ Ibid., 30.

¹⁵ *Gas Flares Still A Burning Issue in the Niger Delta*. March 8, 2012.

<http://search.proquest.com/docview/927608542?accountid=322> (accessed October 19, 2012).

¹⁶ Ibid.

¹⁷ O.Saheed Ismail and G. Ezaina Umukoro. "Global Impact of Gas Flaring." *Energy and Power Engineering*, 2012, 292.

¹⁸ Ibid., 293.

¹⁹ Orimoogunje et al, "Perceptions of Gas Flaring", 188.

²⁰ Ibid., 188.

²¹ Isamil and Umukoro, "Global Impact of Gas Flaring", 292.

²² Ibid., 292.

of Nigeria, unable to sustain any type of agricultural industry. If the GON continues to allow oil spillage and gas flaring, these depleted areas will grow exponentially decreasing the potential for a revitalized agricultural industry.

“The poor state of roads slows down the development of supply systems and food distribution. It is common to see trucks conveying perishable produce breaking down and remaining in that state for from three days to a week without removing the produce. In cities like Jos, Kano, and Lagos, piles of spoiled fruits tell the tale of the ineffectiveness of the transport system.”²³

INFRASTRUCTURE AND TRANSPORTATION: Another area that is contributing to the decline in the agricultural industry is the GON’s continued neglect of rural infrastructure and transportation. A majority of Nigerians live in rural areas and are engaged in agriculture and agriculturally related activities.²⁴ Since the early 1980’s, there has been a collapse of basic infrastructure in the rural areas of Nigeria.²⁵ Transportation activities, including rail, road, water and air transport, only receive about three percent of the Gross Domestic Product (GDP).²⁶ Restructuring regulations to improve the rural infrastructure and transportation will preclude the continued deterioration of the agriculture industry.

The road and railway system are dilapidated and require a significant investment.²⁷ Lack of maintenance over the years has further worsened the condition of the roads such that the cost of necessary repairs now requires three to

²³ B.A. Oyewole and SA Oloko. “Forum for Agricultural Risk Management in Development.” Forum for Agricultural Risk Management in Development. April 2006. <http://www.vri-online.org.uk/ijrs/April2006/Nigeria%20-%20the%20way%20out.pdf> (accessed October 19, 2012).

²⁴ Umar AdamuMadu. “Rural Infrastructure: A Pathway for Sustainable Agricultural Development in Nigeria.” *International Journal of Social Science Tomorrow*, 2012, 1.

²⁵ U.S. Department of State. *Country Fact Sheet – Nigeria*. Washington DC: Bureau of African Affairs, 2012, 11.

²⁶ Nigeria National Bureau of Statistics. National Bureau of Statistics. <http://www.nigerianstat.gov.ng/sectorstat/sectors/Transport> (accessed October 20, 2012).

²⁷ Oyewole and Oloko, “Agriculture and Food Losses in Nigeria”.

five times the funding that preventive maintenance would have cost.²⁸ According to the World bank, the saving of one dollar on road maintenance increases the cost of operating vehicles on that road by two or three dollars.²⁹

In addition to the deplorable road conditions, conditions of the vehicles “hurtling at excess speed from pothole to pothole, overloaded with human and other cargo, a frequent and sometimes fatal recipe for disaster” decrease the efficient flow of agricultural produce.³⁰ Also in many cases, farmers are unable to transport their product due to inaccessibility of roads, especially during the rainy season.³¹ A study of Ekiti State in Nigeria surveyed eight areas of infrastructure: roads, health centers, market centers, water supply, electricity supply, banks, communication gadgets, and education.³² The study found the level of infrastructural availability in the study areas to be extremely poor and requires urgent rehabilitation and construction.³³

Rail transport is usually the lowest cost method of land transport. The Nigerian railways have been relegated and sidelined to encourage privately owned long haulage transport services growth.³⁴ This has resulted in the Nigerian Railway Corporation becoming a lame duck with total reliance on the Government.³⁵ The

²⁸ Ibid.

²⁹ Ibid.

³⁰ Ibid.

³¹ Ibid.

³² B. Segun Fakayode et al., “An Economic Survey of Rural Infrastructures and Agricultural Productivity Profiles in Nigeria.” *European Journal of Social Sciences*, 2008, 144.

³³ Ibid., 154.

³⁴ Nigeria National Bureau of Statistics, National Bureau of Statistics.

³⁵ Ibid.

long haul transport services are disorganized and unregulated, causing increased traffic congestion and worsening environmental pollution.³⁶

Poor road conditions, limited rail service, bottlenecks, and informal checkpoints all contribute to reducing agricultural production and competitiveness in Nigeria.³⁷ Farmers need better access to transport their product quickly and cheaply to the point of sale or storage.³⁸ Increased market access will boost yields and provide incentives to increase production, supporting transformation from subsistence farming to a viable agricultural industry.

“Control over land is crucial for smallholder farmers. In sub-Saharan Africa family holdings pass from one generation to the next with ill-defined rights of tenure, leaving smallholder farmers vulnerable to dispossession and exploitation... Large scale investments may displace people without consultation or adequate compensation.”³⁹

LAND TENURE: The land tenure system is an additional challenge facing the agricultural industry in Nigeria. It discourages long-term investment and encourages substandard production methods. Control of land for smallholder farmers is crucial as continued deficiency in financial assistance discourages farmers from remaining in the agricultural industry. Eighty percent of the agricultural output is produced by farmers who live on less than a dollar a day and farm less than one hectare of land.⁴⁰ The banking sector provides little rural credit.⁴¹ Consequentially farmers are at increased financial risk. Restructuring land tenure regulations would encourage

³⁶ Ibid.

³⁷ USAID/Markets. “Why Does Nigeria Import Rice?” *Nigeria’s Harvest Market AgBiz Update*. July 17, 2009.

³⁸ United Nations Development Programme. *Africa Human Development Report 2012: Towards A Food Secure Future*. Professional Report, New York: United Nations Publication, 2012, 3.

³⁹ Ibid., 6.

⁴⁰ Michael David, *Agricultural Finance and Development Gain Report*. Washington DC: Department of Agriculture: Foreign Agriculture Service, 2011, 1.

⁴¹ U.S. Department of State, *Country Fact Sheet – Nigeria*, 12.

long-term financial investment and availability of rural credit, increasing agricultural productivity.

The Land Use Decree was approved in 1978, vesting all rural land to fall under the appropriate government. As a result of this decree, the allocation of land is highly contingent on state and local government officials and politicians subsequently most land is owned by villages, kinships, or other groups, not by individuals. In order to obtain a Registration of Certificate of Occupancy, it requires excessive time and financial investment. In addition, even after receipt of the certificate, the rights have no foundation in communal land holdings and no assumption of inheritance.⁴² Without clear title to land, access to formal credit is restricted. The Governor of the Central Bank of Nigeria is quoted to have said, “Currently agriculture accounts for forty percent of the GDP, yet it receives only one percent of total commercial bank loans.”⁴³ Only about 35% of Nigeria’s economically active population (does not include the subsistence farmers, which would drive this number even lower) have access to formal financial credit.⁴⁴

The land tenure system is also a deterrent for long-term investment and improvement of land quality.⁴⁵ Without land ownership, there is no incentive for farmers to do any improvement to the land, such as install or maintain irrigation systems, improve production technologies, or build storage facilities. What credit is

⁴² United States Agency for International Development. *Property Rights and Resources Governance - Nigeria*. Country Profile, Washington DC: U.S. AID, 2010.

⁴³ David, *Agricultural Gain Report*, 1.

⁴⁴ *Ibid.*, 8.

⁴⁵ Dayo Phillip et al. *Constraints to Increasing Agricultural Productivity in Nigeria*. Nigeria Strategy Support Program Background Paper No. NSSP 006, Washington DC: International Food Policy Research Institute, September 2009, 5.

available to the farmer is typically on a short term basis, not even covering a planting cycle, with immediate fixed repayment schedules not suitable for annual cropping.⁴⁶ Farmers have turned to informal, rural financial institutions for credit, such as savings and credit associations, money lenders and daily savings or itinerate banking.⁴⁷ The results of this can be devastating, with interest rates in the neighborhood of three hundred percent per year.⁴⁸ Access to reasonable credit, in order to expand operations and increase productivity, is needed, and the current land tenure system is a key inhibitor.

“We need fertilizer and other farming inputs to boost yield, I have heard from neighbors that fertilizer is very good and I want to start using it too, but I am constrained by finance.” Farmer in Chanchaga village, Niger State, Nigeria⁴⁹

AGRICULTURAL ENTERPRISE DEVELOPMENT: Finally, the consistent underfunding of the agricultural enterprise development is hindering the capability of the agricultural industry to increase its yields. Agricultural production accounts for more than one-third of Nigeria’s GDP and employs more than two thirds of the workforce.⁵⁰ Nigeria was a large net agricultural exporter before the advent of oil in the 1970’s.⁵¹ In 2010, agricultural imports totaled \$3.7 billion while exports were only about \$600 million.⁵² Poor farmer extension services are resulting in nonproliferation of modern production methods, and limited access to fertilizer and modern seed varieties are resulting in low-yield crops. If regulations are

⁴⁶ Ibid., 3.

⁴⁷ David, *Agricultural Gain Report*, 7.

⁴⁸ Ibid., 7.

⁴⁹ PrOpCom. Making Fertilizer Markets Work for the Poor in Nigeria. Case Study, Nigeria: UK Department of International Development, 2011.

⁵⁰ U.S. Department of State, *Country Fact Sheet – Nigeria*, 11.

⁵¹ David, *Agricultural Finance and Development Gain Report*, 1.

⁵² Ibid., 2.

restructured, the GON could reallocate revenue to fund agricultural enterprise development, increasing agricultural productivity.

Nigeria has great potential to expand and increase productivity and production yield by using science-based technology, fertilizer, improved seed, and crop protection products.⁵³ Recent research shows that a one percent growth in agricultural yield reduces the percentage of people living on less than one dollar per day by as much as one point two percent.⁵⁴ An increase in productivity can raise the incomes of millions of small-holder farmers.⁵⁵

Nigeria's consumption of fertilizer is seven kilograms per hectare, compared to India's rate of one hundred twenty-one or Pakistan's one hundred eighty-four kilograms per hectare.⁵⁶ When fertilizer is available, the farmers do not have access to the proper application methods. A survey showed fewer than eighty percent of extension agents were able to provide information on fertilizer for three crops even when they were allowed to pick the crops.⁵⁷

Information is a key ingredient in agricultural development programs, but Nigerian farmers seldom feel the impact of any agricultural innovations due to ineffective linkages between research and development and the farmer.⁵⁸ There are a disproportionate number of agricultural extension worker to farmer ratios that negate the ability for the extension agents to provide in-person services, which are

⁵³ O.E. Ayinde, M.O. Adewumi, and F.J. Omotosho, "Effect of Fertilizer Policy on Crop Production in Nigeria." *The Social Sciences*, 2009,53.

⁵⁴ *Ibid.*, 53.

⁵⁵ United Nations Development Programme, *Development Report 2012*, 1.

⁵⁶ Afua B. Banful, Ephraim Nkonya, and Victor Oboh, *Constraints to Fertilizer Use in Nigeria*. IFPRI Discussion Paper, Washington DC: International Food Policy Research Institute, 2010, 1.

⁵⁷ *Ibid.*, 13.

⁵⁸ M.J. Koyenikan, "Issues for Agricultural Extension Policy in Nigeria." *Journal of Agricultural Extension*, 2008, 53.

critical to convince generational farmers to modernize their farming methods.⁵⁹ The methods of information dissemination are not tailored to the needs and relevancy levels of the farmers and have limited applicability.⁶⁰ The agricultural staff also lacks access to adequate training supplies, transport facilities, and input supply such as visual aid equipment and training material.⁶¹

Women play an active role in the agricultural industry in Nigeria; however the extension service is made up of predominately male workers.⁶² The northern portion of Nigeria is predominately Muslim and has strict rules for communications between women and men. This has implications for availability of services provided especially in northern Nigeria where social norms limit women's interaction with males.⁶³ Without women in extension services, messages will not reach a majority of the agricultural population.⁶⁴ The Agricultural Enterprise Development is the link between modern farming technologies, research and development and methods to improve yield but chronic underfunding have resulted in an impotent program.

COUNTER-ARGUMENT

A potential alternate view point is for the GON to grant economic autonomy to states to run their economies without depending on the federal government for revenue.⁶⁵ This would set an environment for the market forces, including the agriculture industry, to spur economic activity. It would shift the power closer to the

⁵⁹ Ibid., 53.

⁶⁰ Ibid., 53.

⁶¹ Ibid., 53.

⁶² Banful, Nkonya, and Oboh, *Constraints to Fertilizer Use in Nigeria*, 7.

⁶³ Phillip et al, *Constraints to Increasing Agricultural Productivity in Nigeria*, 3.

⁶⁴ Banful, Nkonya, and Oboh, *Constraints to Fertilizer Use in Nigeria*, 7.

⁶⁵ Akpan H. Ekpo, *Tell Nigeria's Independent Weekly*. April 20, 2012

http://www.tellng.com/index.php?option=com_k2&view=item&id=1307:fiscal-federalism-and-nigeria's-revenue-sharing-wahala&Itemid=165.

people and hold elected officials more accountable. Currently, Nigeria has an oil revenue sharing system with more than half of the revenue going to the federal government and the remaining split between the state and local government. This “free” money into the state and local governments have moved the state and local governments from revenue oriented to expenditure oriented. When “free” money is no longer available, this will establish a forcing mechanism for the state and local governments to develop revenue-based economies and will also provide them with more control.

The Nigerian economy relies heavily on the oil and gas sector, with eighty percent of government revenues and ninety five percent of export earnings coming from this sector.⁶⁶ While granting autonomy to states could help with a potential revival of economic activity, the agricultural industry will still be hampered by poor infrastructure, the land tenure system, and the damage and degradation of the environment from the oil industry. This could also increase the risk of instability in the nation due to the impacts the non-oil producing states would experience until they could develop sources of income. In a country that is already experiencing massive poverty and economic disparity, eliminating revenue sharing is not currently viable.

CONCLUSIONS

According to the Fund for Peace, Nigeria is in the top 20 failing states.⁶⁷ Increasing levels of violence and security concerns along with abject poverty and large unemployment rates have aggrieved the people of Nigeria. The discovery of

⁶⁶ Ploch, *Current Issues*, 5.

⁶⁷ The Fund for Peace, *Failed States Index 2012*. Professional Report, Washington DC: The Fund for Peace Publication, 2012.

oil has exacerbated these issues. There is a need by the GON to understand and genuinely address the grievances of the population. While oil is the main revenue for the government, it only supports a small portion of the population.

In order to increase stability in Nigeria, the GON should reinvigorate the agricultural industry. The GON should stand firm on a commitment to agricultural growth by strengthening and restructuring existing regulations. Successive Nigerian governments have continually pronounced public support to agricultural and rural development, with little action occurring. Commitments to decreases in environmental damage and subsequent cleanups, infrastructure development plans, and government expenditure on agricultural policies and services have fallen short in execution.

RECOMMENDATIONS

While current regulations prohibit the practice of gas flaring in Nigeria, escape clauses and insufficient fines delegitimize the regulations. A recommendation would be for the GON to amend the Associated Gas (Re-Injection) Act to eliminate the exemption clause and increase the noncompliance fines to a level sufficient to drive the oil industry to begin capturing the gas. In addition to improving the environment, capturing the gas will improve revenue for the GON and increase utility functions in the country. With the capturing of gas, the GON will see increased revenue as well as decreased effects of climate change, acid rain and water pollution.

Oil spillage or leakage is damaging the environment and is against the Constitution of Nigeria's promise to protect and improve the environment. The GON should enforce the regulations already enacted to stop additional damage to the

Niger Delta. In addition, the GON should increase fines to the oil companies at a level adequate to discourage continued spillage or leakage and to pay for cleanup of current damage. This will allow the GON to address the long-term impacts of soil fertility and agricultural productivity.

The current policies of the GON are exacerbating the deterioration of infrastructure in the rural areas of the country. Lack of roads, rail systems, and other infrastructure is detrimental to the continued growth of the agricultural industry. The GON should prioritize funding for infrastructure to reduce transportation costs for agricultural products. Improved infrastructure will increase the efficient flow of agricultural produce, decrease the amount of spoiled production, and drop the amount of traffic congestion. This will also lower the cost of product to market improving exportability of the products.

An additional recommendation for the GON to revitalize the agricultural industry is to address the Land Tenure Act to improve the availability of credit to the agricultural industry. Growth will stagnate without access to credit with acceptable timelines and terms. While this solution will take time, a short term solution that provides financing to encourage long-term investment for land improvements for irrigation systems, modern production technology, and storage facilities is imperative.

Finally, the GON should look at its policies and investments in order to support the agricultural industry. Government subsidies for fertilizer and balancing inputs such as irrigation systems, rural credit, and fertilizer-responsive crop varieties,

along with increased support of extension services, will help to revitalize and sustain the agricultural industry.⁶⁸

⁶⁸ United Nations Development Programme, *Development Report 2012*, 72.

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