

Emily Robb

Vincent Massey High School

Brandon, MB

Nigeria: Sustainable Agriculture

Nigeria: Implementing Sustainable Agricultural Practices to Compensate for the Rising Population

In our growing world, agriculture is becoming more extensive as development and urbanization of Earth continues and food requirements increase. Unfortunately, some of the most agriculturally driven countries lack sustainable practices in growing or harvesting food, thus leading to a degradation of the environment, the quality of the harvest, and the amount of yield. The way that Nigerian agriculture and the country demographics function is closely related to sustainability problems that the country faces. With the change from current agricultural operations to more reliable, environmentally friendly, and more sustainable methods, these problems could be solved over time.

Nigeria is in Africa and is the 7th most populated country on Earth with 190.9 million citizens. Population increases bring food security related issues (Ufiobor, 2017, p. 11). The population is 50.2% urban. Nigeria, a federation, is lead by a democratically elected president. It shares political borders with Chad, Cameroon, Niger, and the Republic of Benin, and borders water bodies including Lake Chad, the Gulf of Guinea (Atlantic Ocean), the Niger River, and River Benue. Nigeria has topographical highlands and plateaus, found in the African tropics.

Four climate types influence Nigeria (“Geography of Nigeria”, 2018). The monsoon climate covers southern Nigeria, accessing water from the ocean and providing 4000 millimeters of rainfall annually. The temperature is consistently 27°C. The tropical savanna climate covers most of Nigeria and borders the monsoon climate. Temperatures will dip to 18°C, but can reach 37°C. To the North, the Sahel climate can reach 40°C. The highland climate covers the northern-most area of Nigeria, and is brisk due to elevation.

Nigerian crops include beans, rubber, cashew nuts, and kolanut. Palm kernels and oil are harvested, and bananas/plantains grow (“Agriculture in Nigeria”, 2018). Agricultural land uses 78% of Nigeria (“Nigeria - Agricultural land (% of land area)”, n.d.). Family farms are 0.85 hectares on average (“FAO.org”, 2013), but can reach 1.7 hectares (each hectare worth \$2,870 for food production). Cash crop farms are 14.7 hectares in size. Nigeria mainly exports crude oil/petroleum, petroleum gas, and minerals. Agriculture accounts for 21% of Nigerian GDP (“Nigeria GDP – Composition By Sector”, 2018). Transport and services provide 60% of GDP, with the rest coming from mining or construction.

Nigerian families include 4 to 5 people on average (NPC & ORC Macro, 2013, p. 19). Half of Nigerians use pit latrines, or no waste removal facility (NPC & ORC Macro, 2013, p. 13). Families live in duplexes/townhouses. Rural families use mud or wood houses with roofs made of palm leaves (“Nigerian House Types”, 2018). Many Nigerians are farmers, and they will earn roughly \$10,000 annually (dependent upon on farm size). Agricultural engineers earn \$60,000 yearly (“10 Most Sought After Jobs in Africa”, 2018). Infrastructure workers are valued and earn \$55,200 annually (“10 Most Sought After Jobs in Africa”, 2018). Transport/logistics workers make \$49,200 annually.

Nigerian education cannot match population increase. Children lack education due to cost, religious beliefs, pregnancies, and early marriages (NPC & ORC Macro, 2013, p. 28). Teachers lack training and government funding is deficient. Only 20% of students finish primary school. Children of wealthy families lack education, as 22% of females and 14% of males living in cities lack education. More drastically, 54% of females and 40% of males living in rural areas lack education (NPC and ORC Macro, 2013, p. 25).

Nigerian healthcare is poor. Medical supplies are in deficit; hygiene is questionable. The deficit of doctors/trained physicians worsens healthcare (“Healthcare in Nigeria”, n.d.). There are four doctors for every 10,000 people in Nigeria. Universal healthcare is an idea, but funding is poor. Healthcare is unaffordable for many, being pay-for-service, making it less attainable for the majority (Okpani & Abimola, 2015).

In Nigeria, yams are often prepared and are boiled or spiced for meals (“Food in Nigeria - Nigerian Food, Nigerian Cuisine”, n.d.). Fish are caught as well and used in stews. Fire cooks food when electricity is not available; half of Nigeria can access electricity (NPC & ORC Macro, 2013, p. 14). Nigerian food quality is substandard (Ufiobor, 2017, p. 13). Water comes from tube wells or boreholes, or unprotected wells and surface water sources (NPC & ORC Macro, 2013, p. 12).

Sustainability in agriculture revolves around 3 key items: sustainability in ecology, sustainability in the economy, and social sustainability. It also includes the requirements that your waste will be reduced, and that less damage is done to land. These factors combined are utilized to compose sustainable agriculture. So, to actually make an agricultural operation sustainable, these measures must be put in place. However, a lack of development in social, economical, and ecological advances leads to the fact that agricultural practices in Nigeria are not sustainable (Ufiobor, 2017, p. 6). As more people move into urban areas, fewer people pursue a farming lifestyle or choose to be agriculturally educated. Therefore, less people are producing food. Urban citizens rely on the rural population for their food, but the rural is unable to provide. A decline in sustainable practices occurs as urbanization continues. If nothing changes, Nigeria will end up in a severe food crisis, as they are already unable to feed the people.

The environment is severely affected by farming practices utilized in Nigeria; soil erosion is a serious issue that is faced. Inadequate road construction and poor maintenance systems on farms will lead to the soil erosion and the degradation of land potential (Ufiobor, 2017, p. 13). When the soil is worked so that it begins to lose its natural nutrients, growing plants will not reach their genetic potential yield wise, meaning less food being produced overall. Additionally, urbanization causes clearing of native forests to be converted into agricultural land, leading to deforestation, and fewer wind breaks in the country. This can also lead to growth of the Sahara Desert, making land unfarmable.

The majority of Nigeria is composed of youth, meaning that food security issues that arise will target them first, as opposed to adults and the elderly. Though both the elderly and adults require food, the need is not as dire compared to children. Children are growing at the fastest rate that they ever will in their lives, and they are developing skills that will be utilized everyday. If their bodily functions cannot be supported by nutritious food, they may become malnourished, and, in extreme cases, may perish. Many children are born into the Nigerian population, and they require nutrition to reach necessary developmental milestones.

There is a program in Nigeria that is designed for the growing population to promote sustainable agriculture. It is called the Youth Initiative for Sustainable Agriculture, or YISA. From projects related to environmentally sustainable agriculture to agricultural reorientation programs, YISA can help Nigeria (“Two Current Programs for Sustainable Agriculture in Nigeria”, 2018). This promotes sustainable

agriculture within Nigeria, but only works to an extent, relying on the interest of those who take part. Therefore, the message that is being conveyed may not always be applied.

To solve the sustainable agriculture deficit within Nigeria, and restore food security, multiple approaches could be implemented to stop these issues. One solution that may provide the best effect is the utilization of aquaponics. Aquaponics requires an aquaculture system where wastes of fish, or other aquatic creatures, are used to give nutrients to plant growth. Plants filter out the water, leaving it clean for the fish. The fish will continue to produce nutrients for the plants, making a symbiotic relationship on a plant-fish spectrum. Practices like this are used within Canada to provide food to many when there are inadequate amounts already. Operations in Mississauga, ON, and Churchill, MB, utilize aquaponic systems to grow food for foodbanks and community use (“Canada’s First Aquaponic Food Bank”, n.d.).

Aquaponics is supposedly the most sustainable method of agriculture that exists today (“7 Ways Aquaponics is Sustainable”, 2019). The usage of an aquaponics system is environmentally sustainable as the usage of water is low overall because water continually circulates, unlike water used on a traditional field. Up to 80% less water can be used in this system due to recirculation (“What is Aquaponics?”, n.d.). Water could be sourced from the monsoon climate region of Nigeria. The power uptake is low too, if any usage even occurs; power usage depends on how an aquaponics system is set up. Overcomplication is not required, and a system could be as simple as putting a flotation device above a water body populated with aquatic animals and allowing the roots of plants to remain suspended in said water.

Few things are required to maintain an aquaponics system, and it does not destroy the land. An aquaponics system is a closed system, and none of its contents will leach into the environment (“What is Aquaponics?”, n.d.). Aquaponics systems are easily adaptable to the elements of the environment. Fertilizers, chemicals, pesticides and synthetic materials are not used in aquaponics (“7 Ways Aquaponics is Sustainable”, 2019). There is no chance of chemical leaching or corruption. Only a semi-watchful eye is necessary in running an aquaponics system. This is due to the fact that aquaponics systems correct their own imbalances often. The pH, for example, is corrected without buffers. Regardless of what you use to “feed” your aquaponic system, which commonly only consists of water and fish food, plants germinate, thrive, and provide food with minimal effort. After a crop has been harvested, turn around time between growing periods is often five times faster than conventional agriculture (“7 Ways Aquaponics is Sustainable”, 2019).

Perhaps one of the most sustainable advantages to an aquaponics system is that you grow and harvest both plants and fish simultaneously (“What is Aquaponics?”, n.d.). Plants in an aquaponics system mature to be much more bountiful than crops grown in soil, and they often mature in fewer days, meaning that a larger yield is grown in less time. Leafy and fruit-bearing plants can be grown side by side, which means that crop rotations are not necessary (“What is Aquaponics?”, n.d.). Overall, this allows for the highest possible yield in the smallest possible space.

The only downside to this is the fact that the initial cost can be high, and it may not seem worth the investment at the time (Chiang, 2009). Depending on the system that you choose to implement, costs will vary. The most reasonable system to implement in Nigeria would be a deep-water culture system, a wick system, or a nutrient film technique system due to their simplicity and low maintenance (“6 Different Types of Hydroponic Systems”, 2019).

A deep-water culture system involves the suspension of plant roots in a water body. A wick system pertains to the utilization of a material that carries water to the roots of a plant without submerging the plant itself. A nutrient film technique regards the usage of channels, similar to garden rows, where water constantly circulates with the help of gravity (one end of the channel is higher than the other). None of these are necessarily the cheapest to implement, but the investment is worth it due to the harvest that will

continue for years (Chiang, 2009). Any system allows direct access to nutrient solutions in the water, meaning that the plants will take up the nutrients and become nutritionally valuable.

The Food and Agriculture Organization of the United Nations (FAO) could offer help in order to implement such systems with the most agricultural insight along with their vast collection of agricultural statistics. This group would provide major insight regarding introductions of what the system is, training necessary to understand and utilize a system, and what the greater benefit of the system is. For the 2018-2019 year, the total FAO budget is set to be 2.6 billion USD (“FAO.org”, 2017). The majority of funding comes from voluntary contributions, or from partner organizations. A separate organization, WE Charity, could be able to offer help for implementation. Organizations such as WE Charity focuses on developmental approaches in areas of education, food, opportunity, and water. Physical implementation of the system could be overseen by WE Charity. Furthermore, ME to WE provides the majority of funding towards WE Charity (“Financial Reports”, n.d.). In 2018, the spending budget of WE Charity was roughly 42.5 million USD (“Financial Reports”, n.d.). Between the organizations, WE Charity would be the main cooperator of the implementation operation due to their willingness, flexibility, stamina, and ethics. If the sole focus of one of these organizations was to implement aquaponic systems in Nigeria, funding and help would be sufficient. After implementation is successful, the running of the systems for a somewhat extended amount of time will earn income and can be treated as a business venture that will pay for itself, rather than a last resort food source. However, if it cannot reach this stage, the environment will be preserved. Charitable dollars will only be required during the initial start-up (the profitable aspect may also help Nigeria’s agricultural economy as well as the extreme poverty rate).

Implementation would rely on farmer compliance. Systems would become situated on their land and they would care for them. The systems would be implemented to the farmland that is closer to major water sources, before they begin being built on the farmland of drier climates. Implementation closer to urban centres will allow for easier upkeep and access, but rural is just as feasible if the farmer compliance is present. In addition to that, small scale operations would be easier to maintain if every farmer wishes to keep their own revenue and grow their own food, though large scale operations are possible if a group of farmers were to work together in maintenance (large scale options would offer greater employment opportunities). The cultural norms in the area may include traditional farming. Instead of harvesting fish from an aquaponics system, catching may be preferred. The organizations that are performing implementation would describe thoroughly and in detail to farmers what the system really is and what it will do for agriculture in the country, including proper care. The agricultural sector of the government could provide insight if necessary (provides income, protects environment, grows nutritious food quickly and efficiently). Once the farmers learn what aquaponics can do for them and their country, they will wish to sustain the system for as long as possible.

If one of these modern practices is carried out and achieved within Nigeria, most of the food security and sustainability issues could be eliminated over time. Although the current demographics reflect poorly upon the country itself, they can be altered in a positive way with the implementation of more sustainable ideologies. Perhaps in fifty years time, several countries including Nigeria will have adopted a sustainable way of living, and all issues related to food security will have subsided.

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