Table 5: Proposed plants.

No.	Name of company	Project information	Budget
1	Jigawa, Benue, Anambra and Ondo States	Integrated bio-ethanol refineries and sugarcane farm	US$4 Billion
2	Nasarawa state	Integrated bioethanol refinary and cassava farm	US$27 Million
3	Casplex	Ethanol refinery and cassava farm	NA
4	Akoni	Ethanol plant	NA
5	Ekiti state	Integrated bioethanol refinary and cassava farm	US$100.7 Million

NA: not available.
Source: Agbola et al. [79].

total nitrogen available for crops varied from 0.9 to 1.2 kg/ha from each centimeter of water applied. Assuming average irrigation is 30 cm, then available nitrogen ranged from 27 to 36 kg/ha, a significant portion of the nitrogen requirement of many agronomic crops. Although the average soybean yield was 3.6 metric tons/ha, double the average yield in Georgia, the increased yield was the result of irrigation alone and not the nutrients in the irrigation water. Although the nutrient content of pond effluents may be too low to affect crop production, effluent water not useful for catfish cultivation can find application for irrigation of crops and thus reduce discharge volume. Rice irrigation with effluents of aquaculture has also been suggested.

It is important to note that even though catfish farming is the major aquaculture, there are also other aqua cultural practices like cultivation (breeding) of crawfish, shrimps, and other fresh water organisms.

The summary of the SRAC [82] publication is an examination of the impact of aquaculture pond effluent on the environment and how the use of cost reduction and yet simple management practices can help to control pollution of the environment with aquaculture effluents. These simple management practices do not require extra expense or labour. It is advocated therefore that all aquaculturists should strive to reduce the impact of their activities on the environment by adhering to the following guidelines (aquaculture management practices).

(i) Use high-quality feeds and efficient feeding practices. Feeds are the origin of all pollutants in catfish pond effluents.

(ii) Provide adequate aeration and circulation of pond water. Maintaining good dissolved oxygen levels enhances the appetite of fish and encourages good feeding conversion. Oxygen availability at bottom of ponds improves degradation of organic matter and reduces the amount of organic matter in effluent.

(iii) Minimize water exchange. Routine water exchange is of questionable value as a water quality management procedure and greatly increases effluent volume.

(iv) Operate ponds for several years without draining. Reusing water for multiple fish crops is one of the best methods of reducing waste discharge from ponds.

(v) Capture rainfall to reduce pond overflow also reduces the need for pumped water to maintain pond water levels.

(vi) Allow solids to settle before discharging water. After sieving ponds partially drained for fish harvest, hold remaining water for 2 to 3 days to allow solids settle. Better still dose not discharge this last portion of water.

(vii) Reuse water that is drained from ponds. Instead of draining ponds for fish harvest, water can be pumped to adjacent ponds and reused in the same or other ponds.

(viii) Treat effluents by using constructed wetlands.

(ix) Use effluents to irrigate terrestrial crops. Under certain conditions, the water discharged from ponds may have value as irrigation water for crops.

10.7. Biocatalysts. By using well-established tools from metabolic engineering [83] and biochemistry [84], efforts have been made on engineering microbes to function as "designer biocatalysis," in which certain desirable traits are brought together with the aim of optimizing the rate and specificity of biodegradation. Therefore, enzymes extracted from naturally occurring microorganisms, plant and animals can be used biologically to catalyse chemical reactions with high efficiency and specificity. Compared to conventional chemical processes, biocatalytic processes usually consume less energy, produce less waste, and use less organic solvents (that then require treatment and disposal) [77].

Microbial industrial production of enzyme involves a lot of aerobic steps within a submerged culture in a stirred tank reactor. The enzyme biochemistry is driven by transcription, translation, and molecular mass, number of polypeptide chains, isoelectric point, and degree of glycosylation, such as a saccharide's reaction with a hydroxyl or amino group