

# PRESKO PLC



**Presko Plc**

RC 174370

**ENVIRONMENTAL IMPACT ASSESSMENT OF PROPOSED EXPANSION  
AND DEVELOPMENT OF OIL PALM ESTATES AT OBARETIN AND OLOGBO,  
EDO STATE AND COWAN, DELTA STATE AND EXPANSION OF  
FACTORY AT OBARETIN ESTATE**

**FINAL REPORT**

**MAY, 2004**

SUMMARY

# ENVIRONMENTAL IMPACT ASSESSMENT

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SUMMARY

# EXECUTIVE SUMMARY, ES

## **ES 1.0 The Proponent, Project Proposal and Location**

Presco Plc, a public liability company, proposes to :

- (a) cultivate and manage oil palm plantations at
  - (i) Ologbo forest covering an area of 6000 ha in a lowland secondary rainforest, in Edo State,
  - (ii) a strip of freshwater swamp forest of approximately 1450 ha bordering Ossiomo river at the existing Obaretin oil palm estate, Edo State
  - (iii) freshwater swamp forest, following farmlands and bushes at different locations, north, west, east and south, collectively covering 1852 ha at the existing Cowan estate, Delta State.
- (b) expand the facilities and capacities of the oil mill, refinery, fractionation plant, and sludge/storage tanks at the Obaretin estate. The capacities and production will be approximately doubled.

## **ES 2.0 EIA Study Procedure**

The EIA study was carried out after due consultation with the Federal Ministry of Environment, FMEnv, and in accordance with the Ministry's procedural guidelines, and Terms of Reference (TOR) and scope of work, approved by the Ministry.

## **ES 3.0 Verification by the FMEnv**

The FMEnv visited the existing and proposed Presco's estates in November 2002 in order to verify proposals and statements in Presco's application for an environmental impact assessment study.

## **ES 4.0 Period of EIA Study**

Field data gathering for scientific studies of the existing environment was carried out in October 2002 for wet/rainy season study and February 2003 for dry season. Stakeholders were consulted from September 2002 to March, 2003.

## **ES 5.0 Consultation with and Participation by Stakeholders**

### **5.1 Identified Stakeholders**

Stakeholders identified were

- Federal Ministry of Environment, FMEnv, Abuja, Warri and Benin City
- Edo State Ministry of Environment and Solid Minerals, ESMESM.
- Delta State Ministry of Environment, DSMEnv.
- Communities: Uroho I, II and III; Obagie; Ologbo; Ajagbodudu – Oghara
- Forestry Association of Nigeria
- Non-Governmental Organizations, NGOs : Nigerian Conservation Foundation, NCF and Palm Oil Producers Association of Nigeria, POPAN.

- Ikpoba-Okha and Ethiope West Local Government Councils
- Federal Department of Forestry, Benin City
- Forestry Department, Edo State Ministry of Agriculture and Natural Resources, Benin City.

## **5.2 Objectives**

- To inform and educate stakeholders on details of the project, its justification, discuss the scope of study and the project's potential and associated environmental impacts, and obtain their views and comments.

## **5.3 Results of Consultations**

- Federal Ministry of Environment has carried out an initial environmental examination IEE and a site verification of project and its locations and activities.
  - Communities have raised some issues and concerns shown in Table 4.1 of the report.
- (i) Uroho and Obagie communities wanted to be reassured that none of their farmlands were to be used for the plantation's expansion at the Obaretin estate
  - (ii) Ologbo Youths Association only (and not the Ologbo elders, the Enogie and the Community Relations Committee) wanted the former Ologbo Forest Reserve to be reverted and given back to the Ologbo community first upon its being dereserved by the Edo State government. The project was supported by the other groups.
  - (iii) The project was fully supported by all sections of the Oghara – Ajagbodudu community.
  - (iv) All communities requested that Presco Plc employ a substantial number of their teeming unemployed youths, provide electricity and roads and give scholarships to secondary and tertiary students.
  - (v) The Ajagbodudu – Oghara community wanted Presco to revive/reactive the Cowan estate oil mill and provide teachers for its primary school.
  - (vi) A summary of the communities' assessment of the likely environmental impacts of the project was that the impacts would largely insignificant adverse impacts except for wildlife at the Ologbo forest.

## **ES 6.0 Project Justification**

### **6.1 Need for the Project**

Proposed project will

- meet Presco's projected production target and become Nigeria's largest integrated oil palm company
- enable the company to maximize existing operational facilities
- provide economic gains to Company and its shareholders



- enable Company meet its financial responsibilities and commitments including those to host communities
- provide employment opportunities to Nigerians
- contribute to Nigeria's economy

## **6.2 Envisaged Sustainability**

- Presco Plc is now a Public Liability Company quoted in the Nigerian Stock Exchange.
- The Company raised over N800m for the project through sales of shares to the public.
- With adequate maintenance, the oil palm plantations can exist for many decades, even centuries.

### **ES 7.0 Relevant Environmental Laws, Acts, Regulations and Edicts.**

The following apply to the proposed project:

- National policy on environment (FEPA, 1989)
- National guidelines and standards for environmental pollution control in Nigeria (FEPA, 1991)
- National effluent limitations regulations S.I.8 (FEPA, 1991)
- National pollution abatement in industries and facilities generating wastes regulations S.I.9 (FEPA, 1991)
- Waste management and hazardous wastes regulations S.I. 15.
- Environmental impact assessment Act 86, 1992
- Environmental edicts of Delta and Edo States' Ministry of Environment/ Environmental Protection Agencies
- Edo State Environmental and Waste Management Board edicts/mandate
- Local government council mandates on environmental sanitation and solid waste management
- Nigerian Landuse Act, 1978
- Forestry Laws of Nigeria
- The Nigerian Urban and Regional Planning Laws
- Regulations of the Delta and Edo States' Directorate of Lands and Surveys.

### **ES 8.0 Existing Baseline Environment**

The biophysical and human socio – economic environments that might be impacted by the project were ascertained from literature review and field data gathering studies carried out in the periods indicated in ES 4.0 in dry and wet seasons 2002/2003. A total of 27 sampling stations, georeferenced with a GPS, were established including two control locations.

### **8.1 Climate and Meteorology**

Rainfall, number of days it rained, relative humidity (R. H), water deficit, temperature, wind pattern, thunderstorm occurrences and hours of sunshine for 1999 and 2000 obtained from the Department of Meteorological Services, Benin City, and monthly data of climate and meteorological statistics taken by Presco at Cowan and Obaretin estates from 1989 to 2002, were presented in the report. The proposed locations meet the climatic requirements for the establishment of oil palms in other parts of Nigeria and the world, namely, an annual rainfall of 2000 mm or more, a very short dry season, temperature of 22°C to 33°C and a daily sunshine of 5 hours or more.

### **8.2 Air Quality and Noise Level**

Automatic – reading equipment were employed to determine air quality at the proposed planting and control sites and the factory at Obaretin estate. The concentrations of SO<sub>2</sub>, NO<sub>3</sub>, Cl<sub>2</sub>, H<sub>2</sub>S, CH<sub>4</sub>, NH<sub>3</sub>, CO and CO<sub>2</sub> were all below detection limit (0.001 mg/m<sup>3</sup>) and those of particulates ranged from 0.002 to 0.0036 µg/m<sup>3</sup> showing clean, unpolluted ambient air in the locations. The noise level was less than 35 dBA. At the factory up to 0.058 µg/m<sup>3</sup> of suspended particulate matter (spm) and noise levels above 100 dBA were obtained. There were appreciable levels of CO (up to 5 ppm) in the wet season only.

### **8.3 Geology and Geomorphology**

Ologbo, Cowan and Obaretin estates are at the southern end of the south-dipping Tertiary Fasc/Scarp of Benin geological formation. Cowan estate is also at the northwestern boundary of the Niger delta. The Benin scarp/fasc consists of sedimentary, unconsolidated, coarse – textured sandstones with cross-and falsely interbedded layers of fine-grained massive clay. The overlying soils are Acid/Benin Sands, are acidic (pH 4.8 to 6.8), loose-grained, sandy with reddish brown topsoils overlying a featureless, non-gravelly and porous reddish subsoil. The Niger delta geology consists of the Agbada paralic formation composed of alternating sands and shales. The overlying soils are alluvial, texture grade from sandy loam to clay loams/clay and grey in colour. They are strongly acidic with pH in range of 4.1 to 4.6.

### **8.4 Soil Physico – Chemical Characteristics and Microbiology**

In the Ologbo forest area and control at Uroho the subsoils were reddish brown silty sand (83.6% to 91.8% and 8.2% to 16.4% silt). Cowan estate and control site (C2) soils were grey silty sand (85.0% to 96.5% and 9.7 to 17.2% silt with much plant roots). The topsoils at the freshwater swamp forest are peaty and waterlogged in wet season with up to 87.5% water, 41.4% sand 22.4% silt and 36.2% clay.

The soil specific gravity ranged between 2.625 to 2.661, bulk density 1.648 to 1.661 mg/m<sup>3</sup>, permeability 2.3 to 5.50 x 10<sup>-6</sup> ms<sup>-1</sup> at Cowan estate and control C2 and 7.1 x

$10^{-6} \text{ ms}^{-1}$  at Ologbo and control C1. The soils at Ologbo had pH 4.8 to 5.3 and those of the swamp forest at Obaretin and Cowan estate were 5.5 to 6.5.

The exchangeable cations and nutrients concentrations were in normal ranges for tropical lateritic and deltaic alluvial soils. There were no Hg, Pb, V in the soils. Soils were rich in micro – organism species diversity but the percentage of hydrocarbon utilizing micro – organisms was less than 0.001% showing that there were no chronic pollution from oil and grease/hydrocarbons in any of the proposed planting areas.

### **8.5 Vegetation and Forestry**

The vegetation at the proposed Ologbo oil palm estate was secondary (disturbed) lowland tropical rainforest with many species of timber – yielding trees, with a variety of high forest, under-storey, small trees and shrubs, herbs and lianes species. Logging activity was high. The proposed plantation location at Obaretin and at some of the northern and southern parts of Cowan estate had a vegetation of dense freshwater swamp forests, dominated by raffia palms, also with many timber – yielding tree species. There were farmlands and fallowing areas at the outer fringes of Ologbo forest. Most of the Cowan estate other plantable areas were fallowing farms, bushes and rubber plantations. In all, a total of over 80 plant species were observed in all stations combined showing very high species richness present in the study area. There were no IUCN Red-listed categories of threatened, endangered, rare and endemic plants, medicinal and economic crops.

### **8.6 Terrestrial Fauna and Wildlife**

A total of over 85 terrestrial invertebrate fauna were taken or observed in all stations combined; the most diverse in species richness were butterflies, beetles, bugs and spiders. The wildlife recorded consisted of 6 amphibian, 15 reptilian, 30 avian and 26 mammalian species. Mainly mona and green monkeys, squirrels, mongeese, giant rats, diverse mice species and grass cutters were the commonly observed mammals in day time. No gorilla was observed, though the Ologbo people claim that there are at the Ologbo Forest.

No IUCN Red listed endangered, rare and endemic species were present in the study area. However, several wildlife listed in the Federal Government Decree No. 11, 1985 which prohibit international trade and traffic on them were present in the freshwater swamp forests and at the Ologbo forest. The decree is in response to the Convention on International Trade on Endangered wild species of fauna and flora (CITES).

## **8.7 Aquatic Biology**

### **8.7.1 Water Chemistry**

The quality of water from the Ossiomo, Ogba, and Ethiope rivers and the streams in Ologbo forest and Cowan estate were good. The waters were clean and unpolluted. The pH was alkaline, values of 7.3 to 7.5 in wet season.

The rivers were freshwater. In wet season salinity varied salinity varying from 0.02 to 0.05 ppt and conductivity 0.17 mScm<sup>-1</sup> to 0.30 mScm<sup>-1</sup>. They had moderate concentrations of dissolved oxygen (4.8 to 5.6 mg/L), zero mg/L oil and grease, biological oxygen demand (BOD<sub>5</sub>) varying from 5.8 mg/L to 9.1 mg/L, 9.0 to 18.0 mg/L for total dissolved solids (TDS), 8.5 to 12.5 mg/L for total suspended solids (TSS), negligible levels of nitrates (0.07 mg/L), phosphates (0.02 to 0.09 mg/L) and sulphates (0.88 to 2.8 mg/L) and no faecal coliform bacteria. Ethiope water was clear and colourless, those of Ogba and Ossiomo rivers were light brown. The Cowan estate streams were very clear/transparent and colourless while those in the Ologbo forest reserve were 'black water'. The concentrations of exchangeable cations showed Na > K > Ca > Mg. The levels of Cu, Fe, Mn and Zn in the rivers were low.

In dry season the rivers did not overflow the banks as in wet season. The pH was more constant (7.0 and 7.1), salinity 0.03 to 0.05 ppt, slightly higher conductivity 0.21 to 0.31 mScm<sup>-1</sup>, lower dissolved oxygen 4.2 to 5.1 mg/L and BOD<sub>5</sub> varying from 3.48 to 6.29 mg/L, no oil and grease, and no faecal coliforms. Dry season concentrations were generally higher than those of wet season. Mercury, Pb, Ni and V were not detected below 0.001 mg/L. The streams except one in Ologbo forest and most of the freshwater swamps were completely dry in January and February (the dry season).

### **8.7.2 Sediments Characteristics**

The sediments of the three rivers were sandy – Ossiomo river at Obaretin 89%, at Cowan 97.4%, Ethiope river 90.9% and Ogba river 99.0% - with little silt and low levels of inorganic nutrients and no oil and grease/hydrocarbon contamination. Sediment exchangeable cations and heavy metals concentrations were similar and comparable to those of the river water.

### **8.7.3 Water and Sediment Microbiology**

Although there was a high variety of heterotrophic micro-organisms, the percentage of hydrocarbon utilizing bacteria (HUB) was less than 0.001%

### **8.7.4 Benthic Fauna**

A total of 24 macrobenthic fauna were taken in all stations combined consisting of water beetles, bugs, midge larvae, dragon fly nymphs, caddis and stoneflies, shrimps



and crayfish, freshwater snails, tadpoles, minnows, and some elephant snout fish. All these species except midge larvae are normally found in clean unpolluted freshwater.

#### **8.7.5 Plankton**

There were a total of 47 phytoplankton and only 3 zooplankton species recorded in all three rivers combined. There were 31 diatom species and only 9 of blue – green algae suggesting clean unpolluted waters. There were 5 species of green algae and 2 euglenoids, Ossiomo river at Obaretin had the highest species variety and density.

#### **8.7.6 Fishery Resources**

The rivers, streams and freshwater swamp forests were very rich in finfish species ranging from barbs, butterfly fish, carps, catfish, elephant snouts, gymnarchids, minnows, moonfish, mormyrids in particular, perch, pike, puffer fish, snake head, snakefish to schilbeids. The shellfish were the purple crab, prawns, crayfish, shrimps and freshwater snails. The major fishing gear used in the area were cast nets, gill nets, longlines, rod and hooks, hand-held baskets, basket traps and pond bailing.

#### **8.8 Landuses**

There are built – up areas / settlements, various private oil palm estates and rubber plantations, petroleum / oil prospecting companies, dereserved forest reserves (Gilli Gilli, Ologbo, Obaretin and Sapoba), water bodies and associated wetlands, farmlands, roads and the Benin – Sapele Express Way in the study area.

#### **8.9 Socio-Economic Environment**

The traditional administrative structure, associations and organizations, culture, religion, archaeology, demographic characteristics, occupation and income, education and literacy levels, level of other developments and infrastructure present in each of Uroho, Obagie, Ologbo and Ajagbodudu communities were presented. Obagie and Uroho communities were populated predominantly by Binis, Ologbo by a mixed balance of Binis, Urhobos (including Isokos), Itsekiris and Ika Ibo, and Ajagbodudu by Urhobos and Itsekiris. Ologbo was the most populated (14000), followed by Ajagbodudu (3102), Uroho I, II and III (1200) and Obagie (1070) the least based on projections to 2002 of the 1991 National Population Commission Census.

### **ES 9.0 Significant Potential and Associated Environmental Impacts**

9.1 The major / significant anticipated impacts at oil palm plantation cultivation and management examined and considered were:

- i. Loss of some parts of the secondary rainforest and freshwater swamp forests
- ii. loss of some economic crops and timber-yielding trees in acquired area
- iii. transformation of forests into monoculture farms
- iv. displacement of many wildlife species into adjacent forests

- v. greatly enhanced employment and income generation.
- vi. problems related to land tenure
- vii. use of chemicals, if necessary to control oil palm diseases and pests in nursery only at Presco
- viii. use of fertilizers and manure at nursery and plantation
- ix. fire hazards from accumulation of dry plant parts especially fronds
- x. rapid growth of unwanted weeds
- xi. conflicts between Presco and host communities particularly at Obagie, Ologbo and Uroho.

**9.2 The major/significant potential/impacts of factory and its expansion considered and examined were:**

- i. air pollution from boilers and generators
- ii. excessive noise levels from boilers and generators
- iii. solid wastes management from accumulation of palm fruit fibres, empty fruit bunches, nut shells, sludges/decanter oil, palm kernel cake and fly ash
- iv. factory wastewaters (palm oil mill effluents, refinery and fractionation plants boilers and generators effluents) treatment and disposal.

9.3 The potential impacts at decommissioning and abandonment of plantations and factory were also evaluated.

**ES 10.0 Alternatives Considered**

These were:

- Alternative A: No project option, which was rejected after detailed considerations
- Alternative B: Improvement in the quality of boiler gaseous emissions/purchase of a modern boiler with flue gas characteristics that will meet regulatory limits.
- Alternative C: Alternatives to Processes and Products
- Alternative D: Alternative uses of some solid by-products
- Alternative E: Efficient primary and secondary wastewaters treatment
- Alternative F: Recycling and reuse of palm oil mill effluent, POME

**ES 11.0 Environmental Management Plan, EMP**

**11.1 Existing Environmental and Waste Management Programmes at Presco**

Presco has put in place good environmental and waste management programmes. No solid waste is wasted at Presco. Highlights include:

- reuse of empty fruit bunches, fibres and nut shells as fuel in boilers
- application of boiler ash as fertilizer in plantations and sales to customers
- sale of palm kernel cake/meal to livestock feeds farmers and manufacturers
- uses of empty fruit bunches and pruned palm fronds as mulch and fertilizers in the plantations

- limiting use of commercial fertilizers and insecticide to nursery mainly. No insecticides are used in plantations. Commercial fertilizers are used sparingly in young plantations.
- constant phytosanitary supervision. Daily
  - detection, enumeration and estimation of level of infection of oil palm diseases and pests and prompt removal of affected or diseased leaves and palms.
  - use of wire netting and traps to control rodent pests.
- removal of dead oil palms to control weevils and rhinoceros beetle.
- zero burning technique during land preparation for planting
- growing of a legume cover crop early in young plantations to prevent weeds growth that compete unfavourably to young oil palms and to control soil erosion
- ring-weeding and regular manual weeding with cutlasses. No herbicides are used at Presco.
- biological/secondary treatment of oil palm effluent in a series (3) of shallow ponds
- discharge of final treated effluent on land in an oil palm block 2 km x 2 km area, about 3 - 5 km from Ossiomo river. No discharge into surface water.
- fire hazard control in plantations by regular removal of dry fronds and very wide and maintained earth roads in blocks.
- conserving the natural predator-prey cycle in plantations
- beautification of estate and factory / plant with beautiful flowers, and well trimmed lawns and planting of exotic palms.
- installation and use of solar photovoltaic (PV) electric power supply for some facilities a renewable energy resource with no waste as by-product.

#### **11.2 Proposed Environmental Management Plan EMP to be put in place**

- a. Appropriate mitigation measures preferred for each of the significant adverse environmental impacts are detailed in Table 8.4 of the report.
- b. The EMP includes the institutional capability to be put in place to implement the environmental management plan. Presco Plc shall implement its Occupational Health, Safety and Environment Policies. Certain staff such as the Company's environmental adviser, agronomist, laboratory technologist, plantation managers, and production and maintenance and Public Relations managers shall effectively implement the EMP.
- c. A proposed waste management plan at all phases for plantations and factory is detailed.
- d. An overall EMP showing adverse impacts, action that shall taken by Presco staff/officers that shall be responsible for the action, monitoring of impacts and the mitigations is detailed in the report.

- e. The EMP includes awareness and in-housing training programmes in seminars, workshops and short term courses.

### **11.3 Decommissioning and Abandonment of a Factory and an Oil Palm Estate**

Presco Plc shall

- consult and notify all stakeholders, staff and local/host communities prior to this planned phase
- adequately pay off all staff and contractors
- dispose of serviceable/unserviceable vehicles, chemicals, equipment, and property by selling them.

### **ES 12.0 Conclusion and Recommendation**

- The project shall be embarked upon in accordance with the recommended environmental management plan presented in Table 8.3 and Table 8.4 in the report.
- The local communities shall be carried along throughout the entire life of the development project. Adequate compensations on land and damaged property shall be promptly paid. The host communities shall be given preferential employment at the appropriate levels, during the project implementation. Some specific infrastructural development shall be provided.
- Presco Plc shall consider the feasibility of establishing fish culture in the more than 20 large and productive fish ponds at Cowan estate or supporting / enhancing their productivity and yield through feedstuff supply (e.g. palm kernel cake) or other ways after due consultation with the Oghara community.

SUMMARY



# CHAPTER NINE

## 9.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

### 9.1 Project and Its Location

Presco Plc is in the process of undertaking extensive expansion programme consisting of

- a. oil palm plantation cultivation and management at two existing estates, namely, Obaretin (approximately 1450 ha) and Cowan (approximately 1852 ha) and a new estate at the Ologbo Forest (6000 ha).
- b. expansion of oil mill, refinery and fractionation plants, storage tank facilities and sludge tank and boilers at its factory at Obaretin in order to double their present capacities, and obtain greater production efficiency. Equipment to be replaced or new ones to be installed include sterilizers, stripper, digester, press, deodorizer, bleacher, vacuum plant, cooling tower, deaerator, boiler and sludge tank.

### 9.2 Consultation and Stakeholders

#### a. The identified stakeholders were:

- Federal Ministry of Environment FMEnv; who have carried out an initial environmental examination IEE and a site verification exercise of the project and examined some data related to the application for an environmental impact assessment study of the project by the Company.
- FMEnv Controllers of Delta and Edo States
- Edo State Ministry of Environment and Solid Minerals, ESMESM
- Delta State Ministry of Environment, DSMEnv (and DELSEPA)
- Department of Forestry, Edo State Ministry of Agriculture and Natural Resources
- Federal Department of Forestry, Ekewan Road, Benin City.
- Communities: Uroho I, II and III; Obagie; Ologbo; Ajagbodudu / Oghara. Meetings were held with these communities at various times in September, 2002.
- NGOs, mainly Nigerian Conservation Foundation, NCF. Edo state chapter.
- Palm Oil Producers Association of Nigeria (POPAN)

#### b. Objectives:

To inform and educate stakeholders on the proposals, justification for the project, discuss scope of the study, the potential and associated environmental impacts and obtain their views and comments.

#### c. Issues and Concerns of Communities

- The Uroho and Obagie communities needed to be assured that their farmlands were not part of the expansion programme
- The Ologbo Youths in particular were expecting that the Ologbo forest reserve should have reverted back to their community after the Edo State Government had

dereserved the forest, and that the 6000 ha to Presco was a large chunk of land which would have been available to them as farmlands.

- All communities were expecting that Presco Plc would provide some basic infrastructure in their communities to include electricity supply and roads and in the case of Ajagbodudu, reviving oil mill and providing teachers for its primary school; all communities expect Presco to increase employment of their numerous unemployed youths.

### **9.3 Existing Baseline Environment**

#### **a. Biophysical**

- The projects are located in the moist lowland rainforest ecological zone of Nigeria in the case of Ologbo and Obaretin and freshwater forest zone in the case of Cowan. Rainfall is heavy in these zones, with two peaks one in July and September. The monthly climatic data for 1999 to 2000, for Benin City were obtained for temperature, rainfall, relative humidity, number of days it rained, thunderstorms, wind pattern and sunshine hours. Data from climate and meteorological stations at Obaretin and Cowan estates for 1987 to 2000 were obtained from Presco Plc and presented in the report.
- The concentrations of SO<sub>2</sub>, NO<sub>2</sub>, Cl<sub>2</sub>, H<sub>2</sub>S, non-methane HC, NH<sub>3</sub> were all below detection limit (0.001 mg/m<sup>3</sup>) and those of particulates ranged from 0.002 to 0.0036 mg/m<sup>3</sup> showing clean ambient air. The noise level was less than 35 dBA.
- Ologbo and Obaretin geological area are within the Tertiary scarp of Benin which consists of unconsolidated, coarse-textured sandstones with cross-and false interbedded layers of fine-grained massive clay. The overlying soils are Acid/Benin sands, acidic (pH 4.8 to 6.8), loose grained, sandy reddish brown topsoils overlying a featureless non-gravelly and porous reddish subsoil. Cowan estate lies in the Benin scarp area as well as bordering the Niger delta.  
The freshwater swamp forests had muddy soils which were waterlogged and alluvial.
- Exchangeable soil cations were Na, K, Ca, Mg, Fe and Mn, Cowan estate having the lowest concentrations of these. Soil pH were all acidic. There was very low to negligible level of oil and grease; no Hg and Vi were detected.
- Although there were soil hydrocarbon degrading / utilizing micro-organisms these constituted less than 0.001 % of the total heterotrophic micro-organisms showing the absence of chronic / persistent oil pollution.
- The vegetation at Ologbo forest was a mixture of primary and secondary lowland / moist rainforest with many timber - yielding trees. Logging activity was high during the period of investigation. There were freshwater swamps and streams with 'black water' in the Ologbo forest. These were dry in dry season. The vegetation at the proposed site for planting at Obaretin was freshwater swamp forest and plam thickets 1.0 to 1.5 km wide west of Ossiomo river. Similar swamp forest and palm thickets were present in the

northern and southern parts of Cowan estate bordering on Ossiomo river at the north and Ethiope river at the south. Most of the plantable areas in Cowan estate were following farmlands, bushes, cassava farms and rubber plantations. Following farmlands and cassava and yam farms dot the outer fringes of Ologbo forest. A total of 80 plant species were identified in all stations combined.

- There were high density and high species diversity of terrestrial invertebrate fauna. Butterflies and moths and spiders had the highest species diversity of 10 – 11 each, followed by beetles, bugs and leaf insects. A total of 85 invertebrate species were taken in all stations combined. The freshwater swamp and Ologbo forest had a total of 6 amphibian species including tree frogs, 15 reptilian, 30 avian and 26 mammalian species making up the vertebrate wildlife. Mainly mona and green monkeys, squirrels, giant rats, mongeese and grass cutters were commonly observed. No gorilla was observed, though Ologbo community claims they exist in their forests.
- No IUCN Red listed endangered, threatened, rare and endemic wildlife species were present in the study area.
- The Ogba, Ossiomo, Ethiope rivers and streams at Cowan estate and Ologbo forests were clean and unpolluted with alkaline pH (7.3 to 7.4), freshwater (0.07 mScm<sup>-1</sup> conductivity), 0.02 to 0.05 ppt salinity, 4.8 to 5.6 mg/L dissolved oxygen, zero mg/L oil and grease concentration, no faecal coliforms, negligible levels of nitrates (0.07 mg/L), phosphate (0.02 to 0.09 mg/L), sulphate (0.88 to 2.8 mg/L), low BOD<sub>5</sub> (5.8 to 9.1 mg/L), total dissolved solids (9.0 to 18.0 mg/L) and total suspended solids (8.5 to 12.5 mg/L).
- The sediments of the rivers were mainly sand (92.9% to 93.2%), very low to negligible phosphate, sulphate and nitrate levels and no oil and grease.
- There were less than 0.001% hydrocarbon utilizing microorganisms in sediments.
- A total of 24 macrobenthic fauna were taken in all stations combined consisting of water beetles and bugs, midge larvae, dragon fly nymphs, stoneflies, shrimps and crayfish, freshwater snails, tadpoles, minnows and some fish such as elephant snouts. All species, except midge larvae, were pollution-intolerant confirming that the waters were very clean.
- Previous workers recorded a total of 33 phytoplankton and 2 of zooplankton species were present in all 3 rivers combined. These were 22 species of diatoms and only 7 blue – green algae were present suggesting clean unpolluted waters. In this study 47 phytoplankton and 3 zooplankton species were recorded 31 of which were diatoms.
- The rivers, streams and freshwater swamp forests were very rich in finfish species ranging from barbs, carps, catfish, electric catfish, gymnarchids, elephant snout fish, butterfly fish, minnows, moonfish, mormyrids, perch, pike, puffer fish, snakehead to snakefish and schilbeids. The shellfish were crabs, prawns, shrimps and freshwater snails.
- Landuses in the area included built up areas, other smaller oil palm estates, petroleum companies, dereserved forest reserves (Ologbo, Obaretin and Sapoba), water bodies and associated wetlands, forests, farmlands, and roads and the Benin – Sapele Express Way.



- The major socio-economic data presented were traditional administrative structures of Uroho, Obagie, Ologbo and Ajagbodudu communities; community and youths associations; culture, religion and archaeology; demographic characteristics, (population and ethnicity), occupation and income; presence of other industries, hotels and banks; education, and literacy levels and infrastructure provision. Ologbo was the most advanced, and populous. Its population in 1991 was less than 12,000, now it is about 14,000. All Uroho communities were about 900, Obagie about 1000 as at 1991 National Population Census. Obagie and Uroho were largely binis, Ajagbodudu were Urhobos and Itsekiris and Ologbo almost equal numbers of binis, Itsekiris, Urhobos and Ika Ibos.

#### **9.4 Significant Potential and Associated Environmental Impacts**

**9.4.1** The major / significant impacts at oil palm plantation cultivation and management will be:

- i. Loss of some areas of the secondary rainforest and freshwater swamp forests
- xii. loss of some economic crops and timber-yielding trees
- xiii. transformation of forests into monoculture farms
- xiv. displacement of many wildlife species
- xv. greatly enhanced employment and income generation
- xvi. fire hazards from accumulation of dry plant parts
- xvii. rapid growth of unwanted weeds
- xviii. accumulation of pruned palm fronds.

**9.4.2** The major impacts of factory and its expansion will be:

- i. air pollution from boilers and generators
- v. excessive noise levels from boilers and generators
- vi. solid wastes accumulation of palm fibres, empty fruit bunches, nut shells, sludges / decanter oil, palm kernel cake / meal, fly ash
- vii. factory wastewaters (palm oil mill effluents, refinery and fractionation plants and generators effluents) treatment and disposal.

#### **9.4.3 Other Adverse Impacts**

- conflicts with local communities particularly Ologbo, Uroho and Obagie
- decommissioning and abandonment of oil palm plantations and factory in the distant future.

#### **9.5 Alternatives Considered**

These were:

- No project option, which was rejected after detailed considerations
- Improvement in the quality of boiler gaseous emissions



- Alternatives to Factory Processes and Products
- Alternative Uses of Some Solid By – Products
- Efficient primary and secondary wastewaters treatment and disposal
- Recycling and reuse of palm oil mill effluent, POME.

#### **9.6 Environmental Management Plan, EMP**

- a. Appropriate mitigation measures were proffered for each of the identified significant adverse environmental impacts including those at decommissioning and abandonment phase.
- b. The institutional capability to be put in place to implement the environmental management plan by Presco Plc shall include strict mplementation of its Occupational Health and Safety and Environment Policies. Certain staff such as the Company's environmental adviser, agronomist, laboratory technologist, plantation managers, and production and maintenance and public relations managers can effectively implement the EMP.
- c. A proposed waste management plan at operation and maintenance phases for plantations and factory for the project is detailed.
- d. An overall EMP showing adverse impacts, action tht shall taken by Presco staff or officers that shall be responsible for the mitigation action and monitoring of impacts and the mitigations were identified and tabulated.
- e. The company's contingency/emergency preparedness for fire and snake bites hazards were noted.

#### **9.7 Conclusion and Recommendation**

- The project shall be embarked upon in accordance with the recommended and existing environmental management plan presented in Table 8.4.
- The local communities shall be carried along throughout the entire life of the development project. Adequate compensations on land and damaged property shall be promptly paid. The host communities shall be given preferential employment at the appropriate levels, during the project implementation. Specific infrastructural development shall be provided.
- Presco Plc shall consider the feasibility of establishing fish culture in the more than 22 large and productive fish ponds at Cowan estate or of supporting / enhancing their productivity and yield through feedstuff supply (e.g. palm kernel cake).