4th National Conference on Ecosystem Restoration

Water Quality Nutrients, Contaminants and Sustainable Sediment Management Session

Wastewater Management at a Rubber Processing Facility, Liberia, West Africa

Wednesday, August 3, 2011

9:10 – 9:30

Nicholas Albergo, P.E., DEE

President & CEO

HSA Engineers & Scientists, Tampa Florida

HSA ENGINEERS & SCIENTISTS

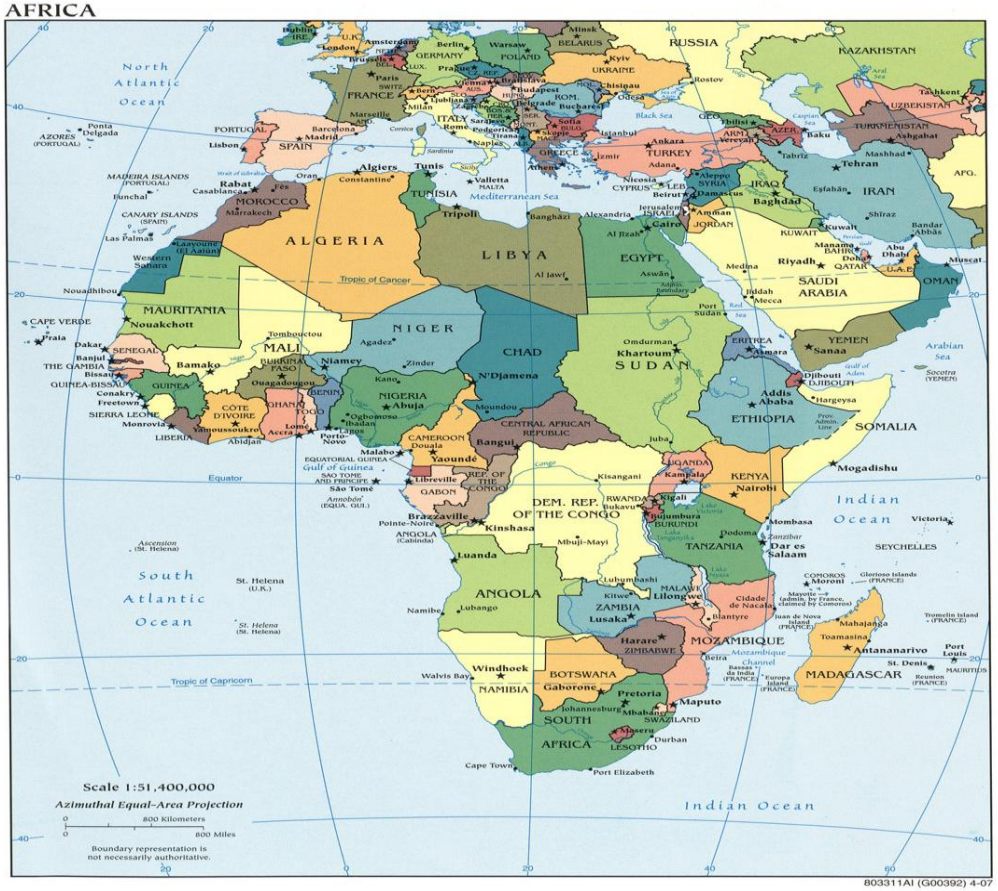
Water Quality Nutrients, Contaminants and Sustainable Sediment Management in Liberia, West Africa

Nicholas Albergo, PE, DEE President & CEO

HSA ENGINEERS & SCIENTISTS

Harbel, Liberia (West Africa)

Africa



West Africa

HSA ENGINEERS & SCIENTISTS

Raw Material Cultivation

Latex Harvesting

Rubber Storage

HSA ENGINEERS & SCIENTISTS

Sustainable Engineering
Project Objectives

1	Improving Water Quality of Farmington River
2	Separate Stormwater from Process Water
3	Utilization of Wetlands for BOD, TSS and Nutrient Treatment
4	Material Selection for Implementation
5	Power Limitations (Gravity Flow and Wetlands)
6	Utilization of Local Manpower

HSA
ENGINEERS & SCIENTISTS

Improving Water Quality of Farmington River

- ***Discharged to River for at least 80 Years***
- **COD, BOD, TSS, Nutrient Loading**
- **River Used for Fishing, Drinking Water, Bathing, cooking and Laundry**
- **Aesthetics**

HSA ENGINEERS & SCIENTISTS

Primary Wastewater

Latex Collection

Latex Processing

HSA ENGINEERS & SCIENTISTS

Secondary Discharges

Rubber Processing

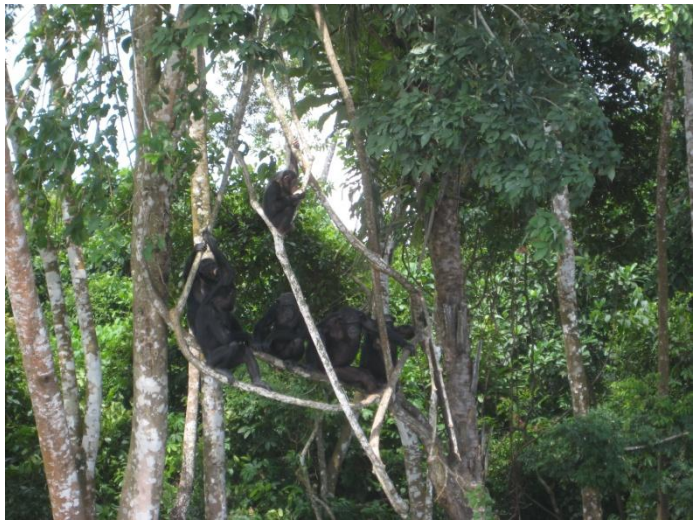
Rubber Storage

HSA ENGINEERS & SCIENTISTS

River Used for Everyday Life

Primary Goal to Eliminate Discharge to River

- Travel
- Drinking Water
- Bathing
- Cooking
- Laundry
- Swimming
- Fishing
- Hunting



HSA ENGINEERS & SCIENTISTS

Separate Stormwater from Process Water

- **Utilize Existing Collection System to Separate Flows**
  - Gravity Flow (Power Savings)
  - Less Water to Treat
- **Design and Construct Stormwater Ponds**
- **Route Stormwater to New Ponds**
- **Route Process Water to Central Location for Treatment**
- **Primary Treatment System**
  - Equalization of Flows
  - Biological Treatment (COD and BOD Reduction)
  - Sedimentation (TSS and Nutrient Removal)
- **Wetland Treament**
  - Power Savings
  - Polishing of Residual Nutirents

HSA ENGINEERS & SCIENTISTS

Existing Infrastructure

HSA
ENGINEERS & SCIENTISTS

Treatment

Primary Treatment

Stormwater Treatment

HSA ENGINEERS & SCIENTISTS

Utilization of Wetlands

- Secondary Treatment for Removal Residual Nutrients and TSS
- Reduction of Power Consumption
- Low Maintenance

HSA
ENGINEERS & SCIENTISTS

Utilization of Wetlands

- Large flat land area
- Established vegetation
- Long residence time

HSA ENGINEERS & SCIENTISTS

Material Selection

4x8 glass lined steel plates

- *Fit in shipping container*
- *Replaceable*

HDPE Pipe

- *Flexible*
- *Corrosion Resistant*
- *No Leaks*

HSA ENGINEERS & SCIENTISTS

Power Limitations

Power Generated from Hydroelectric Dam and Diesel Generators

- *Low Water in Winter*
- *Fuel Costs*

Treatment System Designed to Limit Power Consumption

- *Complete Gravity Flow for Stormwater*
- *Gravity Flow through Treatment Tanks*
- *Wetlands Treatment*

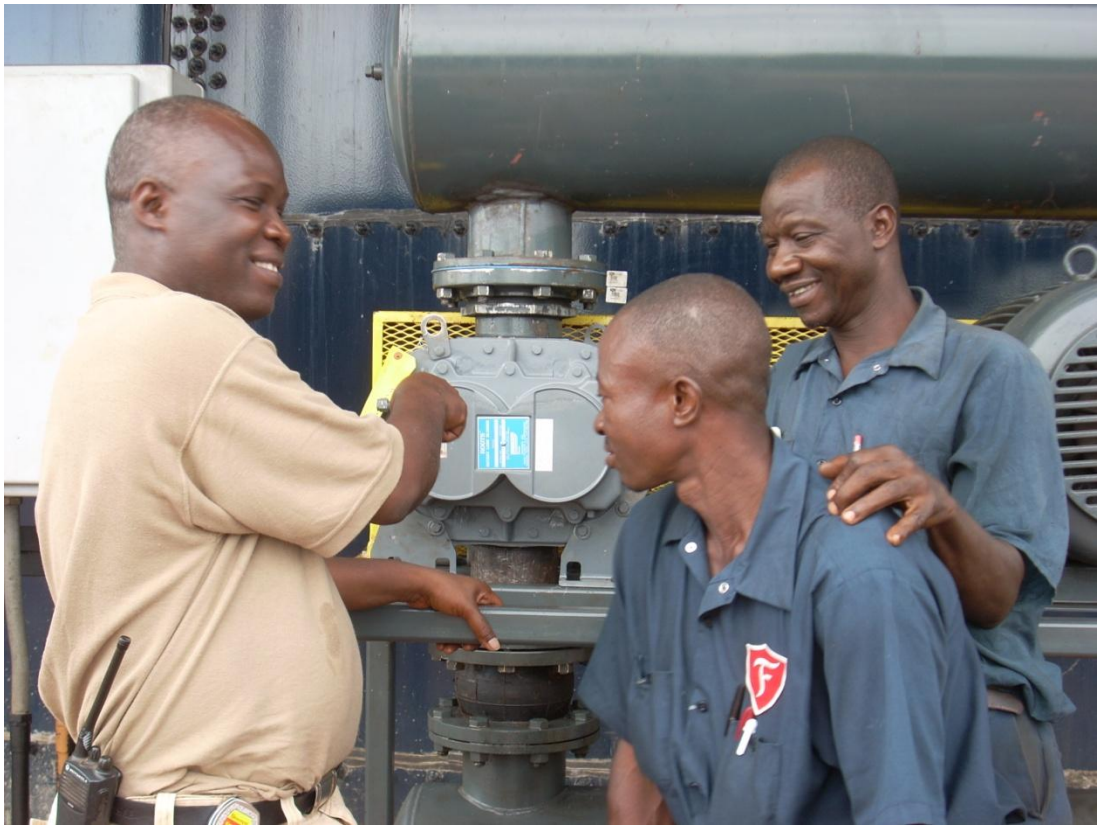
HSA ENGINEERS & SCIENTISTS

Utilization of Local Manpower

- Hired Up to 200 Local Residents During Project
- Several Residents Achieved Full Time Employment
- Influx of Money into Local Establishments

HSA ENGINEERS & SCIENTISTS

Specialized Training



Trained Selected Group with Skills for Future Employment

HSA ENGINEERS & SCIENTISTS

The Results

HSA
ENGINEERS & SCIENTISTS