

# Niger Delta case study

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Module 6b

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# Content

- Brief Details of Ogoniland
- Background to the Conflict
- UN Environment's Role & Tasks
- Key Findings
- Concluding Comments



# UNEP's Mission

1. UN Environment's assistance was requested by the President of Nigeria in 2006
2. Conduct assessment of environmental impacts associated with oilfield activities in Ogoniland, Niger Delta.
3. Provide scientific data and make recommendations for remediation of contaminated soil and groundwater
4. Provide recommendations for sustainable environmental management of Ogoniland
5. Contribute to peace building.



# Ogoniland

- Ogoniland is located within Rivers State, Nigeria.
- Kingdom of 1,000 km<sup>2</sup>
- Population of approximately one million.
- Comprises 4 local government areas.
- Oil exploration and production operations:
  - began 1950s
  - ceased 1993





# Ogoniland

- Oil facilities at 1993 closing:
  - 12 oilfields
  - 116 wells drilled
  - 5 flow stations
  - Flow station capacity of 200,000 barrels per day
  - But production was at only 20,000 bpd (some 10%).
- Today:
  - Zero production, only crude oil and product pipelines passing through Ogoniland.

# Sampling Fieldwork

- 200+ spill sites inspected
- Detailed land and groundwater investigations at 69 priority sites
- Water samples from 142 groundwater monitoring wells
- Soil from 780 boreholes
- Sediment samples collected at 37 locations
- Air quality testing at 29 villages, 2 reference sites
- More than 4,000 samples analyzed





# Soil and Groundwater Sites

Of the 69 sites studied in detail:

- 28 - near SPDC facilities.
- 2 - near NNPC crude lines.
- 34 - pipeline rights of way.
- 1 - fly tipping site.
- 1 – Oil bunkering / artisanal refining site.

# Analyses

## Process

1. Samples collected following internationally-accepted procedures.
2. Proper chain of custody.
3. Dispatched for analysis to accredited (ISO 17025) laboratories in Europe.





# Analyses

- Primarily looking for hydrocarbons the most important:
  - BTEX (benzene, toluene, ethylbenzene and xylenes).
  - PAHs (polycyclic aromatic hydrocarbons).
- Measured as total petroleum hydrocarbons (TPH).
- Air quality: volatile organic compounds (VOCs) and particulate matter.



# Community Involvement

- More than 250 formal community meetings organized.
- Attendance > 23,000 people.
- Input of local knowledge of oil spill sites.
- UNEP Community Liaison Assistants based in each LGA



# Viewing of Ogoniland Videos

# Findings



# Findings

- Contamination in Ogoniland and surrounding creeks is severely impacting many parts of environment.
- Concerns over viability, productivity of ecosystems.
- Serious health risks to thousands of community members.
- Restoration: 25-30 years.



# Soil Contamination

- Pollution by petroleum hydrocarbons is extensive in soil, sediments and swampland.
- Mostly from crude oil (refined product at 3 locations).
- Importantly, areas which appear unaffected on surface often found to be heavily contaminated underground.
- In 49 cases, hydrocarbons in soil at depths of at least 5 m



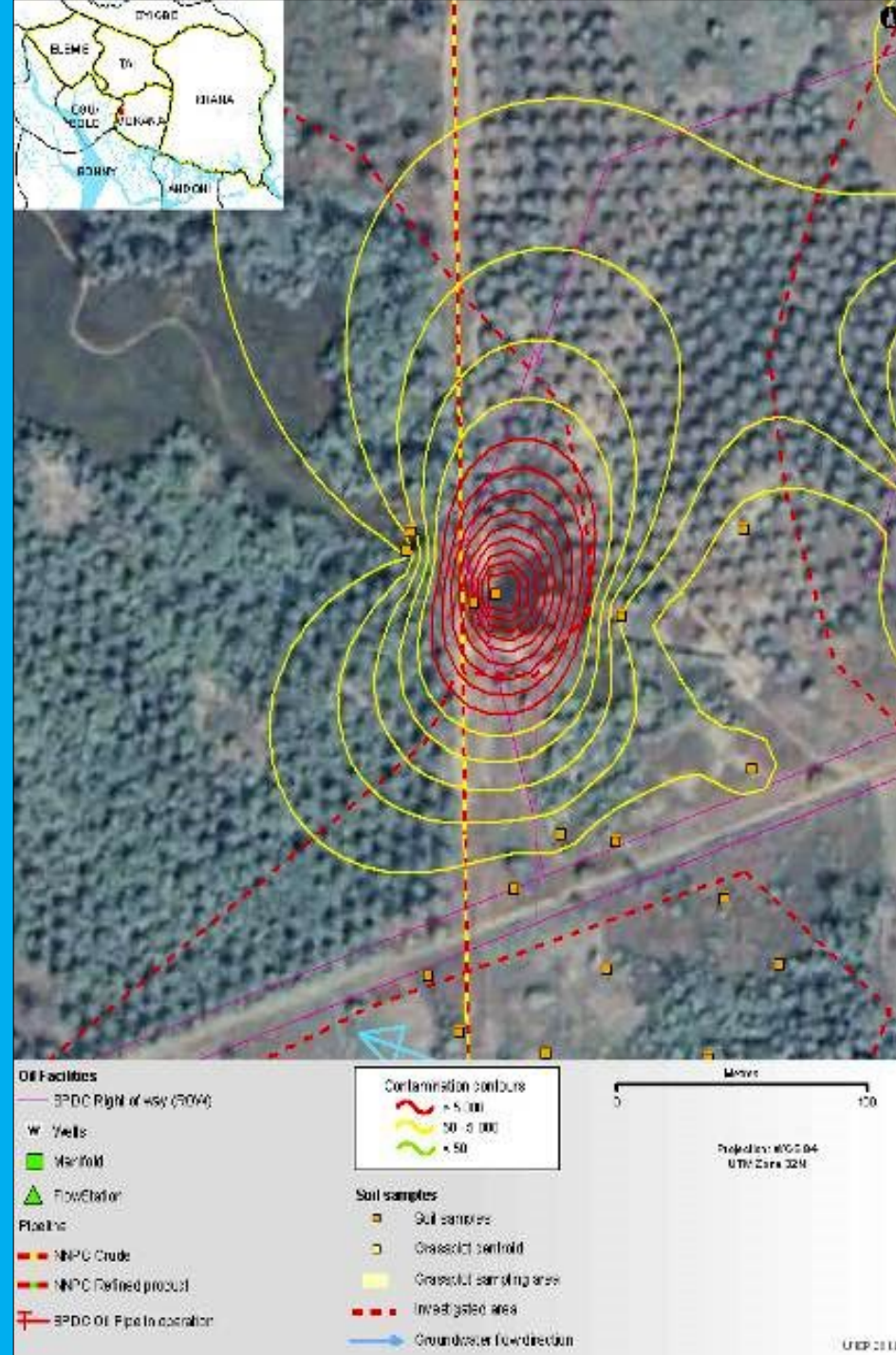


# Groundwater

- At 41 sites, pollution has reached groundwater and exceeds EGASPIN (600 ug/l)
- Most serious case is Nisisioken Ogale:
  - 8 cm layer of refined oil floating on groundwater which serves wells.
  - Water in wells contains benzene at over 900 time WHO standard.
  - Benzene:  $C_6H_6$ , colourless, very flammable, sweet smell (typical in service stations) – highly carcinogenic.
  - Source: local refinery.

# Example: K.Dere

- Contamination depth – 5 m.
- Highest soil concentration (TPH) = 32,500 mg/kg.
- Volume of heavily contated soil (>5,000 mg/kg) = 5,000 m<sup>3</sup>.
- Volume of light contaminated soil (>50 mg/kg) = 27,000 m<sup>3</sup>.
- Level of groundwater contamination – 5,650 ug/l (EGASPIN = 600 ug/l).
- Contamination of nearby rivers – yes





# Vegetation

- Root crops were unusable in areas directly impacted by oil spills.
- When farming recommences, plants can show signs of stress with lower yields.
- Oil-related fires kill vegetation.
- Crust makes remediation or re-vegetation difficult



# Surface water



- Surface water throughout the creeks contains hydrocarbons.
- Oil present on water bodies in most creeks most of the time.
- Thin sheen to thick layers.
- Water used for bathing, swimming, fishing, drinking.



# Aquatic

- Highest reading of dissolved hydrocarbon in water column, of 7,420  $\mu\text{g/l}$ : Ataba-Otokroma.
- Fisheries sector suffering due to destruction of fish habitat and persistent contamination of creeks.
- Fish farms ruined by ever-present layer of floating oil in creeks.

# Public health

Ogoni community exposed to petroleum hydrocarbons via:

- Air;
- Polluted drinking water;
- Bathing, swimming in contaminated water;
- Walking, touching contaminated soil;
- Accidental ingestion.



# Public Health

- Community members at significant risk, particularly where benzene was found in drinking water.
- WHO guideline for benzene is 10 ug/l.
- Benzene detected in 5 drinking water wells in one area, concentrations 161 – 9,280 ug/l.
- Source – production facility.
- Warrants emergency action ahead of all other remediation efforts.



# Public Health

## Drinking water:

- Hydrocarbons found in water from 28 wells at 10 communities adjacent to contaminated sites
- Values range from 11 – 42,200  $\mu\text{g/l}$
- 7 wells: samples at least 1,000 times higher than the Nigerian drinking water standard of 3  $\mu\text{g/l}$
- Local communities aware of pollution but continue to use water for drinking, bathing, washing and cooking as no alternative





# Poor Standards of Waste Management

- Illegal practices common.
- Lack of monitoring and enforcement.
- Typical material dumped is cuttings.
- In this single example, some 1,500 m<sup>3</sup> of bagged waste dumped.
- TPH = 54,300 mg/kg.
- Serious environmental and public health implications.



# Review of Government Institutions

- A number of different national and local government agencies involved.
- Lack of clarity of roles and poor coordination resulting in duplication, inefficiencies and overlap.
- Government agencies generally short of qualified technical experts, equipment and budget.
- Often dependent on oil companies to visit spill sites.
- Many spills not attended to.



# Legal Review

- Various legal instruments which were inconsistent.
- Differing interpretation of the law by differing government agencies.
- Industry manages to comply with lower standards
- No standard set for some of the most hazardous substances such as benzene.
- Standard for hydrocarbon of 3ug/l below detection limits.
- Law does not specify who should do what where standards are exceeded.





# Company Remediation of Spill Sites

- Total sites investigated - 15.
- Sites exceeding standards – 10.
- Concentration below 1m – 9.
- Concentration range (TPH mg/kg) = 7,620 – 139,000.
- Groundwater (32 ug/l to 358,000 ug/l).

# Oil Bunkering (Artisanal Refining)

- Refining of crude oil in makeshift facilities
- Illegally-obtained oil
- Ongoing and extensive in Niger Delta
- Leaves severe and disproportionate environmental footprint
- Health dangers





Thank you

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