United Nations Environment Programme

UNEP Ogoniland fact sheet

Geology of Ogoniland

People who are familiar with Ogoniland, Rivers State, know that it harbours oil pollution. The significance of the *Environmental Assessment of Ogoniland* – and the reason the Federal Government of Nigeria requested the United Nations Environment Programme (UNEP) to conduct it – is that it provides the scientific evidence on the nature, extent and impacts of oil contamination in Ogoniland.

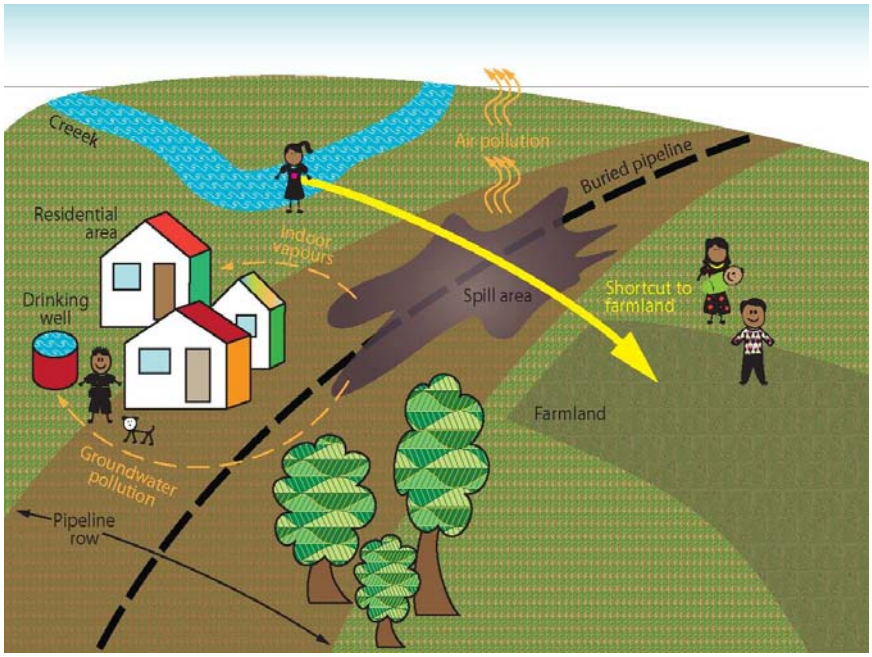
This scientific detail includes the types of polluting substances, their quantities in different locations and the geology of Ogoniland and how it affects the migration or spread of oil contamination.

The geological profile of Ogoniland, including the depth and quality of groundwater, is a key factor when assessing contaminated sites. The soil type and size of the soil grains and their distribution are crucial to the mobility of crude oil in soils and to the groundwater conditions that determine the spread of a 'contamination plume' which can result when hydrocarbons are released in water.

Contamination footprint

The diagram shows how the study set out to identify the geographical extent of hydrocarbon migration around an oil spill site, in this case on land. When oil is spilled on the land from a pipeline or oil well, it will generally run down the natural slope, evaporate or percolate into the ground.

An important observation in the UNEP report is that because Ogoniland has high rainfall, any delay in cleaning up an oil spill leads to oil being washed away, traversing farmland and almost always ending up in the creeks.



In this way, contamination from the land will continue to migrate towards the creeks. This has implications for the sequence of remediation to be carried out.

Due to the dynamic nature of the environment there is a risk of the pollution footprint spreading further. According to the report, the clean-up of Ogoniland should therefore commence with minimum delay.

Soil

The soil structure of Ogoniland has a major bearing on the extent to which pollution can penetrate below ground and migrate downwards. It was assumed in the past that there was a layer of clay in Ogoniland which protected community drinking water from oil pollution. Therefore, the oil clean-up approach in Ogoniland was to target the surface layers only.

However, based on the data from 780 boreholes gathered as part of UNEP's assessment, the soil properties in Ogoniland can be described well. The main observation is that there is no continuous clay layer across Ogoniland and hydrocarbons spilled on the surface can easily move downwards.

In 49 cases, UNEP observed hydrocarbons in soil at depths of at least 5 metres. This finding has major implications for the type of remediation required.

Groundwater

The region's population depends on aquifers below ground for their drinking water. The protection of this groundwater supply is therefore vital. The geological profile of Ogoniland indicates there is only one aquifer, which is being tapped by both shallow wells and deeper boreholes. Ogoni communities typically construct open, hand-dug wells and then withdraw the water either manually or with pumps.

UNEP drilled 180 groundwater monitoring wells in Ogoniland as part of the assessment process. The shallowest observed water level was 0.7 metres below ground level while the deepest was 14 metres below the ground.

The report has found that the Ogoni community's drinking water sources can be exposed to pollution from hydrocarbons spilled on the surface. Hydrocarbons were found in drinking water sampled from 28 wells in 10 communities adjacent to contaminated sites. Local communities said they are aware of the pollution but continue to use the water as they have no alternative.

In some of the contaminated locations, communities drill deeper wells, even up to 50 metres deep, in search of clean water. However, the UNEP assessment found that this approach is not a long term solution as the act of drilling deeper can inadvertently cause the contamination to spread vertically, faster.

More information

The *Environmental Assessment of Ogoniland* report is available at: **www.unep.org/nigeria**

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