

Nigerian communities demand end to gas flaring

Leslie Bienen

Environmental Rights Action (ERA)/Friends of the Earth Nigeria has released a report, co-drafted by the Climate Justice Program, calling for an end to gas flaring in Nigeria. Several communities across the Niger Delta, where gas flaring is common, have also filed a law suit against the Nigerian government, the Nigerian National Petroleum Corporation, and several multinational oil companies (Shell, Exxon, Chevron, Total, and Agip) in an attempt to stop this practice. Multinationals account for 95% of Nigeria's oil production.

Flaring refers to the burning or venting of the associated gas (AG) that is released during crude oil extraction. Peter Roderick (co-Director, Climate Justice Programme, London, UK) explains that flaring, as opposed to reinjecting or usage, enables the oil to be processed more quickly, but notes, "Burning the gas leads to particulate emissions and by-products or unburned components



Courtesy of P Roderick

Children walking past the Shell flare at the Obigbo oilfield near Port Harcourt.

such as sulfur dioxide, dioxins, and benzene. It also contributes significantly to global warming. Either CO₂ is produced or, as often happens if the gas is simply released without being burned, methane."

Nigeria banned flaring in 1984, but oil companies take advantage of a loophole that allows flaring to be done by "ministerial consent". While it is difficult to determine exactly how much gas is flared, a 2004 World Bank report stated that Nigeria flares about 75% of its production, or roughly 2.5 billion ft³ of gas per day. Despite previously referring to gas flaring as consti-

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tuting some of the worst "environmental neglect" in Africa, last year the World Bank failed to insist that companies use AG, instead of flaring or venting it, before receiving guaranteed loans for development projects.

"Gas flaring is an insane waste", laments Roderick. "The annual economic loss to Nigeria has been put at US \$2.5 billion, but flaring has been allowed to continue because of corrupt politicians and companies that have traditionally seen AG as an inconvenient by-product. As a result, for decades companies have been allowed to develop oil fields without integrating the economics of oil and associated gas; doing so now requires a significant investment in infrastructure."

Shell had agreed to phase out flaring by 2008, but the company recently issued a statement saying it will not meet this goal. "The communities involved in the law suit are arguing that flaring violates their right to live in a healthy environment", continues Roderick. "They are saying, enough is enough. This would never be allowed in the developed world." ■

Priming plant defenses

Virginia Gewin

Plant pathologists are developing new products to combat costly plant diseases – by stimulating plants to protect themselves. Endophytes, microorganisms that dwell inside the plant's living tissue, do not cause any overt symptoms of disease. However, these ubiquitous organisms can play a role in stimulating different natural defense mechanisms that protect against a broad spectrum of pathogens simultaneously. Now, scientists are developing biocontrol mechanisms using bacteria and fungi capable of constantly kindling the multiple cascades of plant enzymes that create natural defense products.

Plant losses are almost equally divided among insects, weeds, and fungal pathogens. Losses to pathogens, however, have typically been harder to recoup with chemical

control mechanisms as compared to weed or insect losses. Eliminating the need for agrochemicals altogether would be even better. "If we can constantly stimulate natural defense mechanisms, we won't have to rely on chemical or biorational [environmentally friendly, organic] controls", explains Paul Backman, a plant pathologist at Penn State University (University Park, PA), adding that researchers tend to work on tropical perennial plants that require such biocontrol methods, and that "You can't spray a rainforest with chemicals". Backman has previously isolated *Bacillus* species capable of stimulating cocoa's natural defenses against fungal pathogens.

Colleagues, such as Gary Strobel of Montana State University (Bozeman, MT), are focusing their efforts on fungi capable of producing a mixture of 30 different volatile antibiotics. Found during a rainforest

expedition to Honduras, Strobel's star specimen, *Muscodor albus*, offers a way to tackle hundreds of plant diseases at once. Strobel immediately recognized the possible practical agricultural applications for the fungus, including replacement of the now-banned pesticide methyl bromide, as well as implications for medicine and industry.

Pending authorization from the US Environmental Protection Agency, Strobel's industry partner, Agraquest (Davis, CA), is planning to produce a biocontrol "tea bag" containing *M albus*. Other strategies being developed using endophytes include inoculating seed or formulating foliar sprays containing defense-inducing species.

As Strobel points out, for plant pathologists typically relegated to finding specific solutions for individual plant diseases, endophytes offer an exciting new biological mechanism to control many diseases at once. ■