

- **Project Details:**

Location:	Adjoining Naroda Industrial Area, Ahmedabad, India
Project Duration:	January 2006 – April 2008
Project Cost:	\$25,000 over two years
Implementing Partners	Concept Biotech, Vadodara
Other Partners:	Society for Environment Protection, Ahmedabad



- **Background & the Scope of the Problem:**

Muthia village lies on the eastern periphery of Ahmedabad City and borders a major industrial estate operated by the Naroda Gujarat Industrial Development Corporation(GIDC). Approximately 60,000 tons of sludge from effluent treatment plants and other untreated waste has been dumped along the boundary between the industrial estate and the village over the last decade. These hazardous wastes have leached into the groundwater, which has turned yellow/red. Monsoon rains wash and spread the contaminated sludge over wide areas.

Concept Biotech and the Society for Environmental Protection have been studying contamination in this village since 1996. Blacksmith funded the implementation of a three phase clean-up, the last phase of which is the treatment of the site with vermiculture – using worms – which concentrate heavy metals in their bodies, and reduce contamination in the soil.

- **Solution Implemented:**

Originally a site containing an estimated 150 tons of hazardous wastes had been targeted for initiating a pilot-scale intervention project. But when the project commenced, it was discovered that the dumps extended deep into the ground and needed to be excavated. Heavy machinery and equipment were hired for this purpose. Eventually nearly 3,000 tons of hazardous wastes were excavated from the project site and sent to the hazardous waste disposal facility operated by the Naroda Enviro Projects Ltd (NEPL). The costs of this lifting, which were much greater than the project could have afforded, were borne by local industry, which was a major contribution to the project.

The remaining contaminated ground was then treated with active bacterial inoculants to which five tons of vermi-castings were applied after tilling. In two phases during the monsoon season, around 1,200 litres of solution was applied. The application of worm culture was done every three months after tilling and mulching the soil.

This first plot affected by dumping has been remediated with approx. 60% reduction in select heavy metals, although another round of de-contamination was recommended. The second round of de-contamination using vermin-technology was undertaken. This year approx. 400L of EM solution was applied, followed by introduction 8 tons of vermin-cast and 40 kg worms. The result at the end of second year have proved encouraging with further reduction in the level of heavy metals.

The plot is being monitored every quarter to evaluate the effectiveness of this technology by soil testing and analysis of heavy metals in plant residue.

- **Project Metrics and Results:**

This low-cost pilot bio-remediation method has proved highly effective in managing & treating the waste dumps country-over. The technical solutions to treat toxic dumps are available and can be applicable.

Soil & Grass Sample Analysis Report

Basic soil analysis before start of project (prior to cleanup activity)

Stated Sample Reference	Top Soil layer	Sub-surface soil	Test Method
Nitrogen (%N)	0.10%	0.06%	GAFTA-2003 (method4)
Potassium (%K)	0.21%	0.13%	By Flame Photometer
Phosphorous (P)	827.34ppm	288.56ppm	AOAC-2003 (995.11)
Cadmium (Cd)	0.028ppm	0.034ppm	Atomic Absorption Spectrophotometer
Chromium (Cr)	41.28ppm	28.37ppm	Atomic Absorption Spectrophotometer

Muthia Soil Post-Clean up and treatment activity, Year 1 (2006-07)

Stated Sample Reference	Muthia Soil	Muthia Ground Water
Cadmium	>0.05ppm	< 0.10 ppb
Chromium	14.5ppm	0.90 ppm
Lead	1.13ppm	< 1.00 ppb
Nickel	8.2ppm	2.70 ppb
Zinc	Analysis not done	< 0.01 ppm

Muthia Soil after Clean up and treatment activity, Year 2 (2007-08)

Sample Reference	Muthia soil	Muthia ground water	Grass Sample
Available Nitrogen (N)	0.0045%		
Available P	0.0117%		
Available K	0.0027%		
Chromium	4.544 ppm	Not Detected	1.12ppm
Lead	Not Detected	Not Detected	0.66ppm

- **Outcomes and Follow-up:**

The successful demonstration of this project has built a confidence among the Gujarat State Pollution Control Board (the state regulatory body) to invite us to treat similar sites in Gujarat.

This project was documented by CNN International and aired across the globe in October 2007. (Ref: www.cnn.com/ecosolutions - see Archive; worms).