

FIELD SURVEY

CONTAMINATED LAND

GEOGRAPHIC INFORMATION SYSTEMS

GEOKON



GEOENVIRON

Contaminated Land

POLLUTION PREVENTION & CONTROL

RIVER MONITORING

WASTE MANAGEMENT

WATER SUPPLY

CASE MANAGEMENT

WASTE WATER

GEOENVIRON CONTAMINATED LAND

INTRODUCTION

In general, contamination of land is a result of present or past industrial activities. Getting a full overview of contaminated sites invokes the chain of sources, pathways and receptors using a multi discipline approach of historic mapping, field surveys, chemical investigations, health and safety risk assessment, legal issues, remediation planning and prioritization, and monitoring sites and recipients.

Detailed investigations imply vast amounts of data which hardly can be maintained without a system dedicated to this particular purpose. Using GeoEnviron the environmental case officer can safely store and analyze all available data contained in one system.

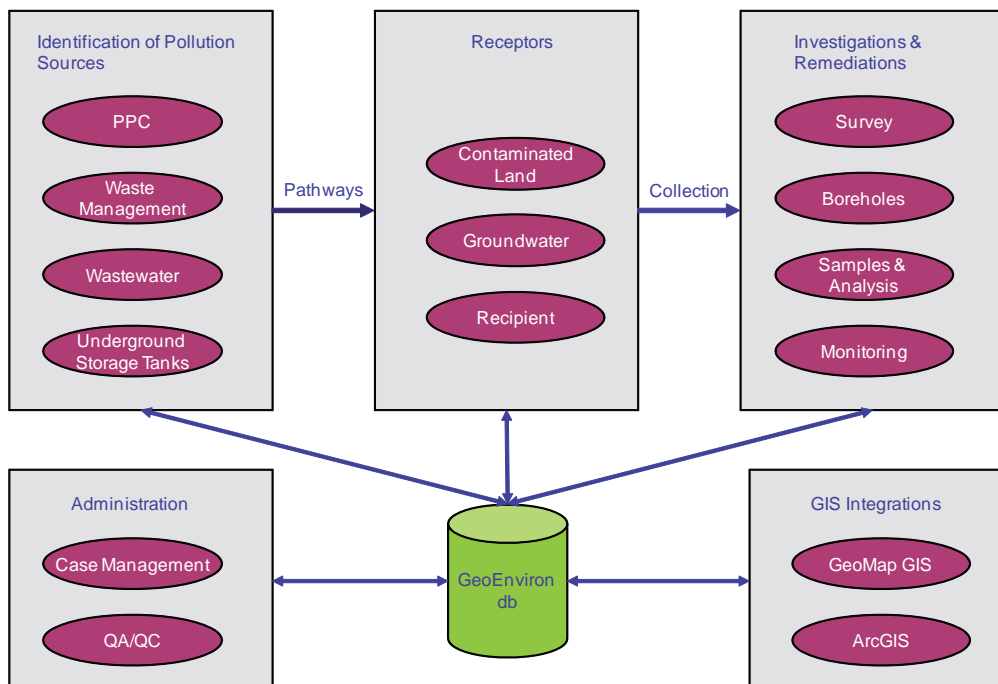
THE GEOENVIRON CONCEPT

GeoEnviron is a specialist system for the environmental case officer in public and private enterprises. It contains technical and administrative data

in a modular structure where each module covers a specific environmental discipline. All data entered in the different modules is stored in the same database, enabling the user to retrieve information across a range of disciplines.

GeoEnviron is a very flexible system which can be adapted to the customers' needs by selecting the number of modules needed to perform their tasks. In order to achieve this flexibility the system uses a set of base modules to handle administrative tasks like case and document handling, QC/QA, and GIS functionality together with more specific modules which each covers defined environmental disciplines, e.g. contaminated land, waste management, water supply, and river monitoring.

GeoEnviron is a fully scalable system ranging from a single PC application to a combined client/server and web-based solution with hundreds of users where each installation can be tailor-made by selecting the exact number of modules needed.

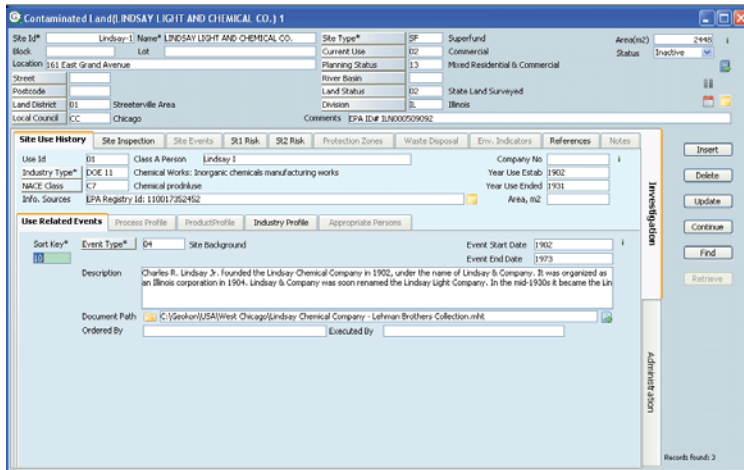


Full scale contaminated land mapping invokes the GeoEnviron modules shown on the diagram above. Using GeoEnviron one can record all the different data types in one database with access from different in house departments as well as external stakeholders for example via our web-solutions, which can be built on top of the database

THE CONTAMINATED LAND MODULE

This module is used for desk studies of potentially contaminated sites, site walkovers, risk assessment, prioritization of further investigations and remedial actions. In addition the module contains

case management, document handling, and reporting together with quality assurance facilities. Finally, the module is fully GIS supported and integrated with other GeoEnviron modules and external systems.



Using the hierarchy of tab folders all information of a preliminary site assessment can be reported in only one screen.

The purpose of the desk study is to identify the type and extent of potential contamination at a site. A preliminary site assessment should include:

- A review of existing records, such as former site use, site plans, records of any former contamination events;
- A site inspection to observe the areas used for industrial processes, abandoned materials, vegetation stress, and the general condition of the property;
- Interviews with knowledgeable people, such as site owners, employees and occupants; neighbours; local government officials; and
- A report with the assessment of the presence of contaminants at the site and other findings

THE SITE SURVEY MANAGER

This module is used for organizing and referencing all data collected during a field investigation. The Site Survey Manager is sub-divided into three sub-modules, known as Survey, Boreholes and Samples.

- The Survey sub-module provides an overview of all the surveys that have been undertaken. With a few mouse clicks you are able to produce a listing of all the boreholes, samples and analyses related to a particular site survey.
- The Borehole sub-module stores information such as the borehole location, measured elevations and depths, geology and sample details. A built-in profile generator allows you to easily create professional borehole logs.

- The Sample sub-module stores information on samples taken during the survey. Data that can be stored includes sample dates, types, location, analytical lab details, sampling methodology and sample analysis results.

Other meta-data that can be managed within the system includes digital site reports, photos and project action and progress notes.

The system's powerful querying facilities allow you to quickly and efficiently retrieve data you are interested in. In addition, powerful Import/Export facilities mean that it is an easy process getting data into and out of the system. For example, data from soil analysis can easily be retrieved and exported to Microsoft Excel for conducting statistic tests such as the mean value tests for contaminated soils or for charting.

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GEOMAP GIS

As with all GeoEnviron modules, the Site Survey Manager is fully integrated with standard GIS software including MapInfo, ArcGIS, and an inline GIS component called GeoMap based on MapInfo technology. The integrations provide a seamless two-way interaction between the GIS and the GeoEnviron database allowing you to query the map from the database and vice versa.

For example to view analysis data on a soil sample displayed on the map, you simply double click on the sample feature and the Samples sub-module will be opened up in the GeoEnviron database and the relevant data displayed. Similarly, whenever survey, borehole or sample records are retrieved in the database, they are automatically selected and centered in the GIS, allowing you to quickly visualize their location.



Screen dump from GeoMap displays a survey area with different types of contaminated and remediated sites.

POLLUTION SOURCES

Apart from the modules mentioned above three other modules are relevant when maintaining data about pollution sources. These are the Pollution Prevention and Control (PPC) module, the Waste Management module, and the module for underground storage tanks.

PPC MODULE

While the contaminated land module mainly deals with historic data, the PPC module deals with environmental assessment of running industries. Some of the headlines are listed below:

- Management of technical data on the types of installation and easy look-up of relevant process/sector guidance notes and provisions
- Maintenance of installation operational details including operating times, raw and risk phrase materials used, processes, emissions, products, storage, waste, and wastewater produced.
- Description of details of plant and equipment involved in the operation
- Management of contact details of relevant persons with e-mail and mail merge facilities to standardise letter writing.
- Management of data on fees and inspection rates to enable cost accounting.



WASTE MANAGEMENT

The waste management module, which is interconnected with the PPC module, consists of four sub-modules:

- Recording of sites (waste generators). Regulatory information - EIA, licenses, storage facilities etc.
- Recording of waste carriers (documentation of transportation). Linked to generation & treatment
- Recording of waste treatment facilities (landfills, recycling plants, incinerators). Regulatory and monitoring of waste facilities including illegal dumpsites.
- Recording of waste schemes (collection districts). Documentation of waste scheme related information

The module keeps track of waste streams from cradle to grave. The type and amount of waste can be followed from the producer over the waste carrier to the treatment facilities giving the authorities a possibility to control irregularities in the waste handling and trace illegal dumpsites.

UNDERGROUND STORAGE TANKS

A substantial amount of soil contamination is due to leaking tank systems. The Tank module of GeoEnviron allows you to describe and control tanks, oil separators, and sand traps. Tanks can be linked to sites via both the Contaminated Land module and the PPC module.

PROTECTING THE RECEPTORS

The main reason for mapping contaminated sites is to protect receptors such as groundwater, surface waters, eco systems and land use from contamination.

The possibilities of expanding GeoEnviron to include other relevant / inter-related data present another key advantage for GeoEnviron. Relevant modules for receptors may include:

- Recipient module – documentation of ambient environmental status (rivers, water quality, monitoring stations etc.)
- Water supply module – documentation of water intake, treatment plant information, water wells, samples and analyses.

RECIPIENT MODULE

The recipient module measures and controls the quality of surface waters with special respect to river monitoring and the challenges this bring. The module consists of three sub-modules:

- Catchments areas
- Rivers
- Monitoring stations

The catchment area sub-module describes location, size, population, industries and type of households within the area.

The river sub- module keeps track of a long row of information including name and position of the river, the quality goals for river sections, monitoring stations, sub-catchment areas, regulations, flushing, responsible authorities, events and cases.

The stations sub-module describes position, type, water and sediment quality, samples and analyses, pollutants in fish, molluscs, and invertebrates, degree of contamination at sampling points, and much more.

WATER SUPPLY MODULE

The Water Supply module is designed to handle data generated during the administrative and technical activities associated with the management of treated and untreated water in water works and distribution systems.

Water quality monitoring programs for example, involve taking large numbers of samples and analyzing them for a wide range of parameters over a period of time and presenting them as time series and other graphs.



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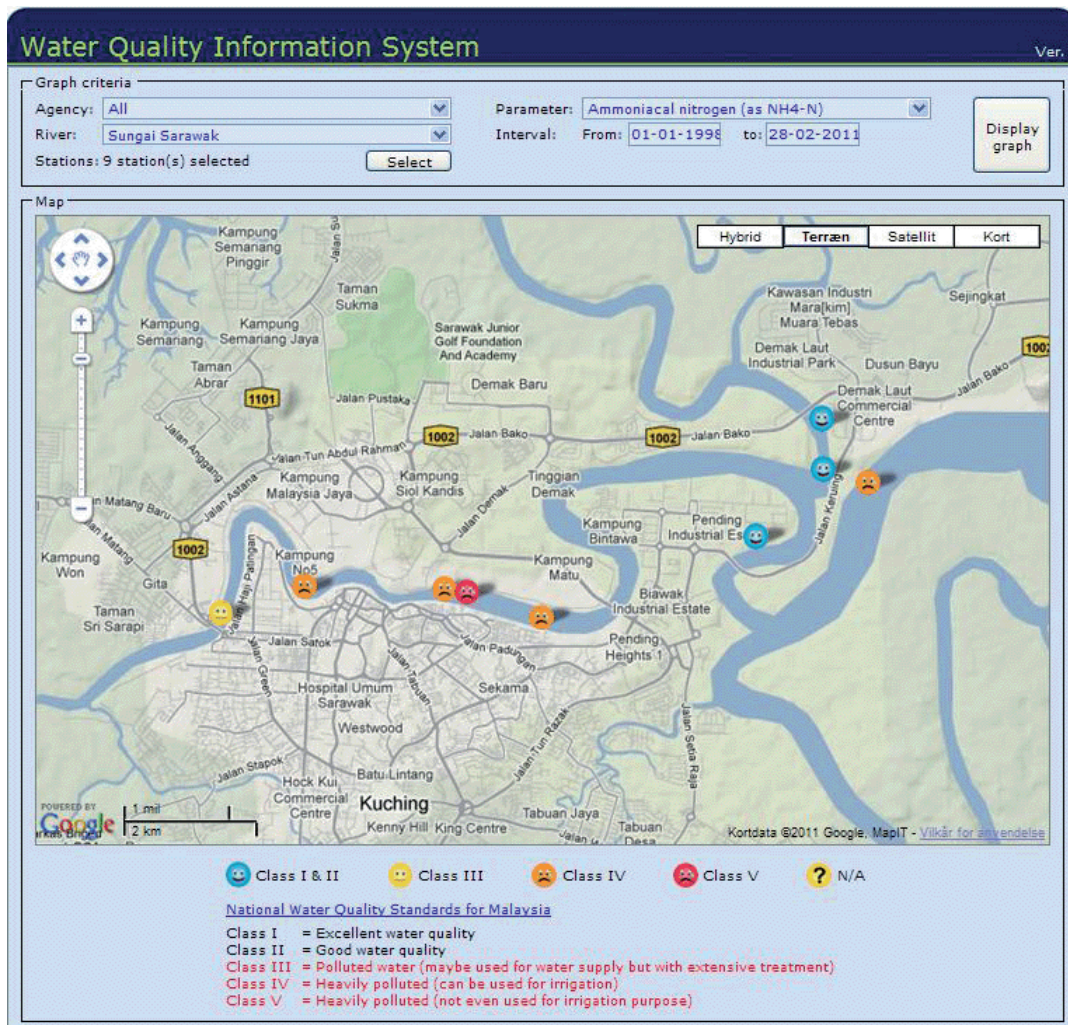
GEOENVIRON WEB SOLUTIONS

The add-on web applications address the GeoEnviron database directly and support other modules as well as giving them enhanced functionality. These modules are very valuable add-ons to make sure all the opportunities modern information technology offers are available to the customer.

The GeoEnviron web browser based solutions give the customer the opportunity to efficiently share data contained in the database with both internal and external colleagues as well as the public. This allows for information crucial to public health to be shared with the citizens through local websites. Using the web modules designed for GeoEnviron also gives the customer the flexibility of allowing

an integration of the system with a federal or municipal "e-vision". A very good example on this is our river monitoring web application in Sarawak State, Malaysia, where contaminants from industries, food outlets and landfills contributes to the pollution of rivers.

Fourteen State Agencies work together on monitoring the river, using GeoEnviron Recipient module together with the Contaminated Land module, the PPC module and the Waste Management module for tracing the pollution sources. Monitoring stations are displayed on Google Maps so the public can seek information on the river quality nearby their homes.



Monitoring stations along the Sarawak River displaying the water quality for selected parameters

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GEOKON THE COMPANY BEHIND GEOENVIRON

Geokon is an independent software house specializing in environmental data management systems for local, regional and national authorities as well as major private companies.

Established in 1971 Geokon is among the pioneers in software development in Denmark. From the very start we have been working with geosciences and environmental subjects.

The company has its base in Copenhagen, Denmark. Geokon provides software systems to environmental authorities and large industrial companies in a number of countries.



During the last 15 years Geokon has developed a very large environmental information and management system, GeoEnviron, dedicated for environmental authorities in industrialised countries.

From a solid base in Denmark with more than 2000 users GeoEnviron has expanded to cover environmental topics in a series of countries in Europe and the Far East. Today GeoEnviron is probably the most comprehensive environmental information and management system in the world and continuously expanding.

INTERNATIONAL AWARD FOR GEOKON AND GEOENVIRON

During a gala evening held by Computerworld at the Andrew Mellon Auditorium in Washington DC June 2010 Geokon was honored by a gold medal for their environmental information system GeoEnviron and selected as one of the five best providers of software in the categories environment, energy and agriculture.

The Computerworld Honors Program recognizes individuals and organizations that use information technology to benefit society. The award recipients represented ten industry and government sectors in the U.S. and worldwide.

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